

**BUILDING G1 AND IPS
ROOF REPLACEMENT
ALEXANDRIA RENEW
ENTERPRISES**



October 2021

**VOLUME 1 OF 2
FOR CONTRACT #21-024
BIDDING REQUIREMENTS
CONTRACT FORMS
CONDITIONS OF THE CONTRACT
TECHNICAL SPECIFICATIONS**

GHD Inc.
14585 Avion Parkway, Suite 150
Chantilly, Virginia



**THIS PAGE
LEFT BLANK**

TABLE OF CONTENTS
ALEXANDRIA RENEW ENTERPRISES
BUILDING G1 AND IPS ROOF REPLACEMENT
CONTRACT #21-024

	PAGES
VOLUME 1	
PART 1 – PROCUREMENT REQUIREMENTS	
00 11 10 Invitation to Bid	1-2
00 20 00 Instructions to Bidders for Construction Contract	1-10
00 41 00 Bid Form	1-8
00 43 00 Standard Bid Bond	1-2
PART 2 – CONTRACT REQUIREMENTS	
CONTRACTING FORMS	
00 52 00 Agreement	1-8
PROJECT FORMS	
00 61 00 Performance Bond	1-4
00 61 50 Standard Labor and Material Payment Bond	1-4
CONDITIONS OF THE CONTRACT	
00 70 00 General Conditions	1-82
00 80 00 Supplementary Conditions	1-4
PART 3 – SPECIFICATIONS	
DIVISION 01 – GENERAL REQUIREMENTS	
01 00 00 General Requirements	1-18
01 11 00 Summary of Work	1-4
01 15 20 Construction Security	1-4
01 26 00 Contract Modification Procedures	1-8
01 29 00 Payment Procedures	1-12
01 31 13 Project Coordination	1-14
01 31 19 Project Meetings	1-4
01 32 00 Construction Progress Documentation	1-26
01 32 33 Construction Photographs	1-4
01 33 00 Submittal Procedures	1-26
01 33 10 Document Management	1-6
01 33 29 Sustainable Construction and Reporting	1-4
01 43 33 Manufacturers’ Field Services	1-8
01 45 16 Contractor Quality Control	1-16
01 45 33 Special Inspection, Observation, and Testing	1-6
01 52 00 Contractor Facilities	1-14
01 54 50 Construction Safety	1-8

01 55 00	Vehicular Access and Parking	1-4
01 58 10	Handling, Testing, and Disposal of Hazardous Waste	1-8
01 61 00	Common Product Requirements	1-10
01 71 16	Beneficial Occupancy	1-4
01 74 00	Cleaning	1-4
01 74 19	Waste Management	1-4
01 74 23	Field Engineering	1-8
01 77 00	Contract Closeout	1-6
01 78 23	Operation and Maintenance Data	1-12
01 78 39	Project Record Documents	1-6
01 79 26	Warranties	1-4
01 88 15	Anchorage and Bracing	1-6
01 91 00	Equipment Systems Commissioning	1-12

DIVISION 02 — EXISTING CONDITIONS

02 41 00	Demolition	1-6
----------	------------	-----

DIVISION 03 — NOT USED

DIVISION 04 — MASONRY

04 01 20	Clay Masonry Restoration and Cleaning	1-10
----------	---------------------------------------	------

DIVISION 05 — METALS

05 50 00	Miscellaneous Metals	1-6
----------	----------------------	-----

DIVISION 06 — WOOD, PLASTICS AND COMPOSITES

06 10 00	Carpentry	1-6
----------	-----------	-----

DIVISION 07 — THERMAL AND MOISTURE PROTECTION

07 32 16	Concrete Roof Tile	1-8
07 54 23	Thermoplastic Polyolefin (TPO) Roofing	1-10
07 62 00	Sheet Metal Flashing and Trim	1-14
07 92 00	Joint Sealants	1-6

DIVISION 08 — OPENINGS

08 62 00	Skylights	1-4
----------	-----------	-----

DIVISION 09 TO 22 — NOT USED

DIVISION 23 — HEATING, VENTILATING AND AIR-CONDITIONING (HVAC)

23 05 29	Hangers and Supports for HVAC Piping and Equipment	1-6
23 05 53	Identification for HVAC Piping and Equipment	1-6
23 05 93	Testing, Adjusting, and Balancing for HVAC	1-10
23 07 13	Duct Insulation	1-6
23 07 19	HVAC Piping Insulation	1-10
23 23 00	Refrigerant Piping	1-6

23 31 13 Metal Ducts	1-6
23 33 00 Air Duct Accessories	1-6

DIVISION 24 — NOT USED

DIVISION 25 — NOT USED

DIVISION 26 — ELECTRICAL

26 00 00 Electrical – General	1-10
26 05 05 Electrical Demolition, Removals, and Relocations	1-4
26 05 13 Conductors	1-12
26 05 23 Grounding	1-6
26 05 29 Electrical Supports, Anchors and Fasteners	1-6
26 05 33 Raceways and Boxes for Electrical Systems	1-24

DIVISION 27 TO 31 NOT USED

DIVISION 33 TO 50 NOT USED

APPENDICES

Appendix 1 Asbestos Survey	1-36
----------------------------	------

VOLUME 2— DRAWINGS (BOUND SEPARATELY)

THIS PAGE INTENTIONALLY LEFT BLANK

PART 1

PROCUREMENT REQUIREMENTS

**THIS PAGE
LEFT BLANK**

SECTION 00 11 10
INVITATION TO BID

GENERAL NOTICE

Alexandria Renew Enterprises (Owner) is requesting Bids for the construction of the following Construction Project (Project):

BUILDING G1 AND IPS ROOF REPLACEMENT
21-024

Sealed bids will be received in the Issuing Office, Alexandria Renew Enterprises, 1800 Limerick Street, Alexandria, VA 22314, until Thursday, November 18 at 4:00 PM local time. At this time bids will be publicly opened and read aloud.

The Project includes the following Work:

Replacement of the existing Building G1 and IPS roofs, including abatement of asbestos, removal of existing Built Up Roof (BUR), including Light Weight Insulated Concrete (LWIC), temporary relocation of functional HVAC equipment. Installation of approximately 25,000 SF of Thermoplastic Polyolefin (TPO) roof, and approximately 2,790 square feet of sloped concrete tile roof, and skylight replacement.

POINT OF CONTACT

The Point of Contact for all matters is:

Maryam Zahory, Purchasing Agent
Alexandria Renew Enterprises
1800 Limerick Street
Alexandria, Virginia 22314
Phone: 703-721-3500, ext. 2207
Email: purchasing@alexrenew.com

OBTAINING THE BIDDING DOCUMENTS

Electronic copies of Bidding Documents for the Project can be found at Alexandria Renew Enterprises website <https://alexrenew.com/lets-do-business-together> and the Commonwealth of Virginia website <https://eva.virginia.gov/>.

All official notifications will be offered through the Alexandria Renew Enterprises website. The Owner is not responsible for Bidding Documents, including addenda, if any, obtained from sources other than the AlexRenew website.

PRE-BID CONFERENCE

A mandatory pre-bid conference for the project will be held virtually on Thursday, October 28, at 10:00 am. The purpose of this conference is to allow potential respondents an opportunity to present questions and obtain clarification relative to any facet of this Invitation to Bid. The pre-bid conference will be followed by an in-person site visit at 1:00 pm at Alexandria Renew

Enterprises, 1800 Limerick Street, Alexandria, VA 22314. Attendees shall arrive at the site by 12:45 pm and shall wear appropriate PPE (boots, hard hat, safety glasses, hearing protection).

Respondents attending the pre-bid meeting and/or the site visit must pre-register by sending an email with the subject: RFP 21-024 ITB Conference & Site Visit to purchasing@alexrenew.com by 4:00 P.M. EDT on Thursday, October 21. Email shall contain the firm's name and the name(s) and email addresses of: (1) the individuals who would like to participate in the virtual meeting and (2) the name of the individual who would like to participate in the tour. A maximum of (2) two people may attend the virtual meeting from each firm and a maximum of (2) two people may attend the in-person tour. All site visitors must be pre-approved. Two (2) primary and two (2) alternate names can be submitted for the site tour to allow for last minute substitutions due to unforeseen circumstances. Tour attendees must wear masks and practice social distancing.

Any prospective bidder requiring "reasonable accommodation" under the Americans with Disabilities Act, must contact the designated Point of Contact by telephone no later than 4:00 PM local time on Monday, October 25.

QUESTIONS AND ADDENDA

All questions regarding the meaning or intent of the Bidding Documents shall be submitted to the Purchasing Agent via email to purchasing@alexrenew.com. For a question to be considered, the subject line of the email must state the following: "ITB No. 21-024 Questions" Questions should be succinct and must include the submitter's name, title, company name, company address, and telephone number. Prior to the award of a contract resulting from this solicitation, potential respondents are prohibited from contacting AlexRenew staff other than the Purchasing Agent. All questions must be received by 4:00 PM local time on Monday, November 8. Any questions received after this date may not be answered.

Changes to the Bidding Documents, if any, will be in the form of formal Addenda that will be posted on the AlexRenew website. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

INSTRUCTIONS TO BIDDERS

For all further requirements regarding bid submittal, qualifications, procedures, and contract award, refer to the Instructions to Bidders that are included in the Bidding Documents.

END OF SECTION

Section 00 20 00

INSTRUCTIONS TO BIDDERS FOR CONSTRUCTION CONTRACT

TABLE OF CONTENTS

Page	
Article 1 - Defined Terms	2
Article 2 - Bids Received	2
Article 3 - COPIES OF Bidding Documents	2
Article 4 - Pre-Bid Conference	3
Article 5 - Interpretations and Addenda.....	3
Article 6 - Bid Security	3
Article 7 - Contract Times	4
Article 8 - Substitute and “Or Equal” Items	5
Article 9 - Subcontractors, Suppliers, and Others.....	5
Article 10 - Preparation of Bid.....	6
Article 11 - Basis of Bid	7
Article 12 - Submittal of Bid	7
Article 13 - Modification and Withdrawal of Bid	8
Article 14 - Opening of Bids.....	9
Article 15 - Bids to Remain Subject to Acceptance	9
Article 16 - Evaluation of Bids and Award of Contract	9
Article 17 - Bonds and Insurance.....	10
Article 18 - Signing of Agreement.....	10
Article 19 - Contracts to Be Assigned	10

This solicitation was issued using the Competitive Sealed Bidding procurement process as defined and authorized in the Virginia Public Procurement Act (VPPA) § 2.2-4302.1. The Contract(s) resulting from this solicitation shall be subject to the terms and conditions as set forth herein, or elsewhere in the Owner's and other applicable Laws and Regulations.

It is the Owner's intent that this Invitation to Bid (ITB) permits competition. It shall be the Bidder's responsibility to advise the Purchasing Agent in writing if any language, requirement, specification, etc., or any combination thereof, inadvertently restricts or limits the requirements stated in this ITB to a single source. Such notification must be received by Purchasing Agent no later than fifteen (15) days prior to the date set for acceptance of Bids

ARTICLE 1 - DEFINED TERMS

1.01 Terms used in these instructions to bidders have the meanings indicated in the general conditions and supplementary conditions. Additional terms used in these instructions to bidders have the meanings indicated below:

- A. *Issuing Office:* Alexandria Renew Enterprises, 1800 Limerick Street, Alexandria, VA 22314
- B. *Owner's Website:* <https://alexrenew.com/lets-do-business-together>

ARTICLE 2 - BIDS RECEIVED

2.01 Bids will be received until the date and time specified in the Invitation to Bid.

ARTICLE 3 - COPIES OF BIDDING DOCUMENTS

3.01 Bidder shall obtain a complete set of Bidding Requirements and proposed Contract Documents (together, the Bidding Documents) for the Owner's Website. *See the Agreement for a list of the Contract Documents.* It is Bidder's responsibility to determine that it is using a complete set of documents in the preparation of a Bid. Bidder assumes sole responsibility for errors or misinterpretations resulting from the use of incomplete Bidding Documents, by Bidder itself or by its prospective Subcontractors and Suppliers.

3.02 Bidding Documents are made available for the sole purpose of obtaining Bids for completion of the Project and permission to download or distribution of the Bidding Documents does not confer a license or grant permission or authorization for any other use.

3.03 All Addenda issued by the Owner will be available through the Owner's Website.

3.04 Electronic Documents

- A. When the ITB or Bidding Requirements indicate that electronic (digital) copies of the Bidding Documents are available, such documents will be made available to the Bidders as Electronic Documents in the manner specified, typically in Adobe PDF.

- B. All Electronic Bidding Documents will be subject to the same limitations set forth in 3.01 and 3.02 above.

ARTICLE 4 - PRE-BID CONFERENCE

- 4.01 A mandatory pre-bid conference will be held at the time and location indicated in the Invitation to Bid. Representatives of Owner and Engineer, if applicable, will be present to discuss the Project.
- 4.02 Questions received at the pre-bid conference may be answered verbally. However, oral statements may not be relied upon and will not be binding or legally effective.
- 4.03 A list of attendees may be distributed as an Addendum at Owner's discretion following the pre-bid conference.

ARTICLE 5 - INTERPRETATIONS AND ADDENDA

- 5.01 Owner on its own initiative may issue Addenda to clarify, correct, supplement, or change the Bidding Documents.
- 5.02 Bidder shall submit all questions about the meaning or intent of the Bidding Documents to the Owner in writing via an email to the Purchasing Agent. For a question to be considered, the subject line of the email must state the following: "ITB No. 21-024 Questions". Questions should be succinct and must include the submitter's name, title, company name, company address, and telephone number.
- A. Contact information for the Purchasing Agent is as follows:
purchasing@alexrenew.com.
- B. Prior to the award of a contract resulting from this solicitation, bidders are prohibited from contacting AlexRenew staff other than the Purchasing Agent.
- 5.03 Questions received by the Purchasing Agent less than 14 days prior to the date for opening of Bids, or later than the date specified in the Invitation to Bid may not be answered. *(The date stated in Invitation to Bid takes priority.)*
- 5.04 Interpretations or clarifications considered necessary by Owner in response to such questions will be issued by Addenda delivered through the Owner's Website as indicated in the Advertisement or ITB.
- 5.05 Only responses set forth in an Addendum will be binding. Oral and other interpretations or clarifications will be without legal effect. Responses to questions are not part of the Contract Documents unless set forth in an Addendum that expressly modifies or supplements the Contract Documents.

ARTICLE 6 - BID SECURITY

- 6.01 A Bid must be accompanied by Bid security, when required as specified on the Bid Form and the project is valued at more than \$500,000, made payable to Owner in an amount of five (5) percent of Bidder's maximum Bid price and in the form of a certified

- check, bank money order, or Bid bond issued by a surety meeting the requirements of Paragraph 6.01 of the General Conditions. Such Bid bond will be issued in the form included in the Bidding Documents.
- 6.02 The Successful Bidder will be required to provide a performance and payment bonds in the amount of 100 percent of the Contract value.
- 6.03 All bonds shall be in a form acceptable to the Owner, which may include a cashier's check, certified check, or bond executed by a company licensed to do business in the Commonwealth of Virginia as allowed by §2.2-4336 – §2.2-4338 of the Code of Virginia.
- 6.04 The Bid security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and such Bidder has executed the Contract, furnished the required performance and payment bonds, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and furnish the required performance and payment bonds within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited, not exceeding the difference between the bid for which the bond was written and the next low bid, or the face amount of the bid bond, whichever is less (§2.2-4336-C). Such forfeiture will be Owner's exclusive remedy if Bidder defaults by failure to execute and furnish the required performance and payment bonds and Contract materials as described herein.
- 6.05 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of 7 days after the Effective Date of the Contract or 61 days after the Bid opening, or the duration of effective bid submittals specified in the ITB or Request for Qualifications/Proposals, whereupon Bid security furnished by such Bidders will be released.
- 6.06 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within 7 days after the Bid opening.
- 6.07 Bid security may be waived by the Owner for contracts in excess of \$100,000 but less than \$500,000. Where a Bid security is waived, prospective bidders shall be prequalified for each project in accordance with §2.2-4317. However, Owner may waive prequalification requirements of a bidder with a current Class A contractor license for contracts in excess of \$100,000 but less than \$300,000 per §2.2-4336.

ARTICLE 7 - CONTRACT TIMES

- 7.01 The number of days within which, or the dates by which, the Work is to be (a) substantially completed and (b) ready for final payment, and (c) Milestones (if any) are to be achieved, are set forth in the Agreement.
- 7.02 Provisions for liquidated damages, if any, for failure to timely attain a Milestone, Substantial Completion, or completion of the Work in readiness for final payment, are set forth in the Agreement.

ARTICLE 8 - SUBSTITUTE AND “OR EQUAL” ITEMS

- 8.01 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration during the bidding and Contract award process of possible substitute or “or-equal” items. In cases in which the Contract allows the Contractor to request that Owner authorize the use of a substitute or “or-equal” item of material or equipment, application for such acceptance may not be made to and will not be considered by Owner until after the Effective Date of the Contract.
- 8.02 All prices that Bidder sets forth in its Bid will be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, and as supplemented by Addenda if applicable. Any assumptions regarding the possibility of post-Bid approvals of “or-equal” or substitution requests are made at Bidder’s sole risk.

ARTICLE 9 - SUBCONTRACTORS, SUPPLIERS, AND OTHERS

- 9.01 A Bidder must be prepared to retain specific Subcontractors and Suppliers for the performance of the Work if required to do so by the Bidding Documents or in the Specifications. If a prospective Bidder objects to retaining any such Subcontractor or Supplier and the concern is not relieved by an Addendum, then the prospective Bidder should refrain from submitting a Bid.
- 9.02 The apparent Successful Bidder, and any other Bidder so requested, must submit to Owner a list of the Subcontractors or Suppliers proposed for the following portions of the Work within five days after Bid opening:
- 9.03 Roof material supplier(s), Electrician, HVAC technician.
- 9.04 If requested by Owner, such list must be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor or Supplier. If Owner, after due investigation, has reasonable objection to any proposed Subcontractor or Supplier, Owner may, before the Notice of Award is given, request apparent Successful Bidder to submit an acceptable substitute, in which case apparent Successful Bidder will submit a substitute, Bidder’s Bid price will be increased (or decreased) by the difference in cost occasioned by such substitution, and Owner may consider such price adjustment in evaluating Bids and making the Contract award.
- 9.05 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 and Suppliers. A Bidder declining to make requested substitutions will constitute grounds for forfeiture of the Bid security. Any Subcontractor or Supplier, so listed and against which Owner makes no written objection prior to Notice of Award will be deemed acceptable to Owner subject to subsequent revocation of such acceptance as provided in Paragraph 7.07 of the General Conditions.

ARTICLE 10 - PREPARATION OF BID

- 10.01 The Bid Form is included with the Bidding Documents.
- 10.02 All blanks on the Bid Form must be completed in ink and the Bid Form signed in ink. Erasures or alterations must be initialed in ink by the person signing the Bid Form. A Bid price must be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.
- 10.03 If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words "No Bid" or "Not Applicable."
- 10.04 If Bidder has obtained the Bidding Documents as Electronic Documents, then Bidder shall prepare its Bid on a paper copy of the Bid Form printed from the Electronic Documents version of the Bidding Documents. The printed copy of the Bid Form must be clearly legible, printed on 8½ inch by 11-inch paper and as closely identical in appearance to the Electronic Document version of the Bid Form as may be practical. The Owner reserves the right to accept Bid Forms which nominally vary in appearance from the original paper version of the Bid Form, providing that all required information and submittals are included with the Bid.
- 10.05 A Bid by a corporation must be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation must be shown.
- 10.06 A Bid by a partnership must be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership must be shown.
- 10.07 A Bid by a limited liability company must be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm must be shown.
- 10.08 A Bid by an individual must show the Bidder's name and official address.
- 10.09 A Bid by a joint venture must be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The joint venture must have been formally established prior to submittal of a Bid, and the official address of the joint venture must be shown.
- 10.10 All names must be printed in ink below the signatures.
- 10.11 The Bid must contain an acknowledgment of receipt of all Addenda, the numbers of which must be filled in on the Bid Form.
- 10.12 Postal and e-mail addresses and telephone number for communications regarding the Bid must be shown.
- 10.13 The Bid must contain evidence of Bidder's authority to do business in the State of Virginia, or Bidder must certify in writing that it will obtain such authority within the time for acceptance of Bids and attach such certification to the Bid, or Bidder must

- provide a statement on Bidder's letterhead certifying their exemption from this requirement.
- 10.14 Bidder's State of Virginia contractor license number or a covenant by Bidder to obtain said license within the time for acceptance of Bids.

ARTICLE 11 - BASIS OF BID

11.01 Lump Sum

- A. Bidders must submit a Bid on a lump sum basis for the items as set forth in the Bid Form.

11.02 Series of Lump Sums

- A. Bidder shall submit a Bid for each lump sum item as set forth on the Bid Form, and shall compute and enter the total of all lump sum items in the space provided on the Bid Form.
- B. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the arithmetically correct sum.

11.03 Unit Price

11.04 Not Used

11.05 Total Bid Price

- A. *The Total Bid Price will be the total of all Lump Sum items plus the Total of All Unit Price Bids.*

ARTICLE 12 - SUBMITTAL OF BID

- 12.01 The required Bid Form is provided in the solicitation. One (1) fully completed Bid Form with longhand signature, and one (1) exact electronic copy of the original Bid on Universal Serial Bus (USB) flash drive or other approved media shall be submitted in a sealed envelope or package, no later than the date and time specified in the Invitation to Bid, above. Electronic files must be in MS Word, Adobe Acrobat (PDF), or Excel format. Bidders shall include a notarized statement that the electronic version is a true copy of the printed version. The exterior of the sealed envelope or package shall be clearly marked with the ITB number and title along with the name of the Bidder submitting the Bid. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED".
- 12.02 Late, unsealed, and electronic bids will not be accepted. A Bidder's failure to submit a bid with a fully completed Bid Form, using the Bid Form provided in this solicitation, shall be cause for rejection of that Bidder's Bid. A Bid will be rejected if its corresponding Bid Form is not signed in the designated space by a person authorized to legally bind the Bidder.

- 12.03 Modification of or additions to the Bid Form may be cause for rejection of the Bid; however, Owner reserves the right to decide, on a case by case basis, in its sole discretion, whether or not to reject such a Bid as nonresponsive. As a precondition to Bid acceptance, Owner may, in its sole discretion, request that the Bidder withdraw or modify any such modifications or additions which do not affect quality, quantity, price, or delivery.
- 12.04 Bids and all documents related to this solicitation submitted to Owner by a Bidder or a prospective Bidder shall, upon receipt by Owner, become the property of Owner.
- 12.05 Submission of a signed Bid Form is certification by the respective Bidder that it read the solicitation documents carefully and fully intends to comply with all the requirements stated in the solicitation or by law. Bidder further certifies that it will accept an award made to it as result of the submission.

ARTICLE 13 - MODIFICATION AND WITHDRAWAL OF BID

- 13.01 No Bid may be withdrawn after it is filed with the Owner but prior to the time set for the opening of Bids unless the Bidder makes a request in writing to the Owner prior to the time set for the opening of Bids. Requests must be delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.
- 13.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 15.01 and submit a new Bid prior to the date and time for the opening of Bids.
- 13.03 After the opening of Bids, a Bidder may withdraw its Bid from consideration if the price of the Bid is substantially lower than other Bids due solely to a mistake therein, provided the Bid was submitted in good faith, the mistake was a clerical mistake as opposed to a judgment mistake, and was actually due to an unintentional arithmetic error or an unintentional omission of a quantity of work, labor or material made directly in the compilation of the Bid, which unintentional arithmetic error or unintentional omission can be clearly shown by objective evidence drawn from inspection of original work papers, documents and materials used in the preparation of the Bid sought to be withdrawn. If a Bid contains both clerical and judgment mistakes, a Bidder may withdraw his Bid from consideration if the price bid would have been substantially lower than the other Bids due solely to the clerical mistake, that was an unintentional arithmetic error or an unintentional omission of a quantity of work, labor or material made directly in the compilation of a Bid that can be clearly shown by objective evidence drawn from inspection of original work papers, documents and materials used in the preparation of the Bid sought to be withdrawn. The Bidder must give notice in writing to Owner of a claim of right to withdraw its Bid and provide all original work papers, documents and other materials used in the preparation of the Bid sought to be withdrawn, within two (2) business days after the conclusion of the Bid opening procedure.

- 13.04 All Bids will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner, or as specified in the Invitation to Bid.
- 13.05 No Bid may withdrawn under this section when the result would be the awarding of the Contract to another Bid of the same Bidder, or in which the withdrawing Bidder has any interest.

ARTICLE 14 - OPENING OF BIDS

- 14.01 Bids will be opened at the time and place indicated in the Advertisement or Invitation to Bid and read aloud publicly. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

ARTICLE 15 - BIDS TO REMAIN SUBJECT TO ACCEPTANCE

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

ARTICLE 16 - EVALUATION OF BIDS AND AWARD OF CONTRACT

- 16.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner also reserves the right to waive all minor Bid informalities not involving price, time, quality or quantity of the Work.
- 16.02 Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to be nonresponsible. Owner may also reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Project to make an award to that Bidder.
- 16.03 If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, whether in the Bid itself or in a separate communication to Owner, then Owner will reject the Bid as nonresponsive.
- 16.04 If Owner awards the Contract for the Work, such award will be to the responsible Bidder submitting the lowest responsive Bid without consideration of proposed substitutions not specifically identified as approved in the Bidding Documents.
- 16.05 In evaluating Bids, Owner will consider whether the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.
- 16.06 For the determination of the apparent low Bidder when unit price bids are submitted, Bids will be compared on the basis of the total of the products of the

estimated quantity of each item and unit price Bid for that item, together with any lump sum items.

- 16.07 This procedure is only used to determine the lowest bid for comparison and contractor selection purposes. The Contract Price for compensation and payment purposes remains the Bid price shown in the Bid Form.
- 16.08 In evaluating whether a Bidder is responsible, Owner will consider the qualifications of the Bidder and may consider the qualifications and experience of Subcontractors and Suppliers proposed for those portions of the Work for which the identity of Subcontractors and Suppliers must be submitted as provided in the Bidding Documents.
- 16.09 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders and any proposed Subcontractors or Suppliers.

ARTICLE 17 - BONDS AND INSURANCE

- 17.01 Article 6 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner's requirements as to performance and payment bonds, other required bonds (if any), and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it must be accompanied by required bonds and insurance documentation.
- 17.02 Article 8, Bid Security, of these Instructions, addresses any requirements for providing bid bonds as part of the bidding process.

ARTICLE 18 - SIGNING OF AGREEMENT

- 18.01 When Owner issues a Notice of Award to the Successful Bidder, it will be accompanied by the unexecuted counterparts of the Agreement along with the other Contract Documents as identified in the Agreement. Within 15 days thereafter, Successful Bidder must execute and deliver the required number of counterparts of the Agreement and any bonds and insurance documentation required to be delivered by the Contract Documents to Owner. Within 10 days thereafter, Owner will deliver one fully executed counterpart of the Agreement to Successful Bidder, together with printed and electronic copies of the Contract Documents as stated in Paragraph 2.02 of the General Conditions.

ARTICLE 19 - CONTRACTS TO BE ASSIGNED

- 19.01 NOT USED

END OF SECTION

SECTION 00 41 00

BID FORM

NOTE TO BIDDER: THE FULL LEGAL NAME OF THE FIRM OR ENTITY SUBMITTING THIS BID MUST BE WRITTEN IN THE SPACE PROVIDED BELOW. THIS BID FORM, AND ALL OTHER DOCUMENT(S) REQUIRED BY THE SOLICITATION TO BE SUBMITTED WITH THIS BID FORM, INCLUDING, BUT NOT LIMITED TO ALL ISSUED ADDENDA, MUST BE FULLY AND ACCURATELY COMPLETED AND SIGNED BY A PERSON AUTHORIZED TO LEGALLY AND CONTRACTUALLY BIND THE BIDDER, OR THE BID MAY BE REJECTED.

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

ARTICLE 1—OWNER AND BIDDER

1.01 This Bid is submitted by:

LEGAL NAME OF ENTITY:	
CONTRACTOR LICENSE:	
FORMER NAMES: (Insert all other names that this entity has been known by in the past twenty (20) years)	
AGE OF THE ENTITY: How many years this entity has been in business under the current name?	
PRINCIPAL PLACE OF BUSINESS:	
TELEPHONE NO.	FAX NO.
CORPORATE WEBSITE	
DUNS NUMBER:	
FORM OF ORGANIZATION: _____ CORPORATION; _____ PARTNERSHIP/JOINT VENTURE; _____ LIMITED LIABILITY COMPANY; _____ INDIVIDUAL	
NAME OF STATE WHERE THE ENTITY WAS FORMED:	
IDENTIFICATION NO. ISSUED TO THE FIRM BY STATE CORPORATE COMMISSION (SCC): If Bidder is exempt from the SCC authorization requirement, it shall include a statement on the entity's letterhead with its application certifying their exemption from this requirement. _____	
BIDDER'S STATUS: Please initial one: _____ MINORITY OWNED; _____ WOMAN OWNED; _____ NEITHER	

1.02 This Bid is submitted to:

Alexandria Renew Enterprises
Office of the Purchasing Agent
1800 Limerick Street
Alexandria, VA 22314

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

ARTICLE 2—ATTACHMENTS TO THIS BID.

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

- A. Required Bid security;
- B. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such authority within the time for acceptance of Bids; or a statement on the Bidder's letterhead certifying their exemption from this requirement; and
- C. Contractor's license number as evidence of Bidder's State Contractor's License or a covenant by Bidder to obtain said license within the time for acceptance of Bids.

ARTICLE 3—BASIS OF BID—LUMP SUM BID AND UNIT PRICES

3.01 *Lump Sum Bids*

- A. Not Used

3.02 *Unit Price Bids*

- A. Not Used

3.03 *Total Bid Price (Lump Sum and Unit Prices)*

- A. Bidder will complete the Work in accordance with the Contract Documents for the following lump sum (stipulated) price(s):

Total Bid Price (Total of all Lump Sum)	\$
---	----

ARTICLE 4—TIME OF COMPLETION

- 4.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.
- 4.02 Bidder accepts the provisions of the Agreement as to liquidated damages.
- 4.03 The estimated time to substantial completion is 180 days.

ARTICLE 5—BIDDER’S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

5.01 *Bid Acceptance Period*

- A. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

5.02 *Instructions to Bidders*

- A. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security.

5.03 *Receipt of Addenda*

- A. Bidder hereby acknowledges receipt of the following Addenda:

Addendum Number	Addendum Date

5.04 *Assigned Goods and Services*

- A. Not used.

ARTICLE 6—BIDDER’S REPRESENTATIONS AND CERTIFICATIONS

6.01 *Bidder’s Representations*

- A. In submitting this Bid, Bidder represents the following:

1. Bidder has examined and carefully studied the Bidding Documents, including Addenda.
2. Bidder has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
3. Bidder is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
4. Bidder has carefully studied the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
5. Bidder has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been

identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.

6. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, if selected as Contractor; and (c) Bidder's (Contractor's) safety precautions and programs.
7. Based on the information and observations referred to in the preceding paragraph, Bidder agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
8. 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.
9. Bidder has given Owner written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Owner is acceptable to Contractor.
10. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
11. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

6.02 *Bidder's Certifications*

A. The Bidder certifies the following:

1. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation (as described in Code of Virginia Section 59.1-68.6 et seq.).
2. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.
3. Bidder has not solicited or induced any individual or entity to refrain from bidding.
4. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 6.02.A:

- a. Corrupt practice means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process.
 - b. Fraudulent practice means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition, or (d) any act of fraud punishable under the Virginia Governmental Frauds Act (Code of Virginia §18.2-498.1 et seq.).
 - c. Collusive practice means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels.
 - d. Coercive practice means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.
- B. The Bidder certifies and warrants that to the best of its knowledge and belief and except as otherwise disclosed, it does not have any organizational conflict of interest, which is defined as a situation in which the nature or work under the contract and the bidder's organizational, financial, contractual or other interest are such that award of the contract may result in the Bidder receiving an unfair competitive advantage, or the Bidder's objectivity in performing the contract work may be impaired. The Bidder agrees that if after being awarded it discovers an organizational conflict of interest with respect to being awarded, it shall make an immediate and full disclosure in writing to Owner which shall include a description of the action which the Bidder has taken or intends to take to eliminate or neutralize the conflict.

ARTICLE 7—TRADE SECRETS OR PROPRIETARY INFORMATION

Trade secrets or proprietary information submitted by a Bidder in connection with a procurement transaction shall not be subject to public disclosure under the Virginia Freedom of Information Act or the Virginia Public Procurement Act. However, except as provided in the Virginia Public Procurement Act, all proceedings, records, contracts and other public records relating to procurement transactions shall be open to the inspection of any citizen, or any interested person, firm or corporation, in accordance with the Virginia Freedom of Information Act. (Cost estimates relating to a proposed procurement transaction prepared by or for a public body shall not be open to inspection.) Therefore, trade secrets or proprietary information submitted by a Bidder in connection with this Bid shall not be subject to the Virginia Freedom of Information Act (§ 2.2-3700 et seq.); however, in order to invoke this protection, the Bidder shall (i) invoke the protections of this section prior to or upon submission of the data or other materials, (ii) identify the data or other materials to be protected, and (iii) state the reasons why protection is necessary. A Bidder shall not designate as trade secrets or proprietary information (a) the entire Bid; (b) any portion of the Bid that does not contain trade secrets or proprietary information; or (c) line item prices or total Bid prices.

A. Please mark one:

() **Yes**, the Bid I have submitted **does** contain trade secrets and/or proprietary information. () **No**, the Bid I have submitted **does not** contain any trade secrets and/or proprietary information.

If Yes, you must clearly identify below (attaching additional pages as necessary) the exact data or other materials to be protected and list all applicable page numbers of the Bid containing such data or materials:

STATE THE SPECIFIC REASON(S) WHY PROTECTION IS NECESSARY:

NOTE: If you fail to identify the data or other materials to be protected and state the reasons why such protection is necessary in the space provided above, you have not invoked the protection, accordingly, effectively the Bid will be open for public inspection consistent with applicable law.

ARTICLE 8—BIDDER QUESTIONNAIRE

NOTE: Use additional pages to explain circumstances, provide detailed description of the situation and full documentation if the answer to any of the questions below is “YES”.

DEBARMENT, DISQUALIFICATION AND OR SUSPENSION:

Is the entity or any of its principals are currently debarred, suspended or disqualified from submitting responses to AlexRenew, or any other state, local or federal entities? If yes, please explain the circumstances. ___ **YES**
___ **NO**

CLAIMS/FINAL RESOLUTION/JUDGMENTS:

Has any Legal Action occurred on, or in conjunction with, any project(s) performed by the Bidder, any affiliate, or their officers, partners or directors in the last five (5) years? “Legal Action” shall include civil or criminal litigation, administrative, proceedings, indictments, arbitrations or the like. If yes, please explain the circumstances. ___ **YES**
___ **NO**

TERMINATION/FAILURE TO COMPLETE:

Has the Bidder ever been terminated for work awarded to it, or failed to complete a project in the last five (5) years? This includes termination for default (or cause) or for the convenience of the owner. If yes, please explain the circumstances. ___ **YES**
___ **NO**

BREACH, DEFAULT:

Within the last five (5) years, has Bidder been disqualified, removed, or otherwise declared in material breach or default of any contract by a public agency? If yes, please explain the circumstances. ___ **YES**
___ **NO**

RELEASE FROM CONTRACT APPLICATION, BIDS OR AWARD:

Has the Bidder filed a request to be released from a solicitation, bid selection or award of any contract within the last five (5) years? If yes, please explain the circumstances. ___ **YES**
___ **NO**

FAILURE TO EXECUTE A CONTRACT:

Within the last five (5) years, has the Bidder ever failed to provide required insurance certificates, surety bonds, or other forms that resulted in it not being awarded a contract for which it had been selected for award? Within the last five (5) years, has Bidder had a bid security exercised for any reason? If yes, please explain the circumstances.

___ **YES**

___ **NO**

BANKRUPTCY:

Has the Bidder filed for bankruptcy in the last seven years, or is currently the debtor in a bankruptcy case? If yes, please explain the circumstances.

___ **YES**

___ **NO**

BIDDER hereby submits this Bid as set forth above:

INDICATE THE NAME AND CONTACT INFORMATION OF THE PERSON WHO CAN RESPOND AUTHORITATIVELY TO ANY QUESTIONS REGARDING THIS BID (i.e., PROJECT MANAGER):

NAME (PRINTED): _____

TITLE: _____

E-MAIL ADDRESS: _____

TELEPHONE. NO.: _____

The undersigned swears or affirms under the penalty of perjury and upon personal knowledge that the contents of the Bid are true and correct and in full compliance with the entire Bidding Documents.

The undersigned swears or affirms under the penalty of perjury that the Bidder, its agents, servants and/or employees, to the best of his/her knowledge and belief, have not in any way colluded with anyone for and on behalf of the Bidder an unfair advantage over others, nor have they colluded with anyone for and on behalf of the Bidder, or themselves, to gain any favoritism in the award of any contract resulting from this Bid.

NAME OF AND TITLE OF BIDDER'S REPRESENTATIVE

SIGNATURE OF BIDDER'S REPRESENTATIVE

END OF SECTION

SECTION 00 43 00
STANDARD BID BOND
21-024

BOND NO. _____

KNOW ALL MEN BY THESE PRESENTS, that _____

_____ hereinafter called the "Principal," and _____

_____ a corporation duly organized under the laws of the State of _____

_____ having its principal place of business at _____

_____ in the State of _____

and authorized to do business in the Commonwealth of Virginia, as Surety,

are held and firmly bound unto _____,

as Owner, hereinafter called the Obligee, in the amount of five percent (5%) of the Bid Amount

(Total Base Bid plus all Additive Bid Items) _____,

bid by the Principal, for the payment whereof, Principal and Surety bind themselves, their heirs, administrators, successors, ad assigns, jointly and severally, firmly by these presents.

The condition of this obligation are as follows. This Bid Bond shall guarantee that the Principal will not withdraw his bid during the period of sixty (60) days following the opening of bids; that if his bid is accepted, Principal will enter into a formal contract with the Owner in accordance with the Contract between Owner and Contractor, Form included as a part of the Invitation to Bid (ITB Documents); the Principal shall submit properly executed and authorized Performance Bond and Labor and Material Payment Bonds within fifteen (15) days after the Principal has received notice of acceptance of his bid; Principal and Surety shall be jointly and severally liable to the Owner for the difference between the amount specified in said bid and such larger amount for which the Owner may contract with another party to perform the work covered by said bid, up to the amount of the bid guarantee. This amount represents the damages to the owner on account of the default of the bidder in any particular thereof.

The Surety represents to the Principal and to the Obligee that it is legally authorized to do business in the Commonwealth of Virginia.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and have executed this instrument in six separately signed counterparts, each one of which shall be deemed an original, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

Signed and sealed this _____ day of _____, 20_____.

Principal

By _____

Surety

By _____

Attorney-In-Fact

IMPORTANT: The Surety executing bonds must appear on the Treasury Department's most current list (Department Circular 570 as amended and supplemented) and be authorized to transact business in the Commonwealth of Virginia.

END OF SECTION

PART 2

CONTRACT REQUIREMENTS

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 00 52 00

AGREEMENT

This Agreement is by and between Alexandria Renew Enterprises (“Owner”) and [name of contracting entity] (“Contractor”).

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

Owner and Contractor hereby agree as follows:

ARTICLE 1—WORK

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

- Abatement of asbestos from Building G1 and IPS roofs
- Removal of existing built up roof (BUR), including Light Weight Insulated Concrete (LWIC)
- Removal of the abandoned HVAC equipment
- Temporary relocation of functional HVAC equipment
- Installation of a new roof
- Replacement of skylights

ARTICLE 2—THE PROJECT

2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows:

- Building G1 and IPS Roof Replacement

ARTICLE 3—ENGINEER

3.01 The Owner has retained GHD Inc. (“Engineer”) to prepare the design for this project. GHD Inc. shall assume all rights and authority assigned to the Engineer in the Contract Documents in connection with completion of the Work.

ARTICLE 4—CONTRACT TIMES

4.01 *Time is of the Essence*

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

4.02 *Contract Times*

- A. The Work will be substantially complete within 180 days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General

Conditions and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within 240 days after the date when the Contract Times commence to run.

4.03 *Milestones*

A. Not used.

4.04 *Liquidated Damages*

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

1. *Substantial Completion:* Contractor shall pay Owner \$[1,070.00] for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for Substantial Completion, until the Work is substantially complete.
2. *Completion of Remaining Work:* After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner \$[965.00] for each day that expires after such time until the Work is completed and ready for final payment.

3. *Milestones:* Not used.

B. If Owner recovers liquidated damages for a delay in completion by Contractor, then such liquidated damages are Owner's sole and exclusive remedy for such delay, and Owner is precluded from recovering any other damages, whether actual, direct, excess, or consequential, for such delay, except for special damages (if any) specified in this Agreement.

C. The parties agree that the per diem measure of liquidated damages is a reasonable measure of the damages Owner is likely to suffer in case of delay, and Contractor agrees that it will not challenge the per diem amounts of liquidated damages imposed pursuant to this Paragraph 4.05. Contractor hereby waives any defense as to the validity of any liquidated damages stated herein on the grounds that such liquidated damages are void as penalties not reasonably related to actual damages. The parties further agree that the liquidated damages set forth in this Paragraph 4.05 shall be the Owner's sole remedy for delay as a result of Contractor's failure to achieve the completion dates within the times required by this Agreement. The Owner may, but shall not be obligated to, deduct any liquidated damages that become due from any unpaid amounts then or which thereafter become due to the Contractor under the Contract Documents. Any liquidated damages not so deducted from any

unpaid amounts due the Contractor shall be immediately due and payable to the Owner upon demand

ARTICLE 5—CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents, the amounts that follow, subject to adjustment under the Contract:

A. Lump sums included in the Contract Price:

Lump Sum Amount	
Description	Extended Price
Lump Sum Contract Price	\$

B. Total of Lump Sum Amount, Allowances, and Unit Price Work (subject to final Unit Price adjustment) is \$[]. The amount listed here is the Contract Price.

ARTICLE 6—PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

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

6.02 *Progress Payments and Retainage*

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

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

a. 95 percent of the value of the Work completed (with the balance being retainage).

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

B. 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 set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less 150 percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

6.03 *Final Payment*

- A. Upon final completion and acceptance of the Work, Owner shall pay the remainder of the Contract Price in accordance with Paragraph 15.06 of the General Conditions.

6.04 *Consent of Surety*

- A. Owner will not make final payment, or return or release retainage at Substantial Completion or any other time, unless Contractor submits written consent of the surety to such payment, return, or release.

6.05 *Interest*

- A. All amounts not paid when due as provided in Article 15 of the General Conditions shall bear interest at the rate of half percent (0.5%) per month.

ARTICLE 7—CONTRACT DOCUMENTS

7.01 *Contents*

- A. The Contract Documents consist of all of the following, and shall be in the following order of precedence:

1. Written Amendments, Change Orders and Work Change Directives
2. Agreement, inclusive of the Exhibits to this Agreement
3. Performance bond and Payment bond, each together with their respective powers of attorney)
4. General Conditions and Supplementary Conditions
5. Specifications – Division 01
6. Specifications – Divisions 02 through 44
7. Drawings, with figure dimensions taking precedence over scaled dimensions, and detailed Drawings taking precedence over general Drawings
8. Contractor's Bid
9. Instructions to Bidders

For the avoidance of doubt, each of the above Contract Documents shall be deemed to include any Addenda to such Contract Document.

10. There are no Contract Documents other than those listed above in this Article 7.

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

ARTICLE 8—REPRESENTATIONS, CERTIFICATIONS, AND STIPULATIONS

8.01 *Contractor's Representations*

- A. In order to induce Owner to enter into this Contract, Contractor makes the following representations:
1. Contractor has examined and carefully studied the Contract Documents, including Addenda.
 2. Contractor has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
 3. Contractor is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
 4. Contractor has carefully studied the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
 5. Contractor has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.
 6. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (c) Contractor's safety precautions and programs.
 7. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
 8. 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.
 9. Contractor has given Owner written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Owner is acceptable to Contractor.
 10. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

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

8.02 *Contractor's Certifications*

- A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 8.02:
 1. Corrupt practice means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process.
 2. Fraudulent practice means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition, or (d) any act of fraud punishable under the Virginia Governmental Frauds Act (Code of Virginia §18.2-498.1 et seq.).
 3. Collusive practice means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels.
 4. Coercive practice means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

8.03 *Standard General Conditions*

- A. The General Conditions that are made a part of this Contract are a modified Engineers Joint Contract Documents Committee (EJCDC®) C-700, Standard General Conditions for the Construction Contract (2018), published by the Engineers Joint Contract Documents Committee. Copyright© 2018 National Society of Professional Engineers, American Council of Engineering Companies, and American Society of Civil Engineers. Those portions of the text that originated in EJCDC documents remain subject to copyright. At the Contractor's request, the Owner will provide modifications to the standard wording of the General Conditions in a "track changes" (redline/strikeout) format.

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

This Agreement will be effective on the date is countersigned by Owner.

Owner:

(typed or printed name of organization)
By: _____
(individual's signature)
Date: _____
(date signed)
Name: _____
(typed or printed)
Title: _____
(typed or printed)

Contractor:

(typed or printed name of organization)
By: _____
(individual's signature)
Date: _____
(date signed)
Name: _____
(typed or printed)
Title: _____
(typed or printed)

(If [**Type of Entity**] is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest: _____
(individual's signature)
Title: _____
(typed or printed)

Address for giving notices:

Designated Representative:
Name: _____
(typed or printed)
Title: _____
(typed or printed)

Address: _____

Phone: _____
Email: _____
License No.: _____
(where applicable)

State: _____

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 00 61 00
PERFORMANCE BOND

Contractor Name: [Full formal name of Contractor] Address (<i>principal place of business</i>): [Address of Contractor's principal place of business]	Surety Name: [Full formal name of Surety] Address (<i>principal place of business</i>): [Address of Surety's principal place of business]
Owner Name: Alexandria Renew Enterprises Mailing address (<i>principal place of business</i>): 1800 Limerick Street Alexandria, VA 22314	Contract Description (<i>name and location</i>): Building G1 and IPS Roof Replacement 1800 Limerick Street Alexandria, VA 22314 Contract Price: [Amount from Contract] Effective Date of [Date from Contract: Contract]
Bond Bond Amount: [Amount] Date of Bond: [Date] (<i>Date of Bond cannot be earlier than Effective Date of Contract</i>)	
Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Performance Bond, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.	
Contractor as Principal	Surety
_____ (<i>Full formal name of Contractor</i>)	_____ (<i>Full formal name of Surety</i>) (<i>corporate seal</i>)
By: _____ <div style="text-align: center;">(<i>Signature</i>)</div>	By: _____ <div style="text-align: center;">(<i>Signature</i>)(<i>Attach Power of Attorney</i>)</div>
Name: _____ <div style="text-align: center;">(<i>Printed or typed</i>)</div>	Name: _____ <div style="text-align: center;">(<i>Printed or typed</i>)</div>
Title: _____	Title: _____
Attest: _____ <div style="text-align: center;">(<i>Signature</i>)</div>	Attest: _____ <div style="text-align: center;">(<i>Signature</i>)</div>
Name: _____ <div style="text-align: center;">(<i>Printed or typed</i>)</div>	Name: _____ <div style="text-align: center;">(<i>Printed or typed</i>)</div>
Title: _____	Title: _____
<i>Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where</i>	

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, including but not limited to correction of defective Work as required therein, which is incorporated herein by reference.
2. Provided, that any alteration which may be made in terms of the Contract, or in the Work to be done under it, or the giving by the Owner of any extension of time for the performance of the Contract, or any other alterations, extension, forbearance on the part of either or both of the Owner or Contractor to the other party shall not in any way release the Contractor and the Surety, or either of them, their heirs, executors, administrators, successors, or assigns from their liability hereunder, notice to the Surety of any such alteration, extension, or forbearance being hereby waived.
3. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.
4. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond will arise after:
 - 4.1. The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice may indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 will be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement does not waive the Owner's right, if any, subsequently to declare a Contractor Default;
 - 4.2. The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
 - 4.3. The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.
5. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 does not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.
6. 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:
 - 6.1. Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;
 - 6.2. Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

- 6.3. Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a 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 Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or
- 6.4. Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:
 - 5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or
 - 5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.
7. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven 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 5.4, and the Owner refuses the payment, or the Surety has denied liability, in whole or in part, or if the Surety proceeds as provided in Paragraphs 5.1, 5.2 or 5.3 and then fails to perform, without further notice, the Owner shall be entitled to enforce any remedy available to the Owner.
8. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner will not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety will not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:
 - 8.1. the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
 - 8.2. 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 5; and
 - 8.3. liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.
9. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.
10. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price will not be reduced or set off on account of any such unrelated obligations. No right of action will accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.

11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
12. Any proceeding, legal or equitable, under this Bond must be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and must be instituted within two years after a declaration of 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 periods of limitations available to sureties as a defense in the jurisdiction of the suit will be applicable.
13. Notice to the Surety, the Owner, or the Contractor must be mailed or delivered to the address shown on the page on which their signature appears.
14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted therefrom and provisions conforming to such statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond. If any provision of this Bond is held to be illegal, invalid or unenforceable, such provision shall be fully severable and this Bond shall be construed and enforces as if such illegal, invalid or unenforceable provision had never been part of this Bond, and the remaining provisions of this Bond shall remain in full force and effect and shall not be affected by the illegal, invalid or unenforceable provision, or by its severance from this Bond.
15. The failure or refusal of the Owner to take any action, proceeding or step to enforce any remedy or exercise any right under the Construction Contract or the taking of any action proceeding or step by the Owner, acting in good faith upon the belief that same is permitted, shall not in any way release the Contractor or the Surety, or any of them, or their respective executors, administrators, successors or assigns from liability under this Bond. The Surety hereby waives notice of any amendment, indulgence or forbearance made, granted or permitted by the Owner.
16. Definitions
 - 16.1. *Balance of the Contract Price*—The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for 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 Construction Contract.
 - 16.2. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.
 - 16.3. *Contractor Default*—Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.
 - 16.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

16.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.

17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.

END OF SECTION

THIS PAGE
INTENTIONALLY
LEFT BLANK

SECTION 00 61 50
STANDARD LABOR AND MATERIAL PAYMENT BOND

Contractor Name: [Full formal name of Contractor] Address (<i>principal place of business</i>): [Full formal name of Contractor]	Surety Name: [Full formal name of Surety] Address (<i>principal place of business</i>): [Full formal name of Contractor]
Owner Name: Alexandria Renew Enterprises Mailing address (<i>principal place of business</i>): 1800 Limerick Street Alexandria, VA 22314	Contract Description (<i>name and location</i>): Building G1 and IPS Roof Replacement 1800 Limerick Street Alexandria, VA 22314 Contract Price: [Amount, from Contract] Effective Date of [Date, from Contract: Contract]
Bond Bond Amount: [Amount] Date of Bond: [Date] (<i>Date of Bond cannot be earlier than Effective Date of Contract</i>)	
Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth in this Standard Labor and Material Payment Bond, do each cause this Standard Labor and Material Payment Bond to be duly executed by an authorized officer, agent, or representative.	
Contractor as Principal	Surety
_____ (<i>Full formal name of Contractor</i>)	_____ (<i>Full formal name of Surety</i>) (<i>corporate seal</i>)
By: _____ (<i>Signature</i>)	By: _____ (<i>Signature</i>)(<i>Attach Power of Attorney</i>)
Name: _____ (<i>Printed or typed</i>)	Name: _____ (<i>Printed or typed</i>)
Title: _____	Title: _____
Attest: _____ (<i>Signature</i>)	Attest: _____ (<i>Signature</i>)
Name: _____ (<i>Printed or typed</i>)	Name: _____ (<i>Printed or typed</i>)
Title: _____	Title: _____
Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party is considered plural where applicable.	

The Contractor and 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 Construction Contract, which is incorporated herein by reference, subject to the following terms.

1. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.
2. A claimant is defined as one having a direct contract with the Contractor or with a subcontractor of the Contractor for labor, material, or both for use in the performance of the Contract. A "subcontractor" of the Contractor, for the purposes of this bond only, includes not only those subcontractors having direct contractual relationship, but also any other contractor that undertake to participate in the Work, which the Contractor is to perform under the aforesaid Contract, whether there are one or more intervening subcontractors contractually positioned between it and the Contractor (for example, a subcontractor). "Labor" and "Material" shall include, but not limited to, public utility services and reasonable rentals of equipment, but only for periods when the equipment rented is actually used at the work site.
3. Any claimant who has a direct contractual relationship with the Contractor and who has performed labor or furnished material in accordance with the Contract documents in furtherance of the Work provided in the Contract, who has not been paid in full therefor before the expiration or ninety (90) days after the day on which such claimant performed the last of such labor or furnished the last of such materials for which the claims payment, may bring an action on this bond to recover any amount due to him for such labor or material, and may prosecute such action to final judgment and have execution on the judgment. The Owner need not be a party to such action and shall not be liable for the payment of any costs, fees or expenses of any such suit.
4. Any claimant who has a direct contractual relationship with any subcontractor of the Contractor who has no contractual relationship, express or implied, with the Contractor may bring an action on this bond only if he has given written notice to the Contractor within ninety (90) days from the day on which claimant performed the last of the labor or furnished the last of materials for which he claims payment, stating with substantial accuracy the amount claimed and the name of the person for whom it the Work was performed or to whom the material was furnished. Notice to the Contractor shall be served by registered or certified mail, postage prepaid, in an envelope addressed to the Contractor at any place where his office is regularly maintained for transaction of business. Claims for sums withheld as retainages with respect to labor performed or material furnished shall not be subject to the time limitation in this paragraph.
5. No suit or action shall be commenced hereunder by any claimant.
 - 5.1. unless brought within one year after the day on which the person bringing such action last performed labor or furnished or supplied materials, if being understood, however, that if any limitation embodied within this bond shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.

- 5.2. other than in a Virginia court of competent jurisdiction, with venue as provided by statute, or in the United States District Court for the district in which the project, or any part thereof is situated.
6. The amount of this bond shall be reduced by and to the extent of any payments made in good faith hereunder.
7. The Surety's total obligation will not exceed the amount of this Bond, plus the amount of reasonable attorney's fees, and the amount of this Bond will be credited for any payments made in good faith by the Surety.
8. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
9. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement will be deemed deleted here from and provisions conforming to such statutory or other legal requirement will be deemed incorporated herein. When so furnished, the intent is that this Bond will be construed as a statutory bond and not as a common law bond. If any provision of this Bond is held to be illegal, invalid or unenforceable, such provision shall be fully severable and this Bond shall be construed and enforces as if such illegal, invalid or unenforceable provision had never been part of this Bond, and the remaining provisions of this Bond shall remain in full force and effect and shall not be affected by the illegal, invalid or unenforceable provision, or by its severance from this Bond.
10. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.
11. The failure or refusal of the Owner to take any action, proceeding or step to enforce any remedy or exercise any right under the Construction Contract or the taking of any action proceeding or step by the Owner, acting in good faith upon the belief that same is permitted, shall not in any way release the Contractor or the Surety, or any of them, or their respective executors, administrators, successors or assigns from liability under this Bond. The Surety hereby waives notice of any amendment, indulgence or forbearance made, granted or permitted by the Owner.
12. Definitions
 - 12.1. *Claim*—A written statement by the Claimant including at a minimum:
 - 12.1.1. The name of the Claimant;
 - 12.1.2. The name of the person for whom the labor was done, or materials or equipment furnished;
 - 12.1.3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
 - 12.1.4. A brief description of the labor, materials, or equipment furnished;
 - 12.1.5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;

- 12.1.6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
 - 12.1.7. The total amount of previous payments received by the Claimant; and
 - 12.1.8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.
- 12.2. *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 Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond is to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction 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.
- 12.3. *Construction Contract*—The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.
- 12.4. *Owner Default*—Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.
- 12.5. *Contract Documents*—All the documents that comprise the agreement between the Owner and Contractor.
13. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond will be deemed to be Subcontractor and the term Owner will be deemed to be Contractor.

END OF SECTION

SECTION 00 70 00
GENERAL CONDITIONS

TABLE OF CONTENTS

	Page
Article 1—Definitions and Terminology.....	7
1.01 Defined Terms.....	7
1.02 Terminology	11
Article 2—Preliminary Matters	13
2.01 Delivery of Performance and Payment Bonds; Evidence of Insurance	13
2.02 Copies of Documents	13
2.03 Before Starting Construction.....	13
2.04 Preconstruction Conference; Designation of Authorized Representatives	14
2.05 Acceptance of Preliminary Submittals.....	14
2.06 Electronic Transmittals	14
Article 3—Contract Documents: Intent, Requirements, Reuse	15
3.01 Intent.....	15
3.02 Reference Standards	16
3.03 Reporting and Resolving Discrepancies	16
3.04 Requirements of the Contract Documents	17
3.05 Reuse of Documents.....	17
Article 4—Commencement and Progress of the Work	18
4.01 Commencement of Contract Times; Notice to Proceed.....	18
4.02 Starting the Work	18
4.03 Reference Points.....	18
4.04 Progress Schedule	18
4.05 Delays in Contractor’s Progress.....	18
Article 5—Site; Subsurface and Physical Conditions; Hazardous Environmental Conditions	20
5.01 Availability of Lands.....	20
5.02 Use of Site and Other Areas	20
5.03 Subsurface and Physical Conditions	22

5.04	Differing Subsurface or Physical Conditions	22
5.05	Underground Facilities	24
5.06	Hazardous Environmental Conditions at Site	26
5.07	Historical Artifacts	27
Article 6	Bonds and Insurance	28
6.01	Performance, Payment, and Other Bonds	28
6.02	Insurance—General Provisions	29
6.03	Contractor’s Insurance	30
6.04	Builder’s Risk and Other Property Insurance	32
6.05	Property Losses; Subrogation	32
6.06	Receipt and Application of Property Insurance Proceeds	33
Article 7	Contractor’s Responsibilities	33
7.01	Contractor’s Means and Methods of Construction	33
7.02	Supervision and Superintendence	34
7.03	Labor; Working Hours	34
7.04	Services, Materials, and Equipment	34
7.05	“Or Equals”	35
7.06	Substitutes	36
7.07	Concerning Subcontractors and Suppliers	38
7.08	Patent Fees and Royalties	39
7.09	Permits	39
7.10	Taxes	40
7.11	Laws and Regulations	40
7.12	Record Documents	41
7.13	Safety and Protection	41
7.14	Hazard Communication Programs	43
7.15	Emergencies	43
7.16	Submittals	44
7.17	Contractor’s General Warranty and Guarantee	46
7.18	Indemnification	47
7.19	Delegation of Professional Design Services	48
Article 8	Other Work at the Site	49
8.01	Other Work	49

8.02	Coordination.....	50
8.03	Legal Relationships	50
Article 9—Owner’s Responsibilities		51
9.01	Communications to Contractor	51
9.02	Replacement of Engineer	51
9.03	Furnish Data	51
9.04	Pay When Due.....	51
9.05	Lands and Easements; Reports, Tests, and Drawings.....	52
9.06	Insurance	52
9.07	Change Orders.....	52
9.08	Inspections, Tests, and Approvals.....	52
9.09	Limitations on Owner’s Responsibilities	52
9.10	Undisclosed Hazardous Environmental Condition	52
9.11	Safety Programs	52
9.12	Other Responsibilities	52
Article 10— Owner’s Role and Rights During Construction.....		53
10.01	General	53
10.02	Owner’s Representative	53
10.03	Clarifications and Interpretations	53
10.06	Decisions on Requirements of Contract Documents and Acceptability of Work.....	54
10.07	Limitations on Owner’s Responsibilities	54
Article 11—Changes to the Contract.....		54
11.01	Amending and Supplementing the Contract	54
11.02	Change Orders.....	54
11.03	Work Change Directives	55
11.04	Field Orders.....	55
11.05	Owner-Authorized Changes in the Work.....	56
11.06	Unauthorized Changes in the Work	56
11.07	Change of Contract Price	56
11.08	Change of Contract Times.....	57
11.09	Change Proposals	58
11.10	Notification to Surety	59
Article 12—Claims		59

12.01 Claims.....	59
Article 13—Cost of the Work; Allowances; Unit Price Work	60
13.01 Cost of the Work	60
13.02 Allowances	63
13.03 Unit Price Work	64
Article 14—Tests and Inspections; Correction, Removal, or Acceptance of Defective Work	65
14.01 Access to Work	65
14.02 Tests, Inspections, and Approvals.....	65
14.03 Defective WorkF	66
14.04 Acceptance of Defective Work	66
14.05 Uncovering Work	67
14.06 Owner May Stop the Work	67
14.07 Owner May Correct Defective Work	68
Article 15—Payments to Contractor; Set-Offs; Completion; Correction Period	68
15.01 Progress Payments.....	68
15.02 Contractor’s Warranty of Title	71
15.03 Substantial Completion	71
15.06 Final Payment.....	73
15.07 Waiver of Claims	74
15.08 Correction Period	74
Article 16—Suspension of Work and Termination	76
16.01 Owner May Suspend Work	76
16.02 Owner May Terminate for Cause	76
16.03 Owner May Terminate for Convenience.....	77
16.04 Contractor May Stop Work or Terminate	77
Article 17—Final Resolution of Disputes.....	78
17.01 Methods and Procedures	78
Article 18—Miscellaneous	79
18.01 Giving Notice	79
18.02 Computation of Times.....	79
18.03 Cumulative Remedies	79
18.04 Limitation of Damages	80
18.05 No Waiver	80

18.06 Survival of Obligations	80
18.07 Controlling Law	80
18.08 Assignment of Contract.....	80
18.09 Successors and Assigns.....	80
18.10 Headings.....	80
18.11 Independent Contractor	80
18.12 Liens.....	80
18.13 Severability.....	81

THIS PAGE INTENTIONALLY LEFT BLANK

ARTICLE 1—DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

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

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

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

Application for Payment—The document prepared by Contractor, in a form acceptable to Owner, to request progress or final payments, and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

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

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

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

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

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

Change Proposal—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times, or seeking other relief with respect to the terms of the Contract.

Claim

- a. A demand or assertion by Contractor to Owner, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment of Contract Price or Contract Times, or seeking other relief with respect to the terms of the Contract.
- b. A demand for money or services by a third party is not a Claim.

Constituent of Concern—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), lead-based paint (as defined by the HUD/EPA standard), hazardous

waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to Laws and Regulations regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.

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

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

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

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

Contractor—The individual or entity with which Owner has contracted for performance of the Work, named as such in the Agreement.

Cost of the Work—See Paragraph 13.01 for definition.

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

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

Electronic Document—Any Project-related correspondence, attachments to correspondence, data, documents, drawings, information, or graphics, including but not limited to Shop Drawings and other Submittals, that are in an electronic or digital format.

Electronic Means—Electronic mail (email), upload/download from a secure Project website, or other communications methods that allow: (a) the transmission or communication of Electronic Documents; (b) the documentation of transmissions, including sending and receipt; (c) printing of the transmitted Electronic Document by the recipient; (d) the storage and archiving of the Electronic Document by sender and recipient; and (e) the use by recipient of the Electronic Document for purposes permitted by this Contract. Electronic Means does not include the use of text messaging, or of Facebook, Twitter, Instagram, or similar social media services for transmission of Electronic Documents.

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

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

Governmental Unit – Means, other than Owner, any federal, state, or local government and any political subdivision or any governmental, quasi-governmental, judicial, public or statutory instrumentality, administrative agency, authority, body or entity.

Hazardous Environmental Condition—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto.

- a. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated into the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, is not a Hazardous Environmental Condition.
- b. The presence of Constituents of Concern as part of the routine, anticipated, and obvious working conditions at the Site, is not a Hazardous Environmental Condition.

Laws and Regulations; Laws or Regulations—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and binding decrees, resolutions, and orders of any and all Governmental Units.

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

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

Notice of Award—The written notice by Owner to Contractor accepting Contractor's Bid.

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

Owner—Alexandria Renew Enterprises, an authority duly organized and existing under the laws of the Commonwealth of Virginia.

Owner's Consultant -- An individual or entity having a contract with Owner to furnish services with respect to the Project as an independent professional associate or consultant and who is identified in the Contract Documents.

Owner-Related Party – Owner, Engineer, Owner's Consultant, Project Representative, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.

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

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

Project Representative—The authorized representative of Owner assigned to assist Owner at the Site. As used herein, the term Project Representative includes any assistants or field staff of Project Representative.

Request for Proposals—A formal request from the Owner to public or selected Respondents or Bidders to submit a proposal. May be used in conjunction with or in place of an Invitation to Bid.

Request for Qualifications—A formal request from the Owner to public or selected Respondents or Bidders to submit a statement of qualifications. May be used in conjunction with or in place of an Invitation to Bid.

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

Schedule of Submittals—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Owner's review of the submittals.

Schedule of Values—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

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

Site—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands or areas furnished by Owner which are designated for the use of Contractor.

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

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.

Submittal—A written or graphic document, prepared by or for Contractor, which the Contract Documents require Contractor to submit to Owner, or that is indicated as a Submittal in the Schedule of Submittals accepted by Owner. Submittals may include Shop Drawings and Samples; schedules; product data; Owner-delegated designs; sustainable design information; information on special procedures; testing plans; results of tests and evaluations, source quality-control testing and inspections, and field or Site quality-control testing and inspections; warranties and certifications; Suppliers' instructions and reports; records of delivery of spare parts and tools; operations and maintenance data; Project photographic documentation; record documents; and other such documents required by the Contract Documents. Submittals, whether or not approved or accepted by Owner, are not Contract Documents. Change Proposals, Change Orders, Claims, notices, Applications for Payment, and requests for interpretation or clarification are not Submittals.

Substantial Completion—The time at which the Work (or a specified part thereof) has progressed to the point where 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 of such Work.

Successful Bidder—Contractor.

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

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

Technical Data – Those items expressly identified as Technical Data in the Supplementary Conditions, including but not limited to (1) existing subsurface conditions at or adjacent to the Site, or existing physical conditions at or adjacent to the Site including existing surface or subsurface structures (except Underground Facilities) or (2) Hazardous Environmental Conditions at the Site.

Underground Facilities—All active or not-in-service underground lines, pipelines, conduits, ducts, encasements, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or systems at the Site, including but not limited to those facilities or systems that produce, transmit, distribute, or convey telephone or other communications, cable television, fiber optic transmissions, power, electricity, light, heat, gases, oil, crude oil products, liquid petroleum products, water, steam, waste, wastewater, storm water, other liquids or chemicals, or traffic or other control systems. An abandoned facility or system is not an Underground Facility.

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

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

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

1.02 Terminology

- A. The words and terms discussed in Paragraphs 1.02.B, C, D, and E are not defined terms that require initial capital letters, but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives*: The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed,” and the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import. Such words are used to describe an action or determination of Owner as to the Work. It is intended that such action or determination will be solely to evaluate, in general,

the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Owner any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 9 or any other provision of the Contract Documents.

- C. *Day*: The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective*: The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
1. does not conform to the Contract Documents; or
 2. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents.
- E. *Furnish, Install, Perform, Provide*
1. The word “furnish,” when used in connection with services, materials, or equipment, means 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, means 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, means to furnish and install said services, materials, or equipment complete and ready for intended use.
 4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.
- F. *Contract Price or Contract Times*: References to a change in “Contract Price or Contract Times” or “Contract Times or Contract Price” or similar, indicate that such change applies to (1) Contract Price, (2) Contract Times, or (3) both Contract Price and Contract Times, as warranted, even if the term “or both” is not expressed.
- G. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2—PRELIMINARY MATTERS

2.01 *Delivery of Performance and Payment Bonds; Evidence of Insurance*

- A. *Performance and Payment Bonds*: No later than 15 days after Notice of Award, Contractor shall deliver to Owner the performance bond and payment bond required to be provided by Contractor in accordance with Article 6.
- B. *Evidence of Contractor's Insurance*: No later than 15 days after Notice of Award, Contractor shall deliver to Owner, with copies to each additional insured (as identified in Paragraph 6.03.C), the certificates, endorsements, and other evidence of insurance required to be provided by Contractor in accordance with Article 6.
- C. *Evidence of Owner's Insurance*: After receipt of all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each additional insured (as identified in Paragraph 6.03.C), the certificates and other evidence of insurance required to be provided by Owner under Article 6.
- D. For the avoidance of doubt, Notice to Proceed will not be issued and Contractor shall not be permitted to begin Work at the Site until Contractor complies with its obligations in Paragraph 2.01.A and B above.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor four (4) printed copies of the Contract (including one fully signed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.
- B. Owner shall maintain and safeguard at least one (1) original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review.

2.03 *Before Starting Construction*

- A. *Preliminary Submittals*: Within ten (10) days after the Effective Date of the Contract (or as otherwise required by the Contract Documents), Contractor shall submit to Owner for timely review:
 - 1. a preliminary Progress Schedule in conformance with Division 01 of the Specifications indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
 - 2. a preliminary Schedule of Submittals; and
 - 3. a preliminary Schedule of Values in conformance with Division 01 of the Specifications for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, and others as appropriate will be held to establish a working understanding among the parties as to the Work, and to discuss the Submittals referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other Submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Acceptance of Preliminary Submittals*

- A. At least 10 days before submission of the first Application for Payment a conference, attended by Owner, Contractor, and others as appropriate, will be held to review the Submittals submitted in accordance with Paragraph 2.03.A. No progress payment will be made to Contractor until acceptable Submittals are submitted to Owner.
 - 1. The Progress Schedule will be acceptable if it provides an orderly progression of the Work to completion within the Contract Times, and is compliant with the schedule requirements set forth in Division 01 of the Specifications. Such acceptance will not impose on Owner responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
 - 2. Contractor's Schedule of Submittals will be acceptable if it provides a workable arrangement for reviewing and processing the required submittals.
 - 3. Contractor's Schedule of Values will be acceptable as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work and is compliant with the Schedule of Values requirements set forth in Division 01 of the Specifications.
 - 4. If a foregoing submittal is not acceptable, Contractor will have an additional 10 days to revise and resubmit the Submittal.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner and Contractor may send, and shall accept, Electronic Documents transmitted by Electronic Means.
- B. If the Contract does not establish protocols for Electronic Means, then Owner and Contractor shall jointly develop such protocols.
- C. Subject to any governing protocols for Electronic Means, when transmitting Electronic Documents by Electronic Means, the transmitting party makes no representations as to long-term compatibility, usability, or readability of the Electronic Documents resulting from the recipient's use of software application packages, operating systems, or

computer hardware differing from those used in the drafting or transmittal of the Electronic Documents.

ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

- A. The Contract Documents comprise the entire agreement between Owner and Contractor governing the Work. The Contract Documents are complementary; what is called for by one is as binding as if called for by all. The Contract Documents will be construed in accordance with the law of the place of the Project. In resolving inconsistencies among two or more components of the Contract Documents, the precedence shall be as set forth in the Agreement.
- 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 indicated result will be provided whether or not specifically called for, at no additional cost to the Owner.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic versions of the Contract Documents (including any printed copies derived from such electronic versions) and the printed record version, the printed record version will govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral. Owner is not responsible for any representation or purported agreement concerning conditions or contract requirements made by any employee, agent or representative of Owner prior to the Effective Date of the Contract, unless such representation or understanding is expressly stated in the Contract Documents.
- E. Owner will issue clarifications and interpretations of the Contract Documents as provided herein.
- F. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation will be deemed stricken, and all remaining provisions will continue to be valid and binding upon Owner and Contractor, which agree that the Contract Documents will be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision. Each and every clause or other provision required by law to be inserted in these Contract Documents shall be deemed to be inserted herein, and they shall be read and enforced as though it were included herein, and if through mistake or otherwise, any such provision is not inserted, or if not correctly inserted, then upon the application of either party, the Contract Documents shall forthwith be amended to make such insertion.

G. Nothing in the Contract Documents creates:

1. any contractual relationship between Contractor and Engineer, Owner's Consultant, or Project Representative, or any third-party beneficiary rights to Contractor;
2. any contractual relationship between: (i) Owner, Engineer, Owner's Consultant, or Project Representative; and (ii) any Subcontractor, Supplier, or other individual or entity performing or furnishing any of the Work, for the benefit of such Subcontractor, Supplier, or other individual or entity; or
3. any obligation on the part of Owner to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity, except as may otherwise be required by Laws and Regulations.

3.02 *Reference Standards*

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

1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, means the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
2. No provision of any such standard specification, manual, reference standard, or code, and no instruction of a Supplier, will be effective to change the duties or responsibilities of Owner, Contractor, or Engineer from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies*

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

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

B. Resolving Discrepancies

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Owner take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:
 - a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 Requirements of the Contract Documents

- A. During the performance of the Work and until final payment, Contractor shall submit to Owner in writing all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Owner will be the final interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work, subject to Contractor's rights to submit a Claim in accordance with Article 12 hereof.

3.05 Reuse of Documents

- A. Contractor and its Subcontractors and Suppliers shall not:
 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media versions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and specific written verification or adaptation by Engineer; or

2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein precludes Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Contract, provided Contractor has complied with the requirements of Article 2 of these General Conditions.

4.02 *Starting the Work*

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

4.03 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which Owner determines 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 Owner whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

- A. Contractor shall submit updated Progress Schedules at the times and in the manner set forth in Division 01 of the Specifications. Updated Progress Schedules shall not change the Contract Times. Proposed adjustments in the Progress Schedule that will change the Contract Times must be submitted in accordance with the requirements of Paragraph 4.05 and Article 11.
- B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work will be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

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

- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to submit a request for an equitable adjustment in Contract Times. Such an adjustment will be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
 - 1. Severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
 - 2. Weather conditions that are more severe than those for the five (5) year NOAA averages for the locale of the Project;
 - 3. Acts or failures to act of third-party utility owners or other third-party entities (other than those third-party utility owners or other third-party entities performing other work at or adjacent to the Site as arranged by or under contract with Owner, as contemplated in Article 8); and
 - 4. Acts of war or terrorism.
- D. Contractor's entitlement to an adjustment of Contract Times or Contract Price is limited as follows:
 - 1. Contractor's entitlement to an adjustment of the Contract Times is conditioned on the delay, disruption, or interference adversely affecting an activity on the critical path to completion of the Work, as of the time of the delay, disruption, or interference.
 - 2. Contractor shall not be entitled to an adjustment in Contract Price for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor. Such a concurrent delay by Contractor shall not preclude an adjustment of Contract Times to which Contractor is otherwise entitled.
 - 3. Adjustments of Contract Times or Contract Price are subject to the provisions of Article 11.
- E. Each Contractor request or Change Proposal seeking an increase in Contract Times or Contract Price must be supplemented by supporting data that sets forth in detail the following:
 - 1. The circumstances that form the basis for the requested adjustment;
 - 2. The date upon which each cause of delay, disruption, or interference began to affect the progress of the Work;

3. The date upon which each cause of delay, disruption, or interference ceased to affect the progress of the Work;
4. The number of days' increase in Contract Times claimed as a consequence of each such cause of delay, disruption, or interference; and
5. The impact on Contract Price, in accordance with the provisions of Paragraph 11.07.

Contractor shall also furnish such additional supporting documentation as Owner may require including, where appropriate, a revised progress schedule indicating all the activities affected by the delay, disruption, or interference, and an explanation of the effect of the delay, disruption, or interference on the critical path to completion of the Work.

- F. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are also conditioned upon the provisions of Article 5, together with the provisions of Paragraphs 4.05.D and 4.05.E.
- G. Paragraph 8.03 addresses delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

ARTICLE 5—SITE; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

- A. Owner shall furnish the Site and obtain and pay for easements for permanent structures or permanent changes in existing facilities. Owner shall notify Contractor in writing of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.
- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

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

1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not

unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas, or to improvements, structures, utilities, or similar facilities located at such adjacent lands or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.

2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.13, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or in a court of competent jurisdiction; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless, the Owner-Related Parties from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against any Owner-Related Party to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.
- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris will conform to applicable Laws and Regulations. If Contractor fails to comply with this Paragraph 5.02.B, Owner shall have the right to take corrective action and charge the costs of doing so to Contractor, including withholding amounts otherwise due Contractor to reimburse Owner's costs of doing so.
- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents. If Contractor fails to comply with this Paragraph 5.02.C, Owner shall have the right to take corrective action and charge the costs of doing so to Contractor, including withholding amounts otherwise due Contractor to reimburse Owner's costs of doing so.
- D. *Loading of Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject

any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

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

1. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data;
2. Those drawings of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data; and
3. Technical Data contained in such reports and drawings.

B. *Underground Facilities*: Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05, and not in the drawings referred to in Paragraph 5.03.A. Information and data regarding the presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

C. *Reliance by Contractor on Technical Data*: Contractor may reasonably rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents.

D. *Limitations of Other Data and Documents*: Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner, or any of its officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto;
2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings;
3. the contents of other Site-related documents made available to Contractor, such as record drawings from other projects at or adjacent to the Site, or Owner's archival documents concerning the Site; or
4. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

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

1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate;
2. is of such a nature as to require a change in the Drawings or Specifications;

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, but in no event later than 48 hours after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.
- B. *Owner's Review:* After receipt of written notice as required by the preceding paragraph, Owner will promptly review the condition in question; determine whether it is necessary to obtain additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A; obtain any pertinent cost or schedule information from Contractor; and advise Contractor in writing of its findings and conclusions.
- C. *Possible Price and Times Adjustments*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. Such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
 - b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,
 - c. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E.
 2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
 - a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise;
 - b. The existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
 - c. Contractor failed to give the written notice required by Paragraph 5.04.A.

3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

D. *Underground Facilities; Hazardous Environmental Conditions*: Paragraph 5.05 governs rights and responsibilities regarding the presence or location of Underground Facilities. Paragraph 5.06 governs rights and responsibilities regarding Hazardous Environmental Conditions. The provisions of Paragraphs 5.03 and 5.04 are not applicable to the presence or location of Underground Facilities, or to Hazardous Environmental Conditions.

5.05 *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 by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner shall not be responsible for the accuracy or completeness of any such information or data; and
2. the cost of all of the following shall 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.
3. In accordance with Paragraph 5.05.A.2, it is understood and agreed that the Contract Price includes all of the permanent and temporary Underground Facilities in their present or relocated positions, and Contractor agrees that no additional compensation will be allowed for normal delays, inconvenience, or damage sustained by Contractor due to any interference from said Underground Facilities, the operation of moving the Underground Facilities, the making of new connections thereto if required by the Contract Documents, or by any other requirements of the owner(s) of the Underground Facilities.

B. *Not Shown or Indicated*: If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated on the Drawings, then Contractor shall, promptly (but in no event later than 48 hours) after becoming aware

thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner in writing regarding such Underground Facility.

C. *Owner's Review*: Owner will:

1. promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated on the Drawings;
2. identify and communicate with the owner of the Underground Facility;
3. obtain any pertinent cost or schedule information from Contractor; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and
4. advise Contractor in writing of its findings and conclusions.

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

D. *Early Resumption of Work*: If at any time Owner determines that Work in connection with the Underground Facility may resume prior to completion of Owner's issuance of its statement to Contractor, because the Underground Facility in question and conditions affected by its presence have been adequately documented, and analyzed on a preliminary basis, then Owner may at its discretion instruct Contractor to resume such Work.

E. *Possible Price and Times Adjustments*

1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, to the extent that any existing Underground Facility at the Site that was not shown or indicated on the Drawings, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;
 - b. Contractor's entitlement to an adjustment of the Contract Times is subject to the provisions of Paragraphs 4.05.D and 4.05.E; and
 - c. Contractor gave the notice required in Paragraph 5.05.B.
2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, then any such adjustment will be set forth in a Change Order.
3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

5.06 *Hazardous Environmental Conditions at Site*

- A. *Reports and Drawings*: The Supplementary Conditions identify:
1. those reports known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site;
 2. drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
 3. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data as defined in Paragraph 1.01.A.46.b. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner, or any of its officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:
1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto;
 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. Where Hazardous Environmental Conditions are shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work, Contractor shall take such action as is necessary, in accordance with applicable Laws and Regulations, to plan for and to remediate and render harmless all such Hazardous Environmental Conditions. Remediation plans for such known Hazardous Environmental Conditions shall be provided to Owner for approval prior to undertaking the remediation.
- D. If Contractor encounters any unknown Hazardous Environmental Conditions at the Site, it shall stop Work immediately in the affected part of the Work to the extent required to avoid any such safety or health hazard until it has taken such action as is necessary, in accordance with pertinent Laws and Regulations, to protect the interests of any affected party. Contractor shall, immediately upon encountering any Hazardous Environmental Conditions at the Site, notify Owner and, if required by Laws and Regulations, all Governmental Units with jurisdiction over the Project or Site.
- E. Contractor shall take all necessary measures required to ensure that Hazardous Environmental Conditions are remediated or rendered harmless in accordance with pertinent Laws and Regulations. Contractor shall, prior to proceeding with any such work: (a) obtain all environmental site assessments of the affected property and submit copies of such assessments to Owner for its approval; (b) develop remediation plans

for the Hazardous Environmental Conditions, subject to Owner's approval; and (c) obtain all pertinent permits to implement such plans. During the period of any investigation and remediation efforts, Contractor shall take all necessary measures to isolate and contain such Hazardous Environmental Conditions from the unaffected parts of the Work, and shall continue the Work to the maximum extent possible on unaffected parts of the Work.

- F. Except for those Hazardous Environmental Conditions set forth in Paragraph G below, Contractor will be entitled to submit a request for an adjustment to the Contract Price and/or Contract Time(s) to the extent Contractor's cost and/or time of performance have been adversely impacted by the presence, removal or remediation of unknown Hazardous Environmental Conditions. Entitlement to any such adjustment is subject to the provisions of Paragraphs 4.05.D, 4.05.E, 11.07, and 11.08.
- G. Notwithstanding anything to the contrary in the Contract Documents, Contractor shall bear full responsibility for the handling, treatment, storage, removal, remediation, avoidance, or other appropriate action (if any), with respect to: (a) any Hazardous Environmental Conditions present at, on, in or under, or migrating and/or emanating to or from the Site, that were generated by or brought or caused to be brought on the Site by any act or omission of Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible; (b) those Hazardous Environmental Conditions identified in paragraph C above; and (c) the creation or exacerbation of any Hazardous Environmental Condition due to the negligence, recklessness or willful misconduct of Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify, defend and hold harmless the Owner-Related Parties from and against all claims, losses, damages, liabilities and expenses, including attorneys' fees and expenses, arising out of or resulting from (a), (b) and/or (c) above.
- H. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

5.07 *Historical Artifacts.*

- A. All articles of historical or scientific value, including but not limited to coins, fossils, and articles of antiquity, which may be uncovered by Contractor during the progress of the Work shall become Owner's property. Such findings shall be reported immediately to Owner, who will determine the method of removal, where necessary, and the final disposition thereof. If Contractor establishes that such discoveries have directly and materially impacted Contractor's cost or time of performance, then Contractor will be entitled to submit a request for an adjustment to the Contract Price and/or Contract Time(s) to the extent Contractor's cost and/or time of performance have been adversely impacted by the presence, removal or remediation of unknown Hazardous Environmental Conditions. Entitlement to any such adjustment is subject to the provisions of Paragraphs 4.05.D, 4.05.E, 11.07, and 11.08.

ARTICLE 6—BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of Contractor's obligations under the Contract. These bonds must remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the terms of a prescribed bond form, the Supplementary Conditions, or other provisions of the Contract.
- B. Contractor shall also furnish such other bonds (if any) as are required by the Supplementary Conditions or other provisions of the Contract.
- C. All bonds must be in the form included in the Bidding Documents or otherwise specified by Owner prior to execution of the Contract, except as provided otherwise by Laws or Regulations, and must be issued and signed by a surety named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Department Circular 570 (as amended and supplemented) by the Bureau of the Fiscal Service, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority must show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.
- D. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue bonds in the required amounts.
- E. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner in writing and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which must comply with the bond and surety requirements above.
- F. If Contractor has failed to provide Owner with a required bond within the time required by Paragraph 2.01.A, Owner may exclude the Contractor from the Site and exercise Owner's termination for cause rights under Article 16.
- G. Upon request to Owner from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Owner shall provide a copy of the payment bond to such person or entity.
- H. Upon request to Contractor from any Subcontractor, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, Contractor shall provide a copy of the payment bond to such person or entity.

6.02 *Insurance—General Provisions*

- A. Owner and Contractor shall obtain and maintain insurance as required in this article and in the Supplementary Conditions.
- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized in the Commonwealth of Virginia to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- C. Alternative forms of insurance coverage, including but not limited to self-insurance and “Occupational Accident and Excess Employer’s Indemnity Policies,” are not sufficient to meet the insurance requirements of this Contract, unless expressly allowed in the Supplementary Conditions.
- D. Contractor shall deliver to Owner, with copies to each additional insured identified in Paragraph 6.03.C, certificates of insurance and endorsements establishing that Contractor has obtained and is maintaining the policies and coverages required by the Contract. Upon request by Owner or any other additional insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, full disclosure of all relevant exclusions, and evidence of insurance required to be purchased and maintained by Subcontractors or Suppliers. In any documentation furnished under this provision, Contractor, Subcontractors, and Suppliers may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those applicable to this Contract.
- E. Owner shall deliver to Contractor, with copies to each additional insured identified in Paragraph 6.03.C, certificates of insurance and endorsements establishing that Owner has obtained and is maintaining the policies and coverages required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies, documentation of applicable self-insured retentions (if allowed) and deductibles, and full disclosure of all relevant exclusions. In any documentation furnished under this provision, Owner may block out (redact) (1) any confidential premium or pricing information and (2) any wording specific to a project or jurisdiction other than those relevant to this Contract.
- F. Failure of Owner or Contractor to demand such certificates or other evidence of the other party’s full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, will not be construed as a waiver of the other party’s obligation to obtain and maintain such insurance.
- G. Contractor shall require:
 - 1. Subcontractors to purchase and maintain worker’s compensation, commercial general liability, and other insurance that is appropriate for their participation in the

- Project, and to name as additional insureds those set forth in Paragraph 6.03.C) on each Subcontractor's commercial general liability and automobile liability insurance policy; and
2. Suppliers to purchase and maintain commercial general liability and any other insurance that is appropriate for their participation in the Project.
- H. If either party does not purchase or maintain the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.
- I. If Contractor has failed to provide Owner with the documents required by Paragraph 2.01.B within the time required by Paragraph 2.01.B, or has failed to maintain required insurance, Contractor's entitlement to enter or remain at the Site will end immediately, and Owner may impose an appropriate set-off against payment for any associated costs (including but not limited to the cost of purchasing necessary insurance coverage), and exercise Owner's termination for cause rights under Article 16.
- J. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect (but is in no way obligated) to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price will be adjusted accordingly.
- K. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests. Contractor is responsible for determining whether such coverage and limits are adequate to protect its interests, and for obtaining and maintaining any additional insurance that Contractor deems necessary.
- L. The insurance and insurance limits required herein are minimums and will not be deemed as a limitation on Contractor's liability, or that of its Subcontractors or Suppliers, under the indemnities granted to Owner and other individuals and entities in the Contract or otherwise.
- M. All the policies of insurance required to be purchased and maintained under this Contract will contain a provision or endorsement that the coverage afforded will not be canceled, or renewal refused, until at least 30 days prior written notice (10 days if cancellation is for non-payment) has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to Owner and all other additional insureds.

6.03 Contractor's Insurance

- A. *Required Insurance:* Contractor shall purchase and maintain Worker's Compensation, Commercial General Liability, Automobile Liability (unless the contractor does not own or lease any vehicles, in which case, hired and non-owned coverage is to be provided as part of the Commercial General Liability) and other insurance pursuant to the specific requirements of the Supplementary Conditions.

B. *General Provisions:* The policies of insurance required by this Paragraph 6.03 as supplemented must:

1. include at least the specific coverages required;
2. be written for not less than the limits provided, or those required by Laws or Regulations, whichever is greater;
3. remain in effect at least until the Work is complete (as set forth in Paragraph 15.06.D), and longer if expressly required elsewhere in the Supplementary Conditions or elsewhere in this Contract, and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract. In no case shall the period of coverage be terminated before a period ending one year after issuance of the final payment;
4. apply with respect to the performance of the Work, whether such performance is 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; and
5. include a waiver of subrogation in favor of the Owner and all additional insureds with regard to any claim covered by the insurance policies herein required; Such requirement for insurance policies to include waivers of subrogation shall also apply to any insurances required of subcontractors as denoted herein; and
6. include all necessary endorsements to support the stated requirements.

Contractor shall be responsible for any deductibles or self-insured retentions applicable to insurance policies carried as a result of these requirements.

C. *Additional Insureds:* The Contractor's commercial general liability, automobile liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies, if required by this Contract, must:

1. include and list as additional insureds the Owner-Related Parties, and any individuals or entities identified as additional insureds in the Supplementary Conditions;
2. include coverage for the respective officers, directors, members, partners, employees, and consultants of all such additional insureds;
3. afford primary coverage to these additional insureds for all claims covered thereby (including as applicable those arising from both ongoing and completed operations);
4. not seek contribution from insurance maintained by the additional insured; and
5. as to commercial general liability insurance, apply to additional insureds with respect to liability caused in whole or in part by Contractor's acts or omissions, or the acts and omissions of those working on Contractor's behalf, in the performance of Contractor's operations.

6.04 *Builder's Risk and Other Property Insurance*

- A. *Builder's Risk*: As provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the Work's full insurable replacement cost (subject to such deductible amounts as may be commercially appropriate unless specifically provided for in the Supplementary Conditions or required by Laws and Regulations). Owner shall be an insured on the policy as its interests may appear.
- B. *Property Insurance for Facilities of Owner Where Work Will Occur*: In addition to the limited coverage for existing property under builder's risk, the Owner is responsible for obtaining and maintaining property insurance covering each existing structure, building, or facility in which any part of the Work will occur, or to which any part of the Work will attach or be adjoined. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis.
- C. *Property Insurance for Substantially Complete Facilities*: Promptly after Substantial Completion, and before actual occupancy or use of the substantially completed Work, Owner will obtain property insurance for such substantially completed Work, and maintain such property insurance at least until the Work is complete, as set forth in Paragraph 15.06.D. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, and provide coverage consistent with that required for the builder's risk insurance. The builder's risk insurance may terminate upon written confirmation of Owner's procurement of such property insurance.
- D. *Partial Occupancy or Use by Owner*: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, as provided in Paragraph 15.04, then Owner will provide Contractor advance notice of such occupancy or use and request that the Contractor provide such notice to the builder's risk insurer, and obtain an endorsement consenting to the continuation of coverage prior to commencing such partial occupancy or use.
- E. *Insurance of Other Property; Additional Insurance*: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, then the entity or individual owning such property item will be responsible for insuring it. If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.04, it may do so at Contractor's expense.

6.05 *Property Losses; Subrogation*

- A. The builder's risk insurance policy purchased and maintained in accordance with Paragraph 6.04 (or an installation floater policy if authorized by the Supplementary Conditions), will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder.
 - 1. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils, risks, or causes of loss covered

by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against the Engineer, Owner's Consultant, Project Representative, and all individuals or entities identified in the Supplementary Conditions as builder's risk or installation floater insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused.

2. None of the above waivers extends to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.

B. Contractor shall be responsible for assuring that each Subcontract contains provisions whereby the Subcontractor waives all rights against the Owner-Related Parties and all individuals or entities identified in the Supplementary Conditions as insureds, for all losses and damages caused by, arising out of, relating to, or resulting from fire or other peril, risk, or cause of loss covered by builder's risk insurance, installation floater, and any other property insurance applicable to the Work.

6.06 *Receipt and Application of Property Insurance Proceeds*

A. Any insured loss under the builder's risk and other policies of property insurance required by Paragraph 6.04 will be adjusted and settled with the named insured that purchased the policy unless the loss was sustained by the Owner as an additional insured on the Contractor's builder's risk policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.

B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause or additional insured clause. A named insured receiving insurance proceeds of \$500,000 or more under the builder's risk and other policies of insurance required by Paragraph 6.04 shall maintain such proceeds in a segregated account, and distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.

C. If no other special agreement is reached, Contractor shall repair or replace the damaged Work, using allocated insurance proceeds.

ARTICLE 7—CONTRACTOR'S RESPONSIBILITIES

7.01 *Contractor's Means and Methods of Construction*

A. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.

B. If the Contract Documents note, or Contractor determines, that professional engineering or other design services are needed to carry out Contractor's responsibilities for construction means, methods, techniques, sequences, and

procedures, or for Site safety, then Contractor shall cause such services to be provided by a properly licensed design professional, at Contractor's expense. Such services are not Owner-delegated professional design services under this Contract, and Owner has no responsibility with respect to (1) Contractor's determination of the need for such services, (2) the qualifications or licensing of the design professionals retained or employed by Contractor, (3) the performance of such services, or (4) any errors, omissions, or defects in such services.

7.02 *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.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who will not be replaced without written notice to Owner except under extraordinary circumstances. Contractor's superintendent will be Contractor's representative at the Site and shall have authority to act on behalf of Contractor. All communication given to or received from Contractor's superintendent shall be binding on Contractor. Contractor's superintendent must be acceptable to Owner.

7.03 *Labor; Working Hours*

- A. Contractor shall provide competent, skilled, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall maintain good discipline and order at the Site. Contractor shall, upon demand from Owner, immediately remove any manager, superintendent, foreman or workman whom Owner may consider incompetent or undesirable.
- B. Contractor shall be fully responsible to Owner for all acts and omissions of Contractor's employees; of Suppliers and Subcontractors, and their employees; and of any other individuals or entities performing or furnishing any of the Work, just as Contractor is responsible for Contractor's own acts and omissions.
- C. 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 will be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or Owner's observed holidays only with Owner's written consent, which will not be unreasonably withheld. Regular working hours shall be defined as 7 a.m. to 6 p.m. unless otherwise approved in advance by Owner.

7.04 *Services, Materials, and Equipment*

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

- B. All materials and equipment incorporated into the Work must be new and of good quality, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications will expressly run to the benefit of Owner. If required by Owner, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment must 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.
- D. Without limiting the responsibility or liability of Contractor pursuant to this Agreement, all warranties given by manufacturers on materials or equipment incorporated in the Work are hereby assigned by Contractor to Owner. If requested, Contractor shall execute formal assignments of said manufacturer's warranties to Owner. All such warranties shall be directly enforceable by Owner. Such assignment shall in no way affect Contractor's responsibilities and duties during the warranty period

7.05 "Or Equals"

- A. *Contractor's Request; Governing Criteria:* Whenever an item of equipment or material is specified or described in the Contract Documents by using the names of one or more proprietary items or specific Suppliers, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Owner authorize the use of other items of equipment or material, or items from other proposed Suppliers, under the circumstances described below.
 - 1. If Owner in its sole discretion determines that an item of equipment or material proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Owner will deem it an "or equal" item. For the purposes of this paragraph, a proposed item of equipment or material will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Owner determines that the proposed item:
 - 1) is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole; and
 - 3) has a proven record of performance and availability of responsive service.
 - b. Contractor certifies that, if the proposed item is approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and

- 2) the item will conform substantially to the detailed requirements of the item named in the Contract Documents.
- B. *Contractor's Expense*: Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.
- C. *Owner's Evaluation and Determination*: Owner will evaluate each "or-equal" request. Owner may require Contractor to furnish additional data about the proposed "or-equal" item. Owner will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Owner determines that the proposed item is an "or-equal," which will be evidenced by an approved Shop Drawing or other written communication. Owner will advise Contractor in writing of any negative determination.
- D. *Effect of Owner's Determination*: Neither approval nor denial of an "or-equal" request will result in any change in Contract Price. Owner's denial of an "or-equal" request will be final and binding.
- E. *Treatment as a Substitution Request*: If Owner determines that an item of equipment or material proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Owner consider the item a proposed substitute pursuant to Paragraph 7.06.

7.06 Substitutes

- A. *Contractor's Request; Governing Criteria*: Unless the specification or description of an item of equipment or material required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Owner authorize the use of other items of equipment or material under the circumstances described below. To the extent possible such requests must be made before commencement of related construction at the Site.
 1. Contractor shall submit sufficient information as provided below to allow Owner to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Owner will not accept requests for review of proposed substitute items of equipment or material from anyone other than Contractor.
 2. The requirements for review by Owner will be as set forth in Paragraph 7.06.B, as supplemented by the Specifications, and as Owner may decide is appropriate under the circumstances.
 3. Contractor shall make written application to Owner for review of a proposed substitute item of equipment or material that Contractor seeks to furnish or use. The application:
 - a. will certify that the proposed substitute item will:
 - 1) perform adequately the functions and achieve the results called for by the general design;
 - 2) be similar in substance to the item specified; and
 - 3) be suited to the same use as the item specified.

- b. will state:
 - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times;
 - 2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item; and
 - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
 - c. will identify:
 - 1) all variations of the proposed substitute item from the item specified; and
 - 2) available engineering, sales, maintenance, repair, and replacement services.
 - d. will contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. *Owner's Evaluation and Determination:* Owner will evaluate each substitute request. Owner may require Contractor to furnish additional data about the proposed substitute item. Owner will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Owner's review is complete and Owner determines that the proposed item is an acceptable substitute. Owner's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Owner will advise Contractor in writing of any negative determination.
- C. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- D. *Reimbursement of Engineer's Cost:* Whether or not Owner approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- E. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute at Contractor's expense.
- F. *Effect of Owner's Determination:* If Owner approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. Owner's denial of a substitution request will be final and binding, and may not be reversed through an appeal under any provision of the Contract. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.06.D, by timely submittal of a Change Proposal.

7.07 *Concerning Subcontractors and Suppliers*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner. The Contractor's retention of a Subcontractor or Supplier for the performance of parts of the Work will not relieve Contractor's obligation to Owner to perform and complete the Work in accordance with the Contract Documents.
- B. Contractor shall retain specific Subcontractors and Suppliers for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor or Supplier to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within 5 days.
- E. Owner may require the replacement of any Subcontractor or Supplier. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors or Suppliers for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor or Supplier so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor or Supplier.
- F. If Owner requires the replacement of any Subcontractor or Supplier retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.
- G. No acceptance by Owner of any such Subcontractor or Supplier, whether initially or as a replacement, will constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.
- H. On a monthly basis, Contractor shall submit to Owner a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors and Suppliers.
- J. The divisions and sections of the Specifications and the identifications of any Drawings do not control Contractor in dividing the Work among Subcontractors or Suppliers, or in delineating the Work to be performed by any specific trade.

- K. All Work performed for Contractor by a Subcontractor or Supplier must be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract for the benefit of Owner.
- L. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor for Work performed for Contractor by the Subcontractor or Supplier.
- M. Contractor shall restrict all Subcontractors and Suppliers from communicating with Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed in this Contract.

7.08 *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 an 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, 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 will be disclosed in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless the Owner-Related Parties 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. Additionally, in the event Owner is enjoined from the operation or use of the Work or any part thereof in connection with any dispute resolution proceeding, Contractor shall (at its sole expense) take all reasonable steps possible to procure for Owner the right to operate or use the Work or part thereof. If Contractor cannot so procure the aforesaid right within a reasonable time, Contractor shall then promptly (at Contractor's sole expense): (i) modify the Work so as to avoid infringement of any patent or other proprietary interest, or (ii) replace said Work with Work that does not infringe or violate any such patent or other proprietary interest, or (iii) remove said Work and refund any compensation theretofore paid to Contractor and pay to Owner any transportation costs and other expenses that may have been paid or incurred by them in connection with the Work so removed.

7.09 *Permits*

- A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits, licenses, and certificates of occupancy. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when

Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

7.10 *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.

7.11 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Owner shall not be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless the Owner-Related Parties from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It is not Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this does not relieve Contractor of its obligations under Paragraph 3.03.
- C. Owner or Contractor may give written notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such written notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.
- D. Contractor shall keep fully informed of all Laws and Regulations in any manner affecting those engaged or employed in the Work or the materials used in the Work or in any way affecting the conduct of the Work.
- E. During the performance of the Contract, Contractor agrees as follows:
 - 1. Contractor will not discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin, age, disability, or other basis prohibited by state law relating to discrimination in employment, except where there is a bona fide occupational qualification reasonably necessary to the normal operation of Contractor. Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause.
 - 2. Contractor, in all solicitations or advertisements for employees placed by or on behalf of Contractor, will state that such Contractor is an equal opportunity employer.

3. Notices, advertisements and solicitations placed in accordance with federal law, rule or regulation shall be deemed sufficient for the purpose of meeting the requirements of this paragraph.
 4. Contractor will include the provisions of the foregoing Paragraphs 1-3 in every subcontract or purchase order over \$10,000, so that the provisions will be binding upon each Subcontractor and Supplier.
- F. During the performance of this Contract, Contractor agrees to: (i) provide a drugfree workplace for Contractor's employees; (ii) post in conspicuous places, available to employees and applicants for employment, a statement notifying employees that the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana is prohibited in Contractor's workplace and specifying the action will be taken against employees or violations of such prohibition; (iii) state in all solicitations or advertisements for employees placed by or on behalf of Contractor that Contractor maintains a drug-free workplace; and (iv) include the provisions of the foregoing clauses in every subcontract or purchase order of over \$10,000, so that the provisions will be binding upon each Subcontractor and Supplier.
- G. Contractor represents that it does not, and during the performance of this Contract, it shall not, knowingly employ an unauthorized alien as defined in the federal Immigration Reform and Control Act of 1986.
- H. Contractor represents that if it is organized as a stock or non-stock corporation, limited liability company, business trust or limited partnership or registered as a registered limited liability partnership, it is authorized to transact business in the Commonwealth of Virginia as a domestic or foreign business entity if required by law, and that it shall not allow its existence to lapse or its certificate of authority or registration to transact business in the Commonwealth of Virginia, if so required by law, to be revoked or cancelled at any time during the term of this Contract.
- I. Contractor acknowledges that Owner does not discriminate against faith-based organizations.

7.12 *Record Documents*

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

7.13 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property

in the performance of their work, nor for compliance with applicable safety Laws and Regulations.

- B. Contractor shall designate a qualified and experienced safety representative whose duties and responsibilities are the prevention of Work-related accidents and the maintenance and supervision of safety precautions and programs. This safety representative shall work with Owner to ensure that no construction activities at the Site infringe upon any activities of Owner or its employees or the existing facilities located at the Site. Further, the safety representative shall work closely with Owner to ensure that Contractor's emergency plans do not adversely affect or infringe upon the emergency or regular operations of Owner's existing facilities or its emergency plans and operations.
- C. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
 - 1. all persons on the Site or who may be affected by the Work;
 - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- D. All damage, injury, or loss to any property referred to in Paragraph 7.13.C.2 or 7.13.C.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or 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). If Contractor has not restored damaged property within 48 hours of written notice by Owner, or sooner in the case of an emergency, Owner may proceed with restoration of the property, improvements, or facilities deemed necessary. The cost thereof will be deducted from and monies due or which may become due Contractor under the Contract.
- E. 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.
- F. Contractor shall notify Owner; the owners of adjacent property; the owners of Underground Facilities and other utilities (if the identity of such owners is known to Contractor); and other contractors and utility owners performing work at or adjacent to the Site, in writing, when Contractor knows that prosecution of the Work may affect

them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.

- G. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. Any Owner's safety programs that are applicable to the Work are identified or included in the Supplementary Conditions or Specifications.
- H. Contractor shall inform Owner of the specific requirements of Contractor's safety program with which Owner's employees and representatives must comply while at the Site.
- I. Contractor's duties and responsibilities for safety and protection will continue until all the Work is completed, Owner has issued a written notice to Contractor in accordance with Paragraph 15.06.C that the Work is acceptable, and Contractor has left the Site (except as otherwise expressly provided in connection with Substantial Completion).
- J. Contractor's duties and responsibilities for safety and protection will resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.
- K. Owner reserves the right to suspend the Work or any portion thereof if, in its reasonable judgment, Contractor has or is violating the Contract or any requirement thereof, including but not limited to violations of Owner's safety programs or any Law or Regulation related to jobsite safety. Contractor shall not receive any adjustment in the Contract Price or Contract Time on the basis of such suspension, even if it is determined that no violation actually existed.

7.14 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of safety data sheets (formerly known as 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.
- B. Contractor shall inform Owner of safety data sheets and hazard communications requirements to further ensure that Owner's employees and representatives are not exposed to hazards associated with any portion of the Project in which Owner's employees and representatives do not have prior specific knowledge.

7.15 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent damage, injury, or loss. Contractor shall give Owner prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused by an emergency, or are required as a result of Contractor's response to an emergency. If Owner determines that a change in the Contract Documents is required because of an emergency or Contractor's response, a Work Change Directive or Change Order will be issued.
- B. Contractor shall immediately inform Owner if any condition exists or occurs which has the potential to inflict or cause an environmental health or safety risk to any employee or property of Owner.

7.16 *Submittals*

A. *Shop Drawing and Sample Requirements*

1. Before submitting a Shop Drawing or Sample, Contractor shall:
 - a. review and coordinate the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determine and verify:
 - 1) all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to the Submittal;
 - 2) the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - 3) all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto;
 - c. confirm that the Submittal is complete with respect to all related data included in the Submittal.
2. Each Shop Drawing or Sample must bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that Submittal, and that Contractor approves the Submittal.
3. With each Shop Drawing or Sample, Contractor shall give Owner specific written notice of any variations that the Submittal may have from the requirements of the Contract Documents. This notice must be set forth in a written communication separate from the Submittal; and, in addition, in the case of a Shop Drawing by a specific notation made on the Shop Drawing itself.

B. *Submittal Procedures for Shop Drawings and Samples*: Contractor shall label and submit Shop Drawings and Samples to Owner for review and approval in accordance with the accepted Schedule of Submittals.

1. Shop Drawings
 - a. Contractor shall submit the number of copies required in the Specifications.
 - b. Data shown on the Shop Drawings must be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Owner the services, materials, and equipment Contractor proposes to provide, and to enable Owner to review the information for the limited purposes required by Paragraph 7.16.C.
2. Samples
 - a. Contractor shall submit the number of Samples required in the Specifications.

- b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Owner may require to enable Owner to review the Submittal for the limited purposes required by Paragraph 7.16.C.
3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Owner's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. Owner's Review of Shop Drawings and Samples

1. Owner will provide timely review of Shop Drawings and Samples in accordance with the accepted Schedule of Submittals. Owner's review and approval will be only to determine if the items covered by the Submittals will, after installation or incorporation in the Work, comply with the requirements of 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. Owner's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction, or to safety precautions or programs incident thereto.
3. Owner's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
4. Owner's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Owner has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Owner will document any such approved variation from the requirements of the Contract Documents in a Field Order or other appropriate Contract modification.
5. Owner's review and approval of a Shop Drawing or Sample will not relieve Contractor from responsibility for complying with the requirements of Paragraphs 7.16.A and B.
6. Owner's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, will not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
7. Neither Owner's receipt, review, acceptance, or approval of a Shop Drawing or Sample will result in such item becoming a Contract Document.
8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.C.4.

D. Resubmittal Procedures for Shop Drawings and Samples

1. Contractor shall make corrections required by Owner 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 Owner on previous Submittals.
2. Contractor shall furnish required Shop Drawing and Sample submittals with sufficient information and accuracy to obtain required approval of an item with no more than two resubmittals. Contractor shall be responsible for Engineer's charges to Owner for reviewing a third or subsequent resubmittal of a Shop Drawing or Sample. Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved Shop Drawing or Sample, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

E. Submittals Other than Shop Drawings, Samples, and Owner-Delegated Designs

1. The following provisions apply to all Submittals other than Shop Drawings, Samples, and Owner-delegated designs:
 - a. Contractor shall submit all such Submittals to Owner in accordance with the Schedule of Submittals and pursuant to the applicable terms of the Contract Documents.
 - b. Owner will provide timely review of all such Submittals in accordance with the Schedule of Submittals and return such Submittals with a notation of either Accepted or Not Accepted. Any such Submittal that is not returned within the time established in the Schedule of Submittals will be deemed accepted.
 - c. Owner's review will be only to determine if the Submittal is acceptable under the requirements of the Contract Documents as to general form and content of the Submittal.
 - d. If any such Submittal is not accepted, Contractor shall confer with Owner regarding the reason for the non-acceptance, and resubmit an acceptable document.
2. Procedures for the submittal and acceptance of the Progress Schedule, the Schedule of Submittals, and the Schedule of Values are set forth in Paragraphs 2.03, 2.04, and 2.05.

F. Owner-delegated Designs: Submittals pursuant to Owner-delegated designs are governed by the provisions of Paragraph 7.19.

7.17 Contractor's General Warranty and Guarantee

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective.

- B. Owner's rights under this warranty and guarantee are in addition to, and are not limited by, Owner's rights under the correction period provisions of Paragraph 15.08. The time in which Owner may enforce its warranty and guarantee rights under this Paragraph 7.17 is limited only by applicable Laws and Regulations restricting actions to enforce such rights; provided, however, that after the end of the correction period under Paragraph 15.08:
 - 1. Owner shall give Contractor written notice of any defective Work within 60 days of the discovery that such Work is defective; and
 - 2. Such notice will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the notice.
 - C. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 - 1. abuse, or improper modification, 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.
 - D. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents, a release of Contractor's obligation to perform the Work in accordance with the Contract Documents, or a release of Owner's warranty and guarantee rights under this Paragraph 7.17:
 - 1. Observations by Owner;
 - 2. Payment by Owner of any progress or final payment;
 - 3. The issuance of a certificate of Substantial Completion by Owner or any payment related thereto by Owner;
 - 4. Use or occupancy of the Work or any part thereof by Owner;
 - 5. Any review and approval of a Shop Drawing or Sample submittal;
 - 6. The issuance of a notice of acceptability by Owner;
 - 7. The end of the correction period established in Paragraph 15.08;
 - 8. Any inspection, test, or approval by others; or
 - 9. Any correction of defective Work by Owner.
 - E. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract will govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.
- 7.18 *Indemnification*
- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify

and hold harmless the Owner-Related Parties from losses, damages, costs, and judgments (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 from third-party claims or actions relating to or resulting from the performance or furnishing of the Work, provided that any such claim, action, loss, cost, judgment or damage is attributable to bodily injury, sickness, disease, or death, or to damage to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, but only to the extent caused by the intentional misconduct or any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable. Nothing herein shall require Contractor to indemnify any Owner-Related Parties for losses, damages, costs or judgments arising out of such party's own negligence.

- B. In any and all claims against an Owner-Related Party by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A will 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.

7.19 *Delegation of Professional Design Services*

- A. Owner may require Contractor to provide professional design services for a portion of the Work by express delegation in the Contract Documents. Such delegation will specify the performance and design criteria that such services must satisfy, and the Submittals that Contractor must furnish to Owner with respect to the Owner-delegated design.
- B. Contractor shall cause such Owner-delegated professional design services to be provided pursuant to the professional standard of care by a properly licensed design professional, whose signature and seal must appear on all drawings, calculations, specifications, certifications, and Submittals prepared by such design professional. Such design professional must issue all certifications of design required by Laws and Regulations.
- C. If a Shop Drawing or other Submittal related to the Owner-delegated design is prepared by Contractor, a Subcontractor, or others for submittal to Owner, then such Shop Drawing or other Submittal must bear the written approval of Contractor's design professional when submitted by Contractor to Owner.
- D. Owner shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, and approvals performed or provided by the design professionals retained or employed by Contractor under an Owner-delegated design, subject to the professional standard of care and the performance and design criteria stated in the Contract Documents.

- E. Pursuant to this Paragraph 7.19, Owner's review, approval, and other determinations regarding design drawings, calculations, specifications, certifications, and other Submittals furnished by Contractor pursuant to an Owner-delegated design will be only for the following limited purposes:
 - 1. Checking for conformance with the requirements of this Paragraph 7.19;
 - 2. Confirming that Contractor (through its design professionals) has used the performance and design criteria specified in the Contract Documents; and
 - 3. Establishing that the design furnished by Contractor is consistent with the design concept expressed in the Contract Documents.
- F. Contractor shall not be responsible for the adequacy of performance or design criteria specified by Owner.
- G. Contractor is not required to provide professional services in violation of applicable Laws and Regulations.

ARTICLE 8—OTHER WORK AT THE SITE

8.01 *Other Work*

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site. The parties acknowledge, however, that the Site is an active work location for Owner and shall remain such for the duration of this Project, and that Contractor shall in no way interfere with or impede Owner's regular business activities.
- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any third-party utility work that Owner has arranged to take place at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford proper and safe access to the Site to each contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work.
- D. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Owner and the others whose work will be affected.

- E. If the proper execution or results of any part of Contractor's Work depends upon work performed by others, Contractor shall inspect such other work and promptly report to Owner 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.
- F. The provisions of this article are not applicable to work that is performed by third-party utilities or other third-party entities without a contract with Owner, or that is performed without having been arranged by Owner. If such work occurs, then any related delay, disruption, or interference incurred by Contractor is governed by the provisions of Paragraph 4.05.C.3.

8.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, then Owner shall be responsible for coordinating such entities with work of Contractor.
- B. Owner intends to have coordination meetings among Contractor and such other entities in an effort to manage the overall program associated with the work being performed at the Site. Contractor agrees that it will attend and participate in these logistics meetings and shall cooperate with Owner and such other entities to the extent reasonably necessary for the performance by such other entities of their work.

8.03 *Legal Relationships*

- A. If, in the course of performing other work for Owner at or adjacent to the Site, the Owner's employees, any other contractor working for Owner, or any utility owner that Owner has arranged to perform work, causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment will take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract, and any remedies available to Contractor under Laws or Regulations concerning utility action or inaction. When applicable, any such equitable adjustment in Contract Price will be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times or Contract Price is subject to the provisions of Paragraphs 4.05.D and 4.05.E.

- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site.
1. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this Paragraph 8.03.B.
 2. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due Contractor.
- C. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor or an Owner-Related Party, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner; and (2) indemnify and hold harmless the Owner-Related Party from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9—OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Owner and, if so designated in the Contract Documents, Owner's Project Representative or Owner's Consultant.

9.02 *Replacement of Engineer*

- A. Owner may at its discretion appoint an engineer to replace Engineer. The replacement engineer's status under the Contract Documents will be that of the former Engineer.

9.03 *Furnish Data*

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

9.04 *Pay When Due*

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

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

- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
- B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
- C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

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

9.07 *Change Orders*

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

9.08 *Inspections, Tests, and Approvals*

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

9.09 *Limitations on Owner's Responsibilities*

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

9.10 *Undisclosed Hazardous Environmental Condition*

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

9.11 *Safety Programs*

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

9.12 *Other Responsibilities*

- A. The foregoing Paragraphs 9.01 through 9.11 shall not be construed to limit the other responsibilities of Owner set forth in these General Conditions.

ARTICLE 10— OWNER’S ROLE AND RIGHTS DURING CONSTRUCTION

10.01 *General*

- A. This Article 10 generally establishes Owner’s role and rights during construction, with the understanding that such role and rights are inclusive of other roles and rights that are set forth elsewhere in these General Conditions and other Contract Documents.
- B. Owner shall have the right to stop work whenever, in its sole discretion, Owner determines that such action is needed to prevent improper execution of the Work or to otherwise project Owner's interests.

10.02 *Owner’s Representative*

- A. Owner may furnish a Project Representative to assist Owner in providing more extensive observation of the Work or fulfill other responsibilities of Owner. If Owner elects to furnish a Project Representative, then Owner will notify Contractor in writing of the identity, authority and responsibilities of any such Project Representative.

10.03 *Clarifications and Interpretations*

- A. Owner will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents as Owner may determine necessary, which shall be consistent with the intent of and reasonably inferable from the Contract Documents. Such written clarifications and interpretations shall be binding on Contractor. If Contractor disagrees with such clarifications and interpretations, 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, it may pursue its rights to submit a Claim in accordance with Article 12 hereof.

10.04 *Authorized Variations in Work*

- A. Owner 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 shall be binding on the Contractor, who shall perform the Work involved promptly. If the Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of such adjustment, it may pursue its rights to submit a Claim in accordance with Article 12 hereof.

10.05 *Rejecting Defective Work*

- A. Owner shall have authority to disapprove or reject Work which Owner believes to be defective, or that Owner 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. Owner shall also have authority to require special inspection or testing of the Work as

provided in Paragraph 14.4, whether or not the Work is fabricated, installed, or completed.

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

- A. Owner will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work.

10.07 *Limitations on Owner's Responsibilities*

- A. Owner 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. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- B. Owner 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.
- C. Owner'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 Contractor under Paragraph 15.06.A, will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.
- D. The limitations upon authority and responsibility set forth in this Paragraph 10.07 also apply to the Project Representative and Owner's Consultant, if any.

ARTICLE 11—CHANGES TO THE CONTRACT

11.01 *Amending and Supplementing the Contract*

- A. The Contract may be amended or supplemented by a Change Order, a Work Change Directive, a Field Order, or a written amendment signed by Owner and Contractor.
- B. If an amendment or supplement to the Contract includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order.
- C. All changes to the Contract must be approved by the Owner.

11.02 *Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders covering:
 - 1. Changes in Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;

2. Changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
 3. Changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.05, (b) required because of Owner's acceptance of defective Work under Paragraph 14; or (c) otherwise agreed upon in writing by the parties to be a change in the Work; and
 4. Changes that embody the substance of any final and binding results under: Paragraph 11.03.B, resolving the impact of a Work Change Directive; Paragraph 11.09, concerning Change Proposals; Article 12, Claims; Paragraph 13.02.D, final adjustments resulting from allowances; Paragraph 13.03.D, final adjustments relating to determination of quantities for Unit Price Work; and similar provisions.
- B. If Contractor refuses to execute a Change Order that is required to be executed under the terms of Paragraph 11.02.A, it will be deemed to be of full force and effect, as if fully executed.
- C. Contractor agrees that duly executed Change Orders will constitute full resolution of all Contractor's rights arising out of or related to the subject matter of the Change Order, including but not limited to time extensions, delays, disruption and cumulative impact.

11.03 *Work Change Directives*

- A. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.07 regarding change of Contract Price.
- B. If Owner has issued a Work Change Directive and Contractor believes that an adjustment in Contract Times or Contract Price is necessary, then Contractor shall submit any Change Proposal seeking such an adjustment no later than 30 days after the completion of the Work set out in the Work Change Directive.

11.04 *Field Orders*

- A. Owner may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Contractor, which shall perform the Work involved promptly, unless the provisions of Paragraph B below are applicable.
- B. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, then it shall, before proceeding with the Work, provide written notice to Owner of such position within three (3) days of its receipt of the Field Order. Contractor shall not proceed with the work until directed by Owner. If directed by

Owner to proceed with the work, Contractor shall submit a Change Proposal within (ten) days of its receipt of the directive. Contractor's failure to provide the 3-day written notice set forth above shall constitute a waiver of Contractor's right to seek an adjustment in the Contract Price or Contract Times for the Field Order.

11.05 *Owner-Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work.
- B. Such changes in the Work may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work must be performed under the applicable conditions of the Contract Documents.
- C. Nothing in this Paragraph 11.05 obligates Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.06 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.C.2.

11.07 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment of Contract Price must comply with the provisions of Article 12.
- B. An adjustment in the Contract Price will be determined as follows:
 - 1. Where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03);
 - 2. Where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.07.C.2); or
 - 3. Where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.07.C).

- C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit will be determined as follows:
1. A mutually acceptable fixed fee; or
 2. If a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. For costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee will be 15 percent;
 - b. For costs incurred under Paragraph 13.01.B.3, the Contractor's fee will be 5 percent;
 - c. Where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.07.C.2.a and 11.07.C.2.b is that the Contractor's fee will be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2 by the Subcontractor that actually per 13.01.B1 and 13.01.B2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of 5 percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted Work the maximum total fee to be paid by Owner will be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the Work;
 - d. No fee will be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
 - e. The amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in Cost of the Work will be the amount of the actual net decrease in Cost of the Work and a deduction of an additional amount equal to 5 percent of such actual net decrease in Cost of the Work; and
 - f. When both additions and credits are involved in any one change or Change Proposal, the adjustment in Contractor's fee will be computed by determining the sum of the costs in each of the cost categories in Paragraph 13.01.B (specifically, payroll costs, Paragraph 13.01.B.1; incorporated materials and equipment costs, Paragraph 13.01.B.2; Subcontract costs, Paragraph 13.01.B.3; special consultants costs, Paragraph 13.01.B.4; and other costs, Paragraph 13.01.B.5) and applying to each such cost category sum the appropriate fee from Paragraphs 11.07.C.2.a through 11.07.C.2.e, inclusive.

11.08 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times must comply with the provisions of Paragraph 11.09. Any Claim for an adjustment in the Contract Times must comply with the provisions of Article 12.
- B. Delay, disruption, and interference in the Work, and any related changes in Contract Times, are addressed in and governed by Paragraph 4.05.

11.09 *Change Proposals*

A. *Purpose and Content*: Contractor shall submit a Change Proposal to Owner to request an adjustment in the Contract Times or Contract Price; challenge a set-off against payment due or any other position taken by Owner; or seek other relief under the Contract. The Change Proposal will specify any proposed change in Contract Times or Contract Price, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents. Each Change Proposal will address only one issue, or a set of closely related issues.

B. *Change Proposal Procedures*

1. *Submittal*: Contractor shall submit each Change Proposal to Owner within 30 days after the start of the event giving rise thereto, or after such initial decision.
2. *Supporting Data*: The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to Owner within 15 days after the submittal of the Change Proposal.
 - a. Change Proposals based on or related to delay, interruption, or interference must comply with the provisions of Paragraphs 4.05.D and 4.05.E.
 - b. Change proposals related to a change of Contract Price must include full and detailed accounts of materials incorporated into the Work and labor and equipment used for the subject Work.

The supporting data must be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event.

3. *Owner's Initial Review*: If in its discretion Owner concludes that additional supporting data is needed before conducting a full review and making a decision regarding the Change Proposal, then Owner may request that Contractor submit such additional supporting data by a date specified, prior to Owner beginning its full review of the Change Proposal.
4. *Owner's Full Review and Action on the Change Proposal*: Upon receipt of Contractor's supporting data (including any additional data requested by Owner), Owner will conduct a full review of each Change Proposal and either approve the Change Proposal in whole, deny it in whole, or approve it in part and deny it in part. Such actions must be in writing and provided to Contractor. If Owner does not take action on the Change Proposal within 60 days, then Contractor may at any time thereafter submit a letter to Owner indicating that as a result of Owner's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.
5. *Binding Decision*: Owner's decision is final and binding upon Contractor, unless Contractor appeals the decision by filing a Claim under Article 12.

11.10 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

ARTICLE 12—CLAIMS

12.01 *Claims*

- A. *Claims Process:* In the event Contractor appeals any Owner decision regarding Change Proposals, the provisions in this article shall govern the appeal.
- B. *Submittal of Claim:* Contractor shall deliver a Claim to Owner promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 21 days of the decision under appeal. The responsibility to substantiate a Claim rests with Contractor. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.
- C. *Review and Resolution:* Owner shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim will be stated in writing and submitted to the other party.
- D. *Partial Approval:* If Owner approves the Claim in part and denies it in part, such action will be final and binding unless within 30 days of such action Contractor invokes the procedure set forth in Article 17 for final resolution of disputes.
- E. *Denial of Claim:* If efforts to resolve a Claim are not successful, Owner may deny it by giving written notice of denial to Contractor. If Owner does not take action on the Claim within 30 days, then as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim will be final and binding unless within 30 days of the denial Contractor invokes the procedure set forth in Article 17 for the final resolution of disputes.
- F. *Final and Binding Results:* If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim will be incorporated in a Change Order or other written document to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13—COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

- A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or
 2. When needed to determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included*: Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work will be in amounts no higher than those commonly incurred in the locality of the Project, will not include any of the costs itemized in Paragraph 13.01.C, and will include only the following items:
1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor in advance of the subject Work. Such employees include, without limitation, foremen, safety representatives, and other personnel (other than any personnel of a position higher than a foreman) employed full time on the Work. Payroll costs for employees not employed full time on the Work will be apportioned on the basis of their time spent on the Work. Payroll costs include, but are not limited to, salaries and wages plus the cost of fringe benefits, which include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, will 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 accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts will accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment will 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, which will then determine 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 will be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed or retained for services specifically related to the Work.
5. Other costs consisting of 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, 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.
 - 1) In establishing included costs for materials such as scaffolding, plating, or sheeting, consideration will be given to the actual or the estimated life of the material for use on other projects; or rental rates may be established on the basis of purchase or salvage value of such items, whichever is less. Contractor will not be eligible for compensation for such items in an amount that exceeds the purchase cost of such item.
 - c. *Construction Equipment Rental*
 - 1) Rentals of all construction equipment and machinery, and the parts thereof, in accordance with rental agreements approved by Owner as to price (including any surcharge or special rates applicable to overtime use of the construction equipment or machinery), and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs will be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts must cease when the use thereof is no longer necessary for the Work.
 - 2) Costs for the use, operating, maintenance, fuel, storage and other costs of all equipment and machinery owned by Contractor or a Contractor-related entity will be paid at the rates established by the most recent version of the Rental Rate Blue Book published by Nielsen/DATAQUEST, Inc. of Palo Alto, California, or its successors. The rental rates to be used shall be the published monthly rate divided by 176 to yield an hourly rate, which hourly rate shall be further adjusted by multiplying it by the Rental Rate Blue Book adjustment rate for the year the equipment was manufactured and by the regional factor contained in the Rental Rate Blue Book estimated hourly operating cost rate.
 - 3) With respect to Work that is the result of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price ("changed Work"), included costs will be based on the time the equipment or machinery is in

use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of any such equipment or machinery, or parts thereof, must cease to accrue when the use thereof is no longer necessary for the changed Work.

- d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
 - e. Deposits lost for causes other than negligence or intentional misconduct 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 builder's risk or other property insurance established in accordance with Paragraph 6.04), provided such losses and damages have resulted from causes other than the negligence or intentional misconduct 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 include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses will be included in the Cost of the Work for the purpose of determining Contractor's fee.
 - g. The cost of utilities, fuel, and sanitary facilities at the Site.
 - h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
 - i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.
- C. *Costs Excluded:* The term Cost of the Work does not include any of the following items:
- 1. Payroll costs and other compensation of Contractor's officers, executives, principals, general managers, personnel above the position of foreman, 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 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
 - 2. The cost of purchasing, renting, or furnishing small tools and hand tools.
 - 3. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.

4. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
5. Costs due to the negligence or intentional misconduct 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.
6. Expenses incurred in preparing and advancing Claims.
7. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. Contractor's Fee

1. When the Work as a whole is performed on the basis of cost-plus-a-fee, then:
 - a. Contractor's fee for the Work set forth in the Contract Documents as of the Effective Date of the Contract will be determined as set forth in the Agreement.
 - b. for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work, Contractor's fee will be determined as follows:
 - 1) When the fee for the Work as a whole is a percentage of the Cost of the Work, the fee will automatically adjust as the Cost of the Work changes.
 - 2) When the fee for the Work as a whole is a fixed fee, the fee for any additions or deletions will be determined in accordance with Paragraph 11.07.C.2.
2. When the Work as a whole is performed on the basis of a stipulated sum, or any other basis other than cost-plus-a-fee, then Contractor's fee for any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price on the basis of Cost of the Work will be determined in accordance with Paragraph 11.07.C.2.

- E. Documentation and Audit:* Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor and pertinent Subcontractors will establish and maintain records of the costs in accordance with generally accepted accounting practices. Subject to prior written notice, Owner will be afforded reasonable access, during normal business hours, to all Contractor's accounts, records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, and similar data relating to the Cost of the Work and Contractor's fee. Contractor shall preserve all such documents for a period of three years after the final payment by Owner. Pertinent Subcontractors will afford such access to Owner, and preserve such documents, to the same extent required of Contractor.

13.02 Allowances

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

- B. *Cash Allowances*: Contractor agrees that:
1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment for any of the foregoing will be valid.
- C. *Owner's Contingency Allowance*: Contractor agrees that an Owner's contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued to reflect actual amounts due Contractor for Work covered by allowances, and the Contract Price will be correspondingly adjusted.

13.03 *Unit Price Work*

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Owner will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Owner will review with Contractor Owner's preliminary determinations on such matters before rendering a written decision thereon. Owner's written decision thereon will be final and binding, and the final adjustment of Contract Price will be set forth in a Change Order, subject to the provisions of the following paragraph.
- E. *Adjustments in Unit Price*
1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:
 - a. the quantity of the item of Unit Price Work performed by Contractor is more than 25% higher or lower than the estimated quantity of such item indicated in the Agreement; and
 - b. Contractor's unit costs to perform the item of Unit Price Work have changed materially and significantly as a result of the quantity change.
 2. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in Contractor's costs to perform

such other Work, such that the resulting overall change in Contract Price is equitable to Owner and Contractor.

3. Adjusted unit prices will apply to all units of that item.

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

14.01 Access to Work

- A. Owner, its consultants and other representatives and personnel, independent testing laboratories, and authorities having jurisdiction have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply with such procedures and programs as applicable.

14.02 Tests, Inspections, and Approvals

- A. Contractor shall give Owner timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.
- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work will be governed by the provisions of Paragraph 14.05.
- C. If Laws or Regulations of any Governmental Unit having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such Governmental Unit, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Owner the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:
 1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
 2. to attain Owner's acceptance of materials or equipment to be incorporated in the Work;
 3. by manufacturers of equipment furnished under the Contract Documents;
 4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
 5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

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

- E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.
- F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Owner, Contractor shall, if requested by Owner, uncover such Work for observation. Such uncovering will be at Contractor's expense unless Contractor had given Owner timely notice of Contractor's intention to cover the same and Owner had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

- A. *Contractor's Obligation:* It is Contractor's obligation to assure that the Work is not defective.
- B. *Owner's Rights:* Owner has the right to determine whether Work is defective, and to reject defective Work.
- C. *Notice of Defects:* Prompt written notice of all defective Work of which Owner has actual knowledge will be given to Contractor.
- D. *Remedying Defective Work:* Contractor will start the process of remedying defective Work within five (5) days of Owner's notice of such defective Work. If Contractor does not effectuate such remedy within fourteen (14) days of Owner's notice, then Owner shall have the right to perform directly, or have performed by third parties, the necessary remedy, and the costs thereof shall be borne by Contractor. If the parties agree that the remedy will take longer than the 14-day period set forth above, they may mutually agree to modify the remedy period.
- E. *Preservation of Warranties:* When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.
- F. *Costs and Damages:* In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by Governmental Units because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord

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

14.05 *Uncovering Work*

- A. Owner has the right to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.
- B. If any Work is covered contrary to the written request of Owner, then Contractor shall, if requested by Owner, uncover such Work for Owner's observation, and then replace the covering, all at Contractor's expense.
- C. If Owner considers it necessary or advisable that covered Work be observed by Owner or inspected or tested by others, then Contractor, at Owner's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Owner may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.
 - 1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.
 - 2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

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

14.07 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Owner to correct defective Work, or to remove and replace defective Work as required by Owner, then Owner may, after 7 days' written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, and Owner's other contractors access to the Site to enable Owner to exercise the rights and remedies under this paragraph.
- C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

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

15.01 *Progress Payments*

- A. *Basis for Progress Payments:* The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Owner. Progress payments for Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. *Applications for Payments*
 - 1. Contractor shall submit to Owner by the 25th day of the month an Application for Payment filled out and signed by Contractor covering the Work completed through the last day of the previous month, and accompanied by such supporting documentation as is required by the Contract Documents.
 - 2. 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 must also be accompanied by: (a) a bill of sale, invoice, copies of subcontract or purchase order payments, or other

documentation establishing full payment by Contractor for the materials and equipment; (b) at Owner's request, documentation warranting that Owner has received the materials and equipment free and clear of all Liens; and (c) evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

3. Beginning with the second Application for Payment, each Application must include an affidavit of Contractor stating that all previous progress payments received by Contractor have been applied to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
4. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

C. Review of Applications

1. Owner will, within 15 days after receipt of each Application for Payment, including each resubmittal, either notify Contractor in writing that Application for Payment has been approved or disapproved, in whole or in part, and the reasons for the disapproval.
2. By approving an Application for Payment, Owner will have relied upon the representations of Contractor that:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment have been fulfilled.
3. In reviewing and acting upon Applications for Payment, Owner shall not be deemed to have represented that the inspections it has made (if any) to check the quality or the quantity of the Work as it has been performed have been exhaustive, or extended to every aspect of the Work in progress.
4. Owner may refuse to approve the whole or any part of any Application for Payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, may revise or revoke any payment approval previously made, as Owner may believe necessary, in its sole discretion, to protect itself from loss because:
 - a. the Work is defective, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;

- d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or
- e. Owner has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. Payment Becomes Due

- 1. Fifteen (15) days after Owner's approval of an Application of Payment, the amount approved (subject to the provisions of Paragraph 15.01.E below, will be paid by Owner to Contractor.

E. Reductions in Payment by Owner

- 1. Owner is entitled to impose a set-off against payment based on any of the following:
 - a. Claims have been made against Owner based on Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages resulting from Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;
 - b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
 - c. Contractor has failed to provide and maintain required bonds or insurance;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
 - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;
 - f. The Work is defective, requiring correction or replacement;
 - g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - h. The Contract Price has been reduced by Change Orders;
 - i. An event has occurred that would constitute a default by Contractor and therefore justify a termination for cause;
 - j. Liquidated or other damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
 - k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens; or
 - l. Other items entitle Owner to a set-off against the amount recommended.

2. If Owner imposes any set-off against payment, Owner will give Contractor written notice stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed will be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.
3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld will be treated as an amount due as determined by Paragraph 15.01.D.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than 7 days after the time of payment by Owner.

15.03 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner in writing that the entire Work is substantially complete and request that Owner issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner an initial draft of punch list items to be completed or corrected before final payment.
- B. Promptly after Contractor's notification, Owner and Contractor, shall make an inspection of the Work to determine the status of completion. If Owner does not consider the Work substantially complete, Owner will notify Contractor in writing giving the reasons therefor.
- C. If Owner considers the Work substantially complete, Owner will prepare and deliver to Contractor a certificate of Substantial Completion which will fix the date of Substantial Completion. There shall be attached to the certificate a punch list of items to be completed or corrected before final payment. If Owner determines that the Work is not substantially complete, it shall so notify Contractor in writing, stating the reasons therefor.
- D. Prior to Owner issuing the certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.
- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases

Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.

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

15.04 Partial Use or Occupancy

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
1. At any time, Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor and Owner will follow the procedures of Paragraph 15.03.A through 15.03.E for that part of the Work.
 2. At any time, Contractor may notify Owner in writing that Contractor considers any such part of the Work substantially complete and request Owner to issue a certificate of Substantial Completion for that part of the Work.
 3. Within a reasonable time after either such request, Owner and Contractor shall make an inspection of that part of the Work to determine its status of completion. If Owner does not consider that part of the Work to be substantially complete, Owner will notify Contractor in writing giving the reasons therefor. If Owner considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
 4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.04 regarding builder's risk or other property insurance.

15.05 Final Inspection

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Owner will promptly make a final inspection with Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *Final Payment*

A. *Application for Payment*

1. After Contractor has, in the opinion of Owner, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.12), and other documents, Contractor may make application for final payment.
2. The final Application for Payment must be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents;
 - b. consent of the surety, if any, to final payment;
 - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.
 - d. a list of all duly pending Change Proposals and Claims;
 - e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work; and
 - f. a general release executed by Contractor waiving, upon receipt of final payment by Contractor, all Claims and other rights arising out of or related to the Contract, except those Claims specifically identified and listed in the general release that remain unsettled at the time of final payment, which Claims shall have been previously made in writing in accordance with this Contract, or which may be made in accordance with the terms of the Virginia Public Procurement Act.
3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

- B. *Owner's Review of Final Application and Approval of Payment:* If Owner is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Owner will, within 10 days after receipt of the final Application for Payment, approve such Application for Payment. Such approval will

account for any set-offs against payment that are necessary in Owner's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. If Owner does not approve the Application for Payment, Owner will notify Contractor in writing the reasons for its disapproval, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

- C. *Completion of Work*: The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Owner's approval of final payment pursuant to Paragraph B above.
- D. *Final Payment Becomes Due*: Owner shall set off against the amount approved for final payment any further sum to which Owner is entitled, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions of this Contract with respect to progress payments. Owner shall pay the resulting balance due to Contractor within 30 days of Owner's approval of the final Application for Payment.

15.07 *Waiver of Claims*

- A. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner, other than those specifically set forth in the general release required by Paragraph 15.06.A.2(f), which Claims shall have been previously made in writing in accordance with this Contract, or which may be made in accordance with the terms of the Virginia Public Procurement Act.

15.08 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the Supplementary Conditions or the terms of any applicable special guarantee required by the Contract Documents), Owner gives Contractor written notice that any Work has been found to be defective, or that Contractor's repair of any damages to the Site or adjacent areas has been found to be defective, then after receipt of such notice of defect Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. correct the defective repairs to the Site or such adjacent areas;
 - 2. correct such defective Work;
 - 3. remove the defective Work from the Project and replace it with Work that is not defective, if the defective Work has been rejected by Owner, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting from the corrective measures.
- B. Owner shall give any such notice of defect within 60 days of the discovery that such Work or repairs is defective. If such notice is given within such 60 days but after the end of the correction period, the notice will be deemed a notice of defective Work under Paragraph 7.17.B.
- C. If, after receipt of a notice of defect within 60 days and within the correction period, Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work

removed and replaced. Contractor shall pay all 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). Contractor's failure to pay such costs, losses, and damages within 10 days of invoice from Owner will be deemed the start of an event giving rise to a Claim under Paragraph 12.01.B, such that any related Claim must be brought within 30 days of the failure to pay.

- D. 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.
- E. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- F. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph are not to be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

15.09 Contractor Payments to Subcontractors

- A. Within seven (7) days after receipt of amounts paid by Owner to Contractor, Contractor shall take one (1) of the following two (2) actions with regard to Work performed by a Subcontractor:
 - 1. Pay Subcontractor for the proportionate share of the total payment received from Owner attributable to the Work performed by Subcontractor under the Contract; or
 - 2. Notify Owner and Subcontractor, in writing, of Contractor's intention to withhold all or a part of Subcontractor's payment with the reason for nonpayment.
- B. Individual Contractors and Subcontractors shall provide their social security numbers and Contractors organized as proprietorships, partnerships or corporations shall provide their federal employer identification numbers to Owner prior to the start of Work under this Contract.
- C. Contractor shall pay interest to Subcontractors on all amounts owed by Contractor that remain unpaid after seven (7) days following receipt by Contractor of payment from Owner for Work performed by Subcontractor under this Contract, except for amounts withheld as allowed in Paragraph.
- D. Unless otherwise provided under the terms of this Contract, interest on undisputed portion of unpaid invoices from Subcontractors shall accrue at the rate of one percent (1%) per month.
- E. Contractor shall include in each of its subcontracts a provision requiring each Subcontractor to include or otherwise be subject to the same payment and interest requirements with respect to each lower tier Subcontractor as set forth in this Paragraph.

ARTICLE 16—SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times directly attributable to any such suspension. Any Change Proposal seeking such adjustments must be submitted no later than 30 days after the date fixed for resumption of Work. Notwithstanding the above, if Owner suspends Work or any portion thereof due to its reasonable judgment that Contractor has or is violating the Contract or any requirement thereof, including but not limited to violations of Owner's safety programs or any Law or Regulation related to jobsite safety, then Contractor shall not receive any adjustment in the Contract Price or extension of the Contract Times, even if it is determined that no violation actually existed.

16.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:
1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment, or failure to adhere to the Progress Schedule);
 2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
 3. Contractor's disregard of Laws or Regulations of any Governmental Unit having jurisdiction; or
 4. Contractor's repeated disregard of the authority of Owner, Project Representative and/or Owner's Consultant.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) 10 days' written notice that Owner is considering a declaration that Contractor is in default and termination of the Contract, Owner may proceed to:
1. declare Contractor to be in default, and give Contractor (and any surety) written notice that the Contract is terminated; and
 2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.

- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within 7 days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price related to Work completed by the Contractor but unpaid as of the time of termination exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.
- F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond will govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate for Convenience*

- A. Upon 7 days' written notice to Contractor, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and
 - 3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid for any loss of anticipated profits or revenue, post-termination overhead costs, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of any Governmental Unit, or (2) Owner fails for 90 days to pay Contractor any undisputed sums due under this Contract, then

Contractor may, upon 7 days' written notice to Owner, and provided Owner does not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.

- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Owner has failed for 30 days to pay Contractor any sum undisputed sums due under this Contract, Contractor may, 7 days after written notice to Owner, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17—FINAL RESOLUTION OF DISPUTES

17.01 Methods and Procedures

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

1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full, pursuant to Article 12; and
2. Disputes between Owner and Contractor concerning the Work, or obligations under the Contract Documents, that arise after final payment has been made.

The party seeking to invoke these Article 17 processes shall provide written notice of the disputed matter to the other party in a "Notice of Request for Dispute Resolution" for which it wishes to use these Article 17 processes. The Notice of Request for Dispute Resolution shall identify the substance and basis for the disputed matter, along with the amount disputed, if any. The party receiving the Notice of Request for Dispute Resolution shall respond in writing within ten business days by setting forth that party's position with respect to the disputed matter raised in the Notice of Request for Dispute Resolution.

- B. *Voluntary Mediation:* If the parties mutually agree to use voluntary mediation for any disputed matter, the mediation proceeding shall be conducted by a single, impartial mediator appointed by and under the rules of The McCammon Mediation Group. The parties shall split the hourly fees of the mediator 50/50, and each shall bear its respective legal fees and other costs. The mediation will take place at the Tysons Corner, Virginia offices of McGuireWoods, LLP, unless the parties agree otherwise. If they elect to seek mediation, each party shall participate in good faith in such mediation as a strict condition precedent to such party instituting any litigation authorized below. All communications and submissions concerning and during the mediation will be strictly confidential and inadmissible in any court proceeding.
- C. *Litigation:* Any and all disputed matters which are unresolved following voluntary mediation, if pursued, shall be resolved exclusively by litigation in either the Circuit Court of the City of Alexandria, Virginia or the United States District Court for the Eastern District of Virginia. These two courts shall have exclusive and binding jurisdiction and venue over any and all disputes arising under the Contract. THE

PARTIES VOLUNTARILY WAIVE ANY AND ALL RIGHTS TO A TRIAL BY JURY. THE FACT FINDER SHALL BE THE COURT SITTING WITHOUT A JURY.

1. If the disputed matter involves Contractor's Claim for costs or damages due to Owner's alleged delaying or disrupting Contractor in the performance of its Work under the Contract, Contractor shall be liable to Owner and shall pay it for a percentage of all costs incurred by Owner in investigating, analyzing, negotiating, and litigating the Claim, which percentage shall be equal to the percentage of Contractor's total delay and disruption claim that is determined through litigation to be false or to have no basis in law or in fact.
2. If Owner has denied Contractor's Claim for costs or damages due to Owner's alleged delaying or disrupting Contractor in the performance of Work under the Contract, Owner shall be liable to and shall pay such Contractor a percentage of all costs incurred by the Contractor in investigating, analyzing, negotiating, and litigating the Claim, which shall be equal to the percentage of Contractor's total delay and disruption claim for which the Owner's denial is determined through litigation to have no basis or have been made in bad faith.

ARTICLE 18—MISCELLANEOUS

18.01 *Giving Notice*

- A. Whenever any provision of the Contract requires the giving of written notice to Owner or Contractor, it will be deemed to have been validly given only if delivered:
 1. in person, by a commercial courier service or otherwise, to the recipient's place of business;
 2. by registered or certified mail, postage prepaid, to the recipient's place of business; or
 3. by e-mail to the recipient, with the words "Formal Notice" or similar in the e-mail's subject line.

18.02 *Computation of Times*

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

18.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.04 *Limitation of Damages*

- A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor any other Owner-Related Party shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

- A. A party's non-enforcement of any provision will not constitute a waiver of that provision, nor will it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

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

18.07 *Controlling Law*

- A. This Contract is to be governed by the law of the Commonwealth of Virginia.

18.08 *Assignment of Contract*

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

18.09 *Successors and Assigns*

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

18.10 *Headings*

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

18.11 *Independent Contractor*

- A. The relationship of Contractor to Owner shall be that of an independent contractor.

18.12 *Liens*

- A. The Site is owned by Owner, which is a public entity and, as such, cannot be subjected to a mechanics' lien. Contractor, on its own behalf and on behalf of its Subcontractors, hereby agrees not to permit any liens of any nature whatsoever, including but not

limited to mechanics liens to be placed on the Site. In the event that a lien is placed on the Site, upon ten (10) days' notice so to do, Contractor will remove the lien, and if necessary will secure a bond to cover the amount of the lien. The payment bond shall be the sole and exclusive remedy for Subcontractors and Suppliers for nonpayment hereunder.

18.13 *Severability*

- A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 00 80 00 SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the General Conditions of the Construction Contract. The General Conditions remain in full force and effect except as amended. The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added—for example, "Paragraph SC4.05."

SC1.01 Supplement Item 49 with the following Technical Data:

- a. Work area contains Asbestos containing materials, as described in the Asbestos survey in Appendix 1.

SC-6.03 Supplement Paragraph 6.03 with the following provisions after Paragraph 6.03.C:

- D. *Workers' Compensation and Employer's Liability:* Contractor shall purchase and maintain the following Virginia Statutory Workers' Compensation and Employer's Liability Insurance:

Workers' Compensation and Related Policies	Policy limits of not less than:
Workers' Compensation	
Commonwealth of Virginia	Statutory
Employer's Liability	
Bodily injury by accident per accident	\$1,000,000
Bodily injury by disease per employee	\$1,000,000
Bodily injury by disease policy limit	\$1,000,000

- E. *Commercial General Liability—Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against claims for:
 1. damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees,
 2. damages insured by reasonably available personal injury liability coverage, and
 3. damages because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.
- F. *Commercial General Liability—Form and Content:* Contractor's commercial liability policy must be written on a 1996 (or later) Insurance Services Organization, Inc. (ISO) commercial general liability form (occurrence form) and include the following coverages and endorsements:
 1. Premises and Operations coverage.
 2. Products and completed operations coverage.

- a. Such insurance must be maintained for three years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
3. Blanket contractual liability coverage, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
 4. Severability of interests and no insured-versus-insured or cross-liability exclusions.
 5. Underground, explosion, and collapse coverage.
 6. Personal injury coverage.
 7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together). If Contractor demonstrates to Owner that the specified ISO endorsements are not commercially available, then Contractor may satisfy this requirement by providing equivalent endorsements.
 8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04 "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.
- G. *Commercial General Liability—Excluded Content:* The commercial general liability insurance policy, including its coverages, endorsements, and incorporated provisions, must not include any of the following:
1. Any modification of the standard definition of "insured contract" (except to delete the railroad protective liability exclusion if Contractor is required to indemnify a railroad or others with respect to Work within 50 feet of railroad property).
 2. Any exclusion for water intrusion or water damage.
 3. Any provisions resulting in the erosion of insurance limits by defense costs other than those already incorporated in ISO form CG 00 01.
 4. Any exclusion of coverage relating to earth subsidence or movement.
 5. Any exclusion for the insured's vicarious liability, strict liability, or statutory liability (other than worker's compensation).
 6. Any limitation or exclusion based on the nature of Contractor's work.
 7. Any professional liability exclusion broader in effect than the most recent edition of ISO form CG 22 79.
- H. *Commercial General Liability—Minimum Policy Limits*

Commercial General Liability	Policy limits of not less than:
General Aggregate – applicable on a per project basis	\$2,000,000

Commercial General Liability	Policy limits of not less than:
Products—Completed Operations Aggregate	\$2,000,000
Personal and Advertising Injury	\$1,000,000
Bodily Injury and Property Damage—Each Occurrence	\$1,000,000

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

Automobile Liability	Policy limits of not less than:
Bodily Injury	
Each Person	\$1,000,000
Each Accident	\$1,000,000
Property Damage	
Each Accident	\$1,000,000
[or]	
Combined Single Limit	
Combined Single Limit (Bodily Injury and Property Damage)	\$1,000,000

- J. *Umbrella or Excess Liability:* Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the Paragraphs above. The coverage afforded must follow form and be at least as broad as that of each and every one of the underlying policies.

Excess or Umbrella Liability	Policy limits of not less than: (per occurrence/general aggregate)
Total Contract Value of \$10 million or more	\$9,000,000
Total Contract Value \$3 million to \$9.99 million	\$4,000,000
Total Contract Value less than \$3 million	\$1,000,000

- K. *Using Umbrella or Excess Liability Insurance to Meet CGL and Other Policy Limit Requirements:* Contractor may meet the policy limits specified for employer's liability, commercial general liability, and automobile liability through the primary policies alone, or through combinations of the primary insurance policy's policy limits and partial attribution of the policy limits of an umbrella or excess liability policy that is at least as broad in coverage as that of the underlying policy, as specified herein.
- L. *Builder's Risk:* Contractor shall purchase and maintain builder's risk insurance as required in Section 6.04 of the General Conditions (Section 00 70 00) and as further provided below. Such coverage shall be written on an 'all risk' (or 'special perils') basis and shall include, but not be limited to physical loss or damage during construction, operational testing and commissioning arising from fire, lightning,

explosion, collapse, wind, flood, storm, earth movement/earthquake and resulting damage from faulty workmanship or design. Such coverage shall include the Owner and other contractors and subcontractors as insureds.

Commercially reasonable sublimits for demolition, debris removal, property in transit, temporary works, damage to existing property, soft costs, landscaping, loss adjustment expenses, expediting expenses, and increased costs for building code compliance will be acceptable. Deductibles under the policy shall be no more than \$100,000.

- M. *Pollution/Environmental Liability:* The contractor will maintain pollution/environmental liability coverage with a limit of \$1,000,000. This insurance may be provided through a stand-alone policy or as part of a professional liability coverage combined policy. The policy will cover third-party injury and property damage, including cleanup costs, as a result of pollution conditions arising from the contractor's operations and completed operations. This insurance must be maintained for no less than three years after final completion.

END OF SECTION

PART 3

SPECIFICATIONS

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 00 00 GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 WORK

- A. Work must comply with all applicable codes, shall be structurally sound and fit for intended use. Deviation from plans and specifications necessary for compliance shall be reported to the Owner subject for approval.

1.02 REFERENCE STANDARDS

- A. The following is a list of standards which may be referenced in this section:
 - 1. Association Advancing Occupational and Environmental Health (ACGIH).
 - 2. National Fire Prevention Association (NFPA): 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations.
 - 3. National Electrical Code (NEC).
 - 4. Virginia Occupational Safety and Health (VOSH): Article 1926.21 - Safety Training and Education.

1.03 DEFINITIONS AND ABBREVIATIONS

- A. ACGIH: Association Advancing Occupational and Environmental Health
- B. AlexRenew: Owner.
- C. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- D. Contaminated Material: Excavated or otherwise disturbed material that is not Hazardous Waste but contains one or more constituent concentrations, as determined through analysis and reporting on a dry-weight basis by an accredited testing laboratory, which equal or exceed:
 - 1. Current respective industrial soil Risk Screening Levels (RSL) as published by EPA Region III, with the exception of arsenic.
 - 2. Current respective Alexandria Tier 1 screening levels for soil as published by City of Alexandria Department of the Environment (ADOE).
 - 3. Allowable Arsenic Level (AAL).

In addition, any man-made structure in an area designated as contaminated is also classified as contaminated and must be properly disposed of. Any demolition waste from subsurface structures in contaminated zones must be handled as contaminated material.

- E. Disposal: Removal offsite of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- F. DSUP: Development Special User Permit, as defined by the City of Alexandria.
- G. Earth: The word “earth,” whenever used as the name of the excavated material or material to be excavated, shall mean all kinds of material other than rock as defined herein.
- H. Engineer: The Design Engineer aka the Engineer of Record, who is an Owner’s authorized representative assigned to provide the project’s technical design and to make technical interpretations, reviews and acceptance.
- I. Inspector: The Owner’s authorized representative assigned to make any inspection of work performed and materials furnished. The Inspector has no authority to change or alter the Contract in any manner whatsoever.
- J. Owner: AlexRenew or its authorized representative.
- K. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- L. Resident Engineer: The authorized representative of the Owner in charge of one or more construction contracts. The Resident Engineer has no authority to change or alter the Contract in any manner whatsoever.
- M. Rock: “Rock,” whenever used as the name of an excavated material, shall mean only boulders and pieces of concrete or masonry exceeding one cubic yard in volume, and solid ledge rock which, in the Owner’s opinion requires for its removal, drilling and blasting, wedging, sledging, barring or breaking up with power-operated tools. No soft or disintegrated rock which can be removed with a hand pick or power equipment excavator or shovel, or loose, or previously blasted rock or broken stone in rock fillings or elsewhere, and no rock exterior to the maximum limits of measurement allowed, which may fall into the excavation, will be measured or allowed as rock.

- N. TLV: Threshold limit value.
- O. VAWC: Virginia Water Company.
- P. WRRF: Water Resource Recovery Facility.

1.04 SUBMITTALS

- A. Informational Submittals:
 - 1. Copies of permits and approvals for construction as required by Laws and Regulations and governing agencies.
 - 2. Copy of the approved City Development Special Use Permit with Final Site Plan DSUP 2009-0017 minor amendment shall be kept at Contractor trailer. City of Alexandria inspectors may audit compliance of the project with the plan, including notes that are Conditions of Approval from the City.
 - 3. Temporary Control Submittals:
 - a. Noise control plan.
 - b. Dust control plan.

1.05 PERMITS

- A. Contractor shall be responsible for obtaining any other licenses, certificates, registrations, approvals, fees, and permits in connection with the prosecution of the Work.
- B. Contractor shall comply with the Government of the City of Alexandria, Standard Contract Provisions Article 7 “Contractor’s Responsibilities” and all other appropriate City of Alexandria and Federal laws and regulations relative to permits, licenses, certificates and registrations.
- C. Contractor shall submit with each payment request, a list of all fees, including copies of invoices thereof to perform work included in the Contract.
- D. No separate payment will be made therefore. Include the costs of fees in the appropriate bid items on the Schedule of Prices.

1.06 TEMPORARY CONTROL PLANS

- A. Noise Control Plan:
 - 1. The Contractor shall comply with the City of Alexandria’s Noise Control Code, Title 11, Chapter 5, which sets the maximum permissible noise level as measured at the property line.

2. Provide acoustical barriers so noise emanating from tools or equipment will not exceed legal noise levels or noise ordinances.
 3. Noise Control Plan: Propose plan to mitigate construction noise and to comply with noise control ordinances, including method of construction, equipment to be used, and acoustical treatments. Identify any additional plans to mitigate noise related to City waiver request for extended working hours.
- B. Dust Control Plan: Contractor shall plan so that no visible dust leaves the property during construction. To this end, the Contractor shall implement appropriate dust/emission control measures and monitor/report spot and daily average readings each day. If a threshold of 3 mg/m³ Particulates, not otherwise specified (PNOS) (the ACGIH TLV) is exceeded, Work shall be stopped, at the Contractor's expense, until the Contractor demonstrates to the Owner's Environmental Representative's satisfaction that the situation has been rectified and, henceforth, shall be appropriately managed.

1.07 PROTECTION OF WORK AND PROPERTY

- A. Comply with Owner's safety rules while on Owner's property and Section 01 54 50, Construction Safety.
- B. Comply with the Owner's site access and security requirements, including, but not limited to the wearing of identification badges and site entry through guard stations at designated locations.
- C. Keep Owner informed of serious onsite accidents and related claims.
- D. Use of Explosives: No blasting or use of explosives will be allowed onsite.
- E. Plan and conduct construction operations so that operation of existing facilities near or adjacent to the Work, including the existing tank and vault, telecommunications equipment, electric, telephone, sewer, water, gas or drainage utilities, are sustained insofar as the requirements of the project will permit.
- F. Protect existing facilities such as valves, piping, instrumentation, HVAC equipment and electrical equipment from damage, spray, dust and debris, or movement through installation of adequate support systems and use of proper equipment for the execution of Work.
- G. Existing utilities, equipment and other facilities which are damaged by the Contractor's construction operations shall be promptly repaired by Contractor to the satisfaction of the affected owner or, if he so elects, that owner will perform the repairs with his own forces. Under either arrangement, such repair work shall be done at Contractor's expense.

- H. When aboveground visible facilities such as poles, wires, cables, fences, signs or structures constitute an unavoidable interference, notify Engineer and consult with Owner regarding temporary removal and later restoration of the interfering item. Arrange with that Owner to remove and later restore the interfering item to the satisfaction of the Owner, subject to approval of the project Owner. Such work shall be done at Contractor's expense.
- I. Take all necessary precautions to prevent fires at or adjacent to the work, buildings, and other facilities. No burning of trash or debris is permitted. If permanent fire extinguishers are used, they shall be recharged and in "new" condition when turned over to Owner.

1.08 EXISTING STRUCTURES AND UTILITIES

- A. All known utilities have been shown on the drawings according to the best information available. It is the Contractor's responsibility to contact all owners of structures or utilities above ground, on the ground, or below the ground, within the Project area so that said owners may stake or otherwise make or protect their facilities.
- B. Dimensions and locations of existing facilities are not necessarily exact. Where installation or connections of any part of the work to existing facilities are required, the Contractor shall verify such dimensions and locations in the field before the fabrication of any material or equipment, which is dependent on the correctness of such information.
- C. Contractor shall make no claim for delays or additional monies due to his failure to make his own investigations or verifications.
- D. Contractor must provide facilities and be responsible for the protection of all structures, buildings and utilities, underground, on the surface, or above ground against trenching, dewatering, or any other activity connected with the Work throughout the entire Contract Time.
- E. When structures and utilities have been properly shown or marked and are disturbed or damaged in the execution of the Work, they must be repaired immediately in conformance with best practice and the approval of the owner of the damaged utility or structure. Repairs and associated cost shall be the responsible of the Contractor with no additional cost to the Contract Price or additional time to the Contract Time.
- F. When structures and utilities have not been properly shown or located as outlined above and are disturbed or damaged in the prosecution of the Work, take whatever steps are necessary for safety and notify the affected utility owner and avoid any actions which might further damage the structure or utility.

1.09 CONTRACTOR USE OF PREMISES

- A. Limit use of premises for Work, for storage, and for access, to allow for:
 - 1. The Owner occupancy.
 - 2. Work by other Contractors.
- B. Coordinate use of premises under direction of the Owner.
- C. Assume full responsibility for protection and safekeeping of products under this Contract.
- D. Obtain and pay for use of additional storage or work areas off site when needed and required for operations under this Contract.

1.10 CONTINUOUS OPERABILITY OF FACILITIES

- A. Continuous operation of all existing facilities is required unless otherwise stated and shall in no way be affected by Contract operations unless the Owner gives written permission to do so.

1.11 PARTIAL OWNER OCCUPANCY

- A. Schedule and substantially complete designated portions of Work for the Owner's occupancy prior to Substantial Completion of entire Work.
- B. The Owner will occupy designated areas for the purpose of operation.
- C. Execute Certificate of Substantial Completion for each designated portion of Work prior to the Owner occupancy. Contractor shall allow:
 - 1. Access for the Owner personnel.
 - 2. Use of parking facilities.
 - 3. Operation of HVAC and electrical systems.

1.12 ACCESS TO SITE FOR INSPECTIONS

- A. The Contractor shall provide the representatives of the City, State, Federal Government, United States Environmental Protection Agency (EPA), United States Army Corps of Engineers (USCOE), United States Department of Labor, United States Occupational Safety and Health Administration (VOSH), and any other persons designated by the Owner with access to the work whenever it is in preparation or in progress.
- B. The Contractor shall provide all necessary and proper facilities for such access and inspection.

- C. The Contractor must also provide that the Grants Officer, the Comptroller General of the United States, or any authorized representative shall have access to any books, documents, papers, and records of the Contractor which are pertinent to the project for the purpose of making audit, examination, excerpts, and transcriptions thereof.

1.13 TRESPASS

- A. Contractor will be solely responsible for any trespass upon adjacent property or injury thereto resulting from or in connection with his or her operations. He or she will be liable for any claims that may be made on account of trespass or the deposit of debris of any kind upon private and/or other public property.

1.14 ADDITIONAL CONTRACTS WITHIN PROJECT AREA

- A. The Owner reserves the right to let other contracts and to permit other utilities and their contractors to perform work within the general areas of this Contract.
- B. Such proposed Work is indicated on the Drawings to the extent that specific information relating thereto was available when the project was prepared. Whether or not such Work to be performed by others is indicated on the Drawings, the Contractor shall make such reasonable adjustments in his operations and schedules as the Owner may direct for the purpose of coordinating his work with that being performed by others.
- C. If any part of the work depends, for proper execution or results, upon the Work of any other contractor, the Contractor shall inspect and promptly report to the Owner any defects in such Work that render it unsuitable for proper execution of Contract Work. The Contractor's failure to so inspect and report such conditions of other contract Work affecting the Contract will constitute an acceptance of the other contractor's Work.
- D. No additional compensation over and above that reflected in the Schedule of Prices will be allowed for complying with the provisions of this Section.

1.15 TEMPORARY HEAT AND COOLING

- A. If temporary heat and cooling is required for the protection of the Work or equipment, the Contractor shall provide approved heating and cooling apparatus and shall maintain heating and cooling as required.
- B. Temporary heating apparatus shall be installed and operated in such a manner that finish work shall not be damaged thereby.

- C. Contractor shall provide temporary heating and cooling as specified in Section 01 50 52, Contractor Facilities.
- D. No separate payment will be made therefore.

1.16 TEMPORARY WATER SUPPLY

- A. Work in Owner WRRF or Remote Facilities:
 - 1. Temporary water supply shall be provided as specified in Section 01 50 52, Contractor Facilities.
- B. Work outside of the Owner facilities:
 - 1. The Contractor shall obtain a City of Alexandria Code permit (Monday - Friday, 8:00 a.m.- 5:00 p.m.) and coordinate with the Virginia-American Water Company (VAWC), Operations Department, telephone number 703-706-3870 between the hours of 7 am and 3:30 pm to use water for construction purposes from public hydrants or to connect to the water system with a temporary tap.
 - 2. If the City of Alexandria and VAWC determines that fire hydrant water may be used, the Contractor will be charged the current fire hydrant use charge per working day.
 - 3. If VAWC determines a temporary water main tap is required, the Contractor shall excavate a pit for a tap as directed, excavate the trench and install water service piping.
 - 4. A temporary water tap requires the payment of the current water tap fee plus the additional fee for the water tap removal.
 - 5. At completion of the Contract, the Contractor shall excavate and remove Contractor water service piping and the meter and tap removal as directed by VAWC. The Contractor shall backfill and restore the area.
 - 6. VAWC will keep an account for direct payment by the Contractor of water and sewer charges.
 - 7. River and stream water shall not be used. Water from a source other than a hydrant or tapped water main will be subject to test per AASHTO T26.

1.17 TEMPORARY CONSTRUCTION POWER

- A. It shall be the Contractor's responsibility to ensure that adequate power is available at all times and of sufficient capacity and characteristics to supply the proper voltage and current for the various types of construction, tools, motors, welding machines, lights, heating plant, pumps and work required.
- B. Contractor shall provide temporary constructions power as specified in Section 01 50 52, Contractor Facilities.

1.18 EQUIVALENT MATERIALS, PRODUCTS AND EQUIPMENT

- A. Whenever a material, article, system or sub-system is specified or described by using the name and/or model of a proprietary product or trademark or the name of the manufacturer or vendor, the specified item shall establish the type, function, and quality required; it shall be understood that the words "or approved equal" are implied whether or not they follow the proprietary enumeration.
- B. The Owner reserves the right to determine when proprietary items have no equivalency, and when uniformity of operations, interchangeability of parts, standard parts inventory, etc., are in the Owner's best interest.
- C. Requests for review of equivalency will be considered upon submission of sufficient information as described herein, to allow a complete review.
- D. Such requests will not be accepted from anyone other than the Contractor. Such submission must be made prior to purchase, fabrication, manufacture or use of the equivalent items under consideration.
- E. The Contractor is responsible for all delays caused by its failure to submit complete and accurate information with any request for approval of any material, article, system or subsystem, as an equivalent.
- F. Contractor Risk:
 - 1. If the Contractor includes in his bid or later proposes any material, product or equipment that he considers equivalent to that specified, the Contractor assumes all risk of any sort associated with acceptance or rejection of proposed equivalent items.
 - 2. The Contractor shall no right to make claim based upon his bid that includes a proposed equivalent items(s) of work which resulted in a lower bid amount for said item(s) or lower total bid.
- G. Submission Requirements: Each submission for equivalency review shall include:
 - 1. Justification for use of the proposed equivalent item(s), including evidence, as applicable, that Contract specified material, product or equipment is unobtainable or unobtainable within an acceptable time for Contract completion;
 - 2. A description of the difference between specified items(s) and proposed equivalent item(s) and the comparative advantages and disadvantages of each;
 - 3. All relevant data addressing each specified parameter to show equivalency;

4. A prediction of any effects the proposed change will have on operation and maintenance costs where applicable.
- H. Delays: The Contractor shall be responsible for all delays caused by its failure to submit complete and accurate information on or with a request for approval of any material, article, system or subsystem, as an approved equivalent.
- I. Supplemental Requirements:
 1. Any tests required by the Owner to establish quality and performance standards shall be promptly conducted by or through the Contractor at no additional cost to the Owner.
 2. The Contractor shall submit any additional data requested by the Owner for the equivalency review.
 3. The Contractor shall satisfactorily accomplish all changes, including any engineering associated with use of equivalent items, at no additional cost to the Owner.
- J. The Contractor shall have no right of appeal to any decision rejecting the equivalency of any item.

1.19 HOLIDAYS

- A. The following days are recognized as legal holidays:
 1. New Year's Day
 2. Memorial Day
 3. Juneteenth
 4. Independence Day
 5. Labor Day
 6. Election Day
 7. Thanksgiving Day
 8. Christmas Day
- B. Any day declared a holiday by the Owner shall be observed. When a holiday falls on a Sunday, the following Monday will be observed as a holiday. When a holiday falls on a Saturday, the proceeding Friday will be observed.

PART 2 GENERAL

2.01 GENERAL

- A. Materials shall be:
 1. Newly manufactured specifically for the project, or

2. New, unused materials obtained from manufacturer's inventory stock or the manufacturer's authorized distributor's stock, provided such materials have been manufactured within the past 2 years from the date of order, are totally in compliance with Specifications and, in either case, are so certified in writing by the manufacturer, and include manufacturer's warranties.
3. Prohibited if from any source other than specified herein, or are re-conditioned, remanufactured or partly remanufactured.

PART 3 EXECUTION

3.01 STARTING WORK

- A. Start Work within 10 days following the date stated in the Notice to Proceed and execute with such progress as may be required to prevent delay to the general completion of the project. Execute Work at such items and in or on such parts of the project, and with such forces, material and equipment, as to complete the Work in the time established by the Contract. At all times, schedule and direct the Work so that it provides an orderly progression to completion within the specified time for completion.

3.02 PROTECTION OF WORK AND PROPERTY

- A. All facilities and utility lines within the construction area not to be abandoned, relocated, or reconstructed shall be protected and maintained in service by the Contractor.
- B. Short interruptions of certain services will be permitted when essential to the Contractor's operations as herein specified when approved by the Owner.
- C. Contractor shall provide and maintain such temporary supports, bypasses or protective devices as may be necessary to preserve the functions of the various utility systems throughout the duration of the Work.
- D. All damage to existing facilities which is attributable to the Contractor's activities shall be repaired by owner of the damaged facility or his designee, at the expense of the Contractor.
- E. All damage to existing water and/or sewer service connections attributable to the Contractor's activities shall be repaired or replaced in accordance with the City of Alexandria Plumbing Code and shall be performed by a plumber licensed in the City of Alexandria, at the expense of the Contractor.
- F. The Contractor will be held responsible for any collateral damage incurred while delivering equipment or materials while preparing for or providing work in this Contract.

- G. Contractor shall be required to restore to their original or better condition any yard surfaces, roadways, curbs, gutters or structures which are damaged by the Contractor's activities.
- H. Perform Work within right-of-way and easements in a systematic manner that minimizes inconvenience to property owners and the public.
- I. A preconstruction walk/survey of the site shall occur with City of Alexandria Transportation and Environmental Services Construction and Inspection staff to document existing conditions prior to any land disturbing activities.
- J. Maintain in continuous service existing oil and gas pipelines, underground power, telephone or communication cable, water mains, irrigation lines, sewers, poles and overhead power, and other utilities encountered along line of the Work, unless other arrangements satisfactory to owners of said utilities have been made.
- K. Where completion of the Work requires temporary or permanent removal or relocation of existing utility, coordinate activities with owner of said utility and perform work to their satisfaction.
- L. Protect, shore, brace, support, and maintain underground pipes, conduits, drains, and other underground utility construction uncovered or otherwise affected by construction operations.
- M. Keep fire hydrants and water control valves free from obstruction and available for use at all times.
- N. In areas where Contractor's operations are adjacent to or near a utility, such as gas, telephone, television, electric power, water, sewer, or irrigation system, and such operations may cause damage or inconvenience, suspend operations until arrangements necessary for protection have been made by Contractor.
- O. Notify property owners and utility offices that may be affected by construction operation at least 2 days in advance: Before exposing a utility, obtain utility owner's permission. Should service of utility be interrupted due to Contractor's operation, notify proper authority immediately. Cooperate with said authority in restoring service as promptly as possible and bear costs incurred.
- P. Do not impair operation of existing sewer system. Prevent construction material, pavement, concrete, earth, volatile and corrosive wastes, and other debris from entering sewers, pump stations, or other sewer structures.
- Q. Maintain original Site drainage wherever possible.

3.03 TEMPORARY CONTROLS

A. Execute noise and dust control plans.

B. Air Pollution Control:

1. Minimize air pollution from construction operations.
2. City of Alexandria requires that Contractors shall not cause or permit vehicles to idle for more than 10 minutes when parked.
3. Burning of waste materials, rubbish, or other debris will not be permitted on or adjacent to Site.
4. Conduct operations of dumping rock and of carrying rock away in trucks to cause a minimum of dust.
5. To prevent dust, treat unpaved streets, roads, detours, or haul roads used in construction area with a dust-preventive treatment or, periodically, with water application. AlexRenew WRRF plant effluent shall be used for dust control applications. Strictly adhere to applicable environmental regulations for dust prevention.
6. Comply with dust control requirements of Section 02 41 00, Demolition.
7. Provide and maintain temporary dust-tight partitions, bulkheads, or other protective devices during construction to permit normal operation of existing facilities. Construct partitions of plywood, insulating board, plastic sheets, or similar material. Construct partitions in such a manner that dust and dirt from demolition and cutting will not enter other parts of existing building or facilities. Remove temporary partitions as soon as need no longer exists. Clean any dirt or dust entering operating buildings as a result of construction activities on a daily basis.
8. Provide load covers for all trucks carrying waste materials, rubbish, or debris, to minimize dust pollution.
9. The Engineer will monitor areas contiguous to the Contractor's immediate work and office areas for appreciable dust accumulation on vehicles, structures, equipment, etc. As directed by the Engineer, the Contractor shall clean structures and take any additional preventive measures to limit dust accumulation at no additional cost to the Owner.

C. Water Pollution Control:

1. Divert sanitary sewage and non-storm waste flow interfering with construction and requiring diversion to sanitary sewers after consulting with the Owner. Do not cause or permit action to occur which would cause an overflow to existing waterway.
2. Prior to commencing excavation and construction, obtain Engineer's agreement with detailed plans showing procedures intended to handle

- and dispose of sewage, groundwater, and stormwater flow, including dewatering pump discharges. Provide detailed plans to show temporary treatment facilities planned for use to handle construction dewatering operations and disposal or discharge.
3. Comply with Erosion and Sediment Control plan and Section 01 57 13, Temporary Erosion and Sediment Control Plan and dewatering requirements of Section 02 61 00, Disposal of Contaminated Groundwater.
 4. Do not dispose of volatile wastes such as mineral spirits, oil, chemicals, or paint thinner in sanitary drains. Disposal of any wastes into storm drains, streams, or waterways is prohibited. Provide acceptable containers for collection and disposal of waste materials, debris, chemicals, and rubbish.
 5. Provide oil drip pans under all heavy construction equipment that is parked onsite for more than 7 days. Dispose or recycle oils in accordance with local Regulations.
- D. Energy and Emissions Control:
1. The Contractor shall maintain an inventory record of all construction equipment either owned or rented for the Project. Include equipment make, model, engine size, specific emission controls, EPA Tier classified, etc. Make inventories available to the Engineer for review as requested.
 2. Provide mufflers on all vehicles and equipment to reduce emissions.
 3. Operate construction equipment and vehicles only when necessary to limit idling and emissions.
 4. Maintain tire pressures on construction equipment per manufacturer's recommendation and keep records of maintenance on site.
 5. The Contractor is encouraged to utilize EPA Tier 4 compliant construction equipment where available, based on rated engine power.
 6. Utilized battery-operated or electric-powered compressors, hand tools, and other small construction equipment to the greatest extent practical except where physical access does not permit electrical equipment.
- E. Erosion, Sediment, and Flood Control: Provide, maintain, and operate temporary facilities to control erosion and sediment releases, and to protect the Work and existing facilities from flooding during construction period.

3.04 UTILITY RELOCATION

- A. Existing utilities which are to be relocated have been shown according to available data. Plans and details for the intended relocation alignments and specifications are included in the Contract Documents for such relocations; however, the Contractor shall satisfy himself by performing test pits (at his own expense) and any other investigations as he shall deem necessary, as to

the exact locations of the existing utilities prior to obtaining new pipe, fittings, accessories and other appurtenances.

- B. The Contractor shall use new pipe, fittings, piping accessories and other appurtenances as specified to relocate existing utilities. Existing manhole frames and covers, removable catch basin top slabs and hydrants may be reused if these items are serviceable and such reuse is approved in writing by the Owner.

3.05 UTILITY PROTECTION AND NOTIFICATION

- A. Existing utilities shall be protected and kept in service during the life of the Contract unless relocation, reconstruction, abandonment, or outage is specifically permitted by the utility owner or by the Owner.
- B. Miss Utility will not issue a blanket ticket for excavation at multiple sites. The Contractor shall notify Miss Utility of impending excavation for each location at least forty-eight (48) hours prior to excavation.
- C. MISS Utility will not mark out utilities located inside the WRRF fence line. In such cases, it is the Contractor's responsibility to locate and mark out the utilities. The Contractor's is responsible for means and methods to confirm the location of sensitive utilities prior to excavation.
- D. The Contractor shall provide and maintain such temporary supports as may be necessary to preserve the functions of the various utility systems. No wires, conduits and/or pipes shall be removed until all services therein have been made inoperable. Any damage sustained to utilities above or below the ground shall be repaired at Contractor expense. The Contractor shall notify the impacted parties, by telephone, of the impending excavation or demolition and the location thereof, at least 48 hours, but not more than ten (10) (excluding Saturdays, Sundays, and holidays) in advance of proceeding with excavation or demolition work necessitated by the Contract.
- E. The Contractor shall not proceed with work until utility facilities involved have been located, disconnected, or otherwise adjusted by utility companies.
- F. Hand excavation is required within 18-inches from the nearest point of a natural gas line; Contractor may hand excavate a test pit to locate the line.
- G. If the underground utility is damaged, under no circumstance shall the Contract backfill an excavation affecting said utility without first receiving permission from the utility owner and the Owner.
- H. In the event of damage to any utility service encountered in the performance of this contract; the Contractor will immediately notify the owner by

telephone and shall report the damage with complete details to the Owner utilizing the current "UTILITY STRIKE REPORT" form no later than 24-hours after the incident occurs.

3.06 BLASTING

- A. No blasting is permitted.

3.07 ILLUMINATION OF NIGHT WORK

- A. The Contractor shall maintain sufficient light illumination levels for safe operation in all active work areas during evening and night work.
- B. Lights shall be shielded from Federal Aviation Administration (FAA) flight paths to and from Reagan National Airport.
- C. No direct payment will be made for night lighting.

3.08 DELIVERY, STORAGE, AND HANDLING

- A. Contractor shall be responsible for handling, hauling, storing, and distributing all materials, equipment and surplus materials for the Contract as necessary or required, shall be provide suitable storage for materials and equipment during work progress, and be responsible for the protection, loss of, or damage to Contract materials and equipment until final Contract completion.
- B. Materials and equipment shall be placed so as not to injure any part of the Work or existing facilities and so that free access is available at all times to all parts of the Work.
- C. Storage and demurrage charges by transportation companies and vendors shall be borne by the Contractor.

3.09 ADVERSE WEATHER PRECAUTIONS

- A. During adverse weather, the Contractor shall take necessary precautions so that the Work may progress properly and is satisfactory in all respects.
- B. During hot weather, and cold weather below 40 deg. F, any part of the work that is temperature dependent shall be properly protected.

3.10 EASEMENTS, RIGHT-OF-WAY AND LAND

- A. Street right of way lines, limits of easements, project property lines, and limits of construction permits are indicated in the Drawings. The Contractor's construction activities shall be confined within these limits, unless arrangements for use of private property are made.

- B. The Owner will have obtained, prior to bid opening, all rights of way and easements, both permanent and temporary, necessary for carrying out the work. Exceptions to this are noted in the Contract Documents.
- C. Whenever any of the work is accomplished on or through property other than public right of way, the Contractor shall meet and fulfill all covenants and stipulations of any easement agreement obtained by the Owner from the owner of the private property. Copies of the easement agreements may be included in the Contract Documents or made available to the Contractor as soon as practical after they have been obtained by the Owner.
- D. Whenever easements or rights of entry have not been acquired prior to advertising, these areas are so noted on the Drawings. The Contractor shall not proceed with any portion of the work in areas where right of way, easements or rights of entry have not been acquired until the Owner certifies to the Contractor that the right of way or easement is available or that the right of entry has been received. If the Contractor is delayed due to acts of omission on the part of the Owner in obtaining easements, rights of entry or right of way, the Contractor will be entitled to an extension of time. The Contractor agrees that such delay shall not be a breach of contract.
- E. The Contractor shall be responsible for providing, without expense or liability to the Owner, any additional land and access thereto that the Contractor may desire for temporary construction facilities, storage of materials, or other Contractor needs.
- F. Before using any private property, whether adjoining the work or not, the Contractor shall file with the Owner a written permission of the private property owner, and, upon vacating the premises, a written release from the property owner of each property disturbed or otherwise interfered with by reasons of construction pursued under this contract.
 - 1. The Statement shall be signed by the private property owner, or proper authority acting for the owner of the private property affected, stating that permission has been granted to use the property and all necessary permits have been obtained or, in the case of a release, that the restoration of the property has been satisfactorily accomplished.
 - 2. The statement shall include the parcel number, address, and date of signature.
 - 3. Written releases must be filed with the Owner before the Completion Date will be established.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 11 00 SUMMARY OF WORK

PART 1 GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

- A. The completed Work will provide the Owner with the replacement of the existing Building G1 and IPS roofs, including abatement of asbestos, removal of existing built up roof (BUR), including Light Weight Insulated Concrete (LWIC), temporary relocation of functional HVAC equipment, installation of approximately 25,000 SF of thermoplastic polyolefin (TPO) roof, 2,790 SF of sloped concrete roof tiles, and skylights.
- B. The Work includes, but is not limited to, the major tasks listed below. The listing of major tasks in this section is not meant to imply anything whatsoever about the necessary construction sequencing of individual tasks, which must be carefully coordinated throughout the construction period.
 - 1. Asbestos abatement.
 - 2. Existing roof system demolition.
 - 3. Temporary relocation and protection of the existing functional HVAC roof top equipment, including piping, wiring and accessories for reinstallation after roof installation.
 - 4. Removal of existing abandoned rooftop equipment as shown on Drawing A-001.
 - 5. Providing temporary roof access to safely enter and leave the roof during construction.
 - 6. Providing temporary HVAC for Building G1 and IPS during construction.
 - 7. Repointing and repair of existing parapet walls, including corrections at weep holes.
 - 8. Installation of new roof materials and insulation.
 - 9. Removal and replacement of skylights.
 - 10. Removal of stone screen wall to the extent shown on Drawing A-001.
 - 11. Installation of aluminum screen wall to the extent shown on Drawing A-002.
 - 12. Installation of roof drains.
 - 13. Reinstallation, balancing and testing of existing HVAC equipment.
- C. The words “provide” or “to be provided”, or any variation thereof, are used in the listing of major work tasks above, shall mean “furnish and install, complete and ready for final acceptance and operation in conformance with the Contract Documents.”

- D. Implicit in each task in the listing of major work tasks below is the overall task to “perform all miscellaneous Work under all of the various trades necessary to complete the intent of the Contract Documents, which is to provide a fully-functional, operating, and finished facility.”
- E. Alternates:
 - 1. Only those alternates that were selected by the Owner, as evidenced in the Agreement, are made a part of this Contract.
- F. This Project is located on the roof of Buildings G1 and IPS within an active area of an existing wastewater treatment plant. The plant must remain in operation and key elements of this construction must be coordinated with the Owner. Sequencing construction and coordination of the work with the Owner is a project requirement.

1.02 EARLY-PROCUREMENT CONTRACTS NOT APPLICABLE

1.03 RELATED WORK AT THE SITE

- A. The Contractor is hereby notified that there may be other construction contracts underway on the site during the performance of this contract.
- B. Other projects may be or become active during the term of this contract. See list in Section 01 31 13, Project Coordination and contact the Construction Manager for the most current information.
- C. Refer to Section 01 31 13, Project Coordination, for work restrictions and additional information.

1.04 OTHER AGENCIES/UTILITY OWNERS REVIEW/INSPECTION COSTS

- A. The Contractor shall pay directly to other agencies and utility owners all costs incurred by the agency/utility owner related to inspection, coordination meetings.

1.05 SEQUENCING

- A. The Contractor shall commence Work on the date specified in a written notice to proceed and all Work shall be completed as specified in Section 00 52 00, Agreement. The Contractor is reminded, however, that all Work shall be scheduled and proceed in such sequence as to avoid interference and delays to normal Owner operations.
- B. The requirements included hereinafter are necessary to minimize conflicts with ongoing Owner Facilities and other working contracts in the immediate

vicinity. Whether or not such Work being performed by others is indicated on the Drawings, the Contractor shall make such reasonable adjustments in this operations and schedules as the Engineer may direct for the purpose of coordinating his Work with that in-progress by others.

- C. All roadways affording ingress to and egress from the work area shall be maintained in-service and kept free of obstructions at all times.
- D. The Contractor shall submit a Shutdown Period and/or Cut-In Schedule request for the Owner's approval prior to any interruption of existing services. Submit the schedule at least 10 business days prior to the planned interruption.

1.06 SCHEDULING

- A. The Contractor shall commence Work when the Notice to Proceed is formally issued by the Owner. Refer to Section 01 32 00, Construction Progress Documentation, for additional information.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 E-BUILDER

- A. Contractor shall use E-Builder and shall assure that Contractor staff is trained to use E-Builder. Refer to section 01 33 10, Document Management, for additional information.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 15 20 CONSTRUCTION SECURITY

PART 1 GENERAL

1.01 SUMMARY

- A. Work specified in this section includes but is not limited to work site security program, entry control and restrictions.

1.02 SUBMITTALS

- A. Informational Submittals:
 - 1. Contractor Security Plan.

1.03 GENERAL

- A. Security Program:
 - 1. The Contractor shall:
 - a. Protect the Work including all field office trailers and their contents from theft, vandalism, and unauthorized entry.
 - b. Initiate a site security system and program, at the time of mobilization onto the work-site, which provides adequate security for site stored and installed material, product, and equipment.
 - c. Maintain the security program throughout the Contract duration.
 - d. Be responsible at all times for security of the storage compound and lay-down areas, and for all Contractor plant, material, equipment, and tools, as well as, for those belonging to subcontractors.
 - e. Provide the Owner with a list of 24-hour emergency phone numbers.
- B. Entry Control:
 - 1. The Contractor shall:
 - a. Comply with the Owner's site access and security requirements, including, but not limited to the wearing of Owner furnished identification badges and site entry through guard stations at designated locations.
 - b. Restrict entry of unauthorized personnel and vehicles onto the project or work site.
 - c. Maintain copies of vehicle insurance cards or other proof of insurance on-site for vehicles permitted on-site.

- d. Maintain an Employee/Visitor Log and make the log available to the Owner on request.
- C. Restrictions: The Contractor shall not allow cameras on site, or photographs to be taken except with prior approval of the Owner.

1.04 WORK SITE ENTRY IDENTIFICATION

- A. Contractors imbedded for six months or more on Owner facilities, or other work areas in this Contract.
 - 1. All persons (the Contractor and subcontractors) who need to work on-site be will be required to display an Owner furnished ID badge on their person. The Contractor shall provide the following for each employee as a pre-requisite to badging:
 - a. Name of company employing individual.
 - b. Recent 1" x 3/4" head color photograph of individual.
 - c. Individual's name.
 - d. Statement signed by the individual and the company's safety manager stating that the named individual has completed the site safety orientation training and has a valid V/OSHA 10-hour safety certification card.
 - e. \$30 badge deposit to be reimbursed when the badge is turned in following the completion of the employee's project assignment.
 - 2. Field staff new to the site that have not received an Owner ID shall be escorted by a Contractor employee with a valid ID to the Contractor's Field Trailer. The employee shall not be permitted to work on the site until such time that they have received their site safety orientation and have been issued a valid Owner ID.
 - 3. Each individual shall wear a hard hat bearing the company logo, their full name and an Owner furnished "Safety Trained" sticker.
 - 4. Each worker entering the Owner WRRF site or other work areas in this Contract will be expected to produce their ID card when requested to do so by uniformed security personnel or other Owner personnel or agents.
- B. The Contractor shall provide a list of new hires, guest visitors or supplier deliveries to security 24 hours in advance. No person or delivery shall be permitted entry unless they appear on the list. Supply the following information:
 - 1. Deliveries:
 - a. Name of firm supplying the materials (should match with packing slip).
 - b. Contractor contact person and phone number.
 - c. Site destination of delivery.

2. Personnel:
 - a. Name of new hire (or existing company employee who is new to site) or visitor.
 - b. Contractor contact person and phone number.
- C. Visitors shall be escorted by a Contractor employee with a valid ID to the Contractor's Field Trailer. The visitor shall not be permitted to leave the field trailer until such time that they have received their site safety orientation. Visitors shall always be escorted around the facility by a Contractor representative with a valid ID.

1.05 CONTRACTOR SECURITY PLAN

- A. Prior to the performance of any work the Contractor shall submit to the Owner for review and comment two copies of security plan commensurate with the needs of the project and signed by an officer of the Contractor. Adequacy of the security plan is the responsibility of the Contractor.
- B. The security plan shall:
 1. Include employee site security and safety orientation program.
 2. Include security measures to protect Contractor employees and other persons from injury, prevent material damages, or avoid financial losses.
 3. Cover security procedures related to Contractor tools and equipment that shall be mobilized for the Work.
 4. Cover the Contractors Safety Plan, including awareness of work by the Plant or others on the site.
- C. The Owner will not review the Contractor security plan for adequacy.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 26 00 CONTRACT MODIFICATION PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. This section specifies administrative and procedural requirements for handling and processing Contract modifications.

1.02 RESPONSIBLE INDIVIDUAL

- A. Provide a letter indicating the name and address of the individual authorized to execute Modifications, and who will be responsible for informing others in the Contractor's employ and the Subcontractors of changes to the Work.

1.03 MINOR CHANGES IN THE WORK

- A. Supplemental instructions authorizing minor changes in the Work, not involving an adjustment to the Contract Sum or Contract Time, will be issued by the Resident Engineer using a Field Order Instructions form.

1.04 CHANGE ORDER PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Proposed changes in the Work that will require adjustment to the Contract Sum or Contract Time, will be issued by the Owner, with a detailed description of the proposed change and supplemental or revised Drawings and Specifications, if necessary.
 - 1. Proposal requests issued by the owner are for information only. Do not consider them instruction either to stop work in progress, or to execute the proposed change.
 - 2. Unless otherwise indicated in the proposal request, within 2 days or 48 hours of receipt of the proposal request, submit a detailed estimate of cost necessary to execute the proposed change which complies with Articles 11 and 13 of the General Conditions and Part 3 below.
 - a. Include a list of quantities of products to be purchased and unit costs, along with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include a statement indicating the effect the proposed change in the Work will have on the Contract Time.

- B. Contractor-Initiated Change Order Proposal Requests: When latent or other unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the AlexRenew.
 - 1. Include a statement outlining the reasons for the change and the effect of change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and Contract Time.
 - 2. Include a list of quantities of products to be purchased and unit costs along with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
 - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - 4. Comply with requirements in General Conditions and Section 01 61 00, Common Product Requirements, if the proposed change in the Work requires the substitution of one product or system for a product or system specified.
- C. Proposal Request Form: Use Change Order Proposal Request Form provided by Owner.
- D. Proposal shall remain firm for a maximum period of 45 days after receipt by Resident Engineer.
- E. Owner's request for proposal or Contractor's failure to submit such proposal within the required time period will not justify a Claim for an adjustment in Contract Price or Contract Times (or Milestones).

1.05 CLAIMS

- A. Include, at a minimum:
 - 1. Specific references including:
 - a. Drawing numbers.
 - b. Specification section and article/paragraph number.
 - c. Submittals: type, number, date reviewed, Engineer's comment, as applicable, with appropriate attachments.
 - 2. Stipulated facts and pertinent documents, including photographs and statements.
 - 3. Interpretations relied upon.
 - 4. Description of:
 - a. nature and extent of Claim.
 - b. who or what caused the situation.
 - c. impact to the Work and work of others.
 - d. discussion of claimant's justification for requesting a change to price or times or both.

5. Estimated adjustment in price claimant believes it is entitled to with full documentation and justification.
6. Requested Change in Contract Times: Including, but not limited to:
 - a. Progress Schedule documentation showing logic diagram for request.
 - b. documentation that float times available for Work have been used.
 - c. revised activity logic with durations including sub-network logic revisions, duration changes, and other interrelated schedule impacts, as appropriate.
7. Documentation as may be necessary as set forth below for Work Change Directive, and as Resident Engineer may otherwise require.

1.06 WORK CHANGE DIRECTIVES

- A. The Work Change Directive will contain a complete description of the change in the Work and designate the method to be followed to determine change in the contract Sum or Contract Times.
- B. Subsequent to a Work Change Directive issued by AlexRenew to the Contractor under Section 00 70 00, General Conditions, Article 11.03, the Contractor shall:
 1. Proceed promptly to execute changes in the Work in accordance with the Construction Change Directive.
 2. Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
 - a. After completion of the change, submit an itemize account and supporting data necessary to substantiate cost and time adjustments to the Contract.
- C. Effective Date of Work Change Directive: Date of signature by Owner, unless otherwise indicated thereon.

1.07 SUBMITTALS

- A. Submit name of the individual authorized to receive change documents, and be responsible for informing others in Contractor's employ or Subcontractors of changes to the Work
- B. Revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum/Price.
- C. Promptly revise progress schedules to reflect any changes in Contract Times, revise sub-schedules to adjust time for other items of work affected by the change, and submit.

D. Promptly enter changes in Project Record Documents.

1.08 CHANGE ORDERS

A. Procedure:

1. The Owner will advise of minor changes in the Work not involving an adjustment to Contract Sum/Price or Contract Time.
2. The Owner may issue a Proposal Request or Notice of Change which includes a detailed description of a proposed change with supplementary or revised Drawings and Specifications. Contractor will prepare and submit an estimate within two (2) days, unless otherwise indicated in the proposal request.
3. The Contractor may propose a change by submitting a request for change to the Owner, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum/Price and Contract Time with full documentation.
4. Upon the Owner's approval of a Change Order Proposal Request, the Owner will issue a Change Order for signatures of the Owner and Contractor, as provided in the Conditions of the Contract

B. In signing a Change Order, Owner and Contractor acknowledge and agree that:

1. Stipulated compensation (Contract Price or Contract Times, or both) set forth includes payment for:
 - a. Cost of the Work covered by the Change Order
 - b. Contractor's fee for overhead and profit
 - c. Interruption of Progress Schedule
 - d. Delay and impact, including cumulative impact, on other Work under the Contract Documents
 - e. Extended overheads.
2. Change Order constitutes full mutual accord and satisfaction for the change to the Work.
3. Unless otherwise stated in the Change Order, all requirements of the original Contract Documents apply to the Work covered by the Change Order.

1.09 DOCUMENTATION OF CHANGE IN CONTRACT SUM/PRICE AND CONTRACT TIME

A. Maintain detailed records of work done on a time and material or force account basis. Provide full information required for evaluation of proposed changes, and to substantiate costs of changes in the Work.

- B. Document each quotation for a change in cost or time with sufficient data to allow evaluation of the quotation.
- C. On request, provide additional data to support computations:
 - 1. Quantities and description of products, labor, and equipment;
 - 2. Taxes, insurances and bonds;
 - 3. Overhead and profit;
 - 4. Justification for any change in Contract Time;
 - 5. Credit for deletions from Contract, similarly documented.
- D. Support each claim for additional costs, and for work done on a time and material or force account basis, with additional information:
 - 1. Origin and date of claim;
 - 2. Dates and times work was performed, and by whom;
 - 3. Time records and wage rates paid.
 - 4. Invoices and receipts for products, equipment, and subcontracts, similarly documented.

1.10 AS-BUILT CHANGE ORDER

- A. The total Bid Price will be determined as the sum of the products of the estimated quantity of each item and the unit price bid.
- B. The final Contract Price will be subject to adjustment according to final measured, used, or delivered quantities as stated herein, and the unit prices in the Bid will apply to such final quantities, except that unit prices will be subject to change by Change Order as stipulated herein.

1.11 REQUEST FOR INFORMATION (RFI) OR CLARIFICATION MEMO

- A. Procedures: Pursuant to paragraphs 3.03 and 10.03 of the General Conditions:
 - 1. Contractor: Initiate RFI using the RFI Form or the Owner-Selected Electronic System. Provide information required by Owner- provided form or the Owner-Selected Electronic System:
 - 2. Engineer: Upon receipt of Contractor's written RFI, will:
 - a. Promptly review request to determine intent of Contract Documents and clarification necessary.
 - b. Notify Contractor promptly if unable to meet Contractor's requested response date and indicate a tentative response date.
 - c. Respond to RFI and/or issue a Clarification Memo in accordance with paragraph 10.03 of General Conditions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 CHANGE ORDER BREAKDOWN

- A. Contract prices shall be used for Change Order work where work is of similar nature; no other costs, overhead or profit will be allowed.
- B. When Contract prices are not appropriate and the nature of the change is known in advance of construction, the parties shall attempt to agree on a fully justifiable price adjustment and/or adjustment of completion time.
- C. When Contract prices are not appropriate, or the parties fail to agree on equitable adjustment, or in processing claims, equitable adjustment for Change Order work shall be per this section and shall be based upon the breakdown show in the following subsections. The Contractor shall assemble a complete cost breakdown that lists and substantiates each item of work and each item of cost.
 - 1. Labor: Payment will be made for direct labor cost plus payroll costs and fee per Article 11.07 of the General Conditions.
 - 2. Bond: Payment for additional bond cost will be made per bond rate schedule submitted to the Owner with the executed Contract.
 - 3. Materials: Payment for cost of required materials will be F.O.B. the job site plus fee per Article 11.07 of the General Conditions.
 - 4. Rented Equipment: Payment for required equipment rented from an outside company that is neither an affiliate of, nor a subsidiary of, the Contractor will be based on receipted invoices per Article 13.01.B.5.c. No additional allowance will be made for overhead and profit. The Contractor shall submit written certification to the Owner that any required rented equipment is neither owned by nor rented from the Contractor or an affiliate of or subsidiary of the Contractor.
 - 5. Contractor's Equipment: Payment for equipment and machinery owned by Contractor or a Contractor-related entity will be paid per Article 13.01.B.5.c. Payment for Contractor equipment made idle by delays attributable to the Owner will be based on one-half the derived rate under this subsection. Approved transportation charges will be paid (one way) from the nearest source if the equipment is brought to the project specifically for use on the change order work and is not to be used on any other work. No additional allowance will be made for overhead and profit.
 - 6. Miscellaneous: No additional allowance will be made for general superintendence, use of individual pieces of equipment or small tools having a replacement value of less than \$1,000 and other costs for which no specific allowance is herein provided.

7. Subcontract Work: Payment for additional necessary subcontract work will be based on applicable procedures in 1 through 6. Contractor's and subcontractors' fees limited per Article 11.07 of the General Conditions.
 8. Builder's Risk Insurance: Payment for additional contractor builder's risk insurance on change orders will be based on actual additional premiums with no additional fee.
- D. If directed, the Contractor shall submit to the Owner three (3) qualified bids for extra or changed work and materials, if similar Work is not being performed at job site. If directed, the Contractor shall submit daily time charges to the Owner each day for Change Order Work.
- E. Invoice for work included in the contract pursuant to a change order issued or recognized pursuant may only be submitted to the Owner following the Contracting Officer's issuance of a written modification of the contract price.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 29 00 PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. Specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.02 FORMAT

- A. Application shall be on forms as supplied by the Owner.

1.03 DEFINITIONS

- A. General:

1. Pay Item: An item of work specifically described and for which a price, either unit or lump sum is provided.
2. Pay Item Schedule (Schedule of Prices): A schedule showing the pay item number, the approximately quantity of each pay item, the price bid by the Contractor to be paid for each item of work performed under Contract, the total cost of each item, and the total amount bid by the Contractor.
3. Extra Work: Work other than that required either expressly or implied by the Contract in its executed form.

- B. Measurement:

1. Lump-Sum Measurement:
 - a. Measurement will be for the entire item, unit of work, structure, or combination thereof, as specified.
 - b. Contractor shall show each applicable lump-sum item a fixed definable and measurable quantities where possible and unit prices there for as developed and assigned by the Contractor to the different features of the work. The summation of extensions of quantities and unit prices and related costs shall equal the amount of the lump-sum Contract Price or lump sum bid item indicated in the Bid Schedule of Prices.
 - c. Progress payments will be made in accordance with the Contractor's payment-apportioning program and from the approved progress schedule, reflecting the progress which occurred during the payment period.
2. Volume Measurement: Measurement will by the volume dimension indicated in the Bid Schedule of Prices.

3. Area Measurement: Measurement by area will be by the area dimensions as measured in the Field.
4. Linear Measurement: Linear measurement will be by the linear dimension and unless otherwise indicated, items, components, or work to be measured on a linear basis will be measured at the centerline of the item in place.
5. Weight Measurement:
 - a. Measurement by weight shall be measured by scale or by handbook weights for the type and quantity of material actually furnished and used.
 - b. Trucks used to haul material being paid by weight shall be weighed empty daily and each loaded trip. Each truck shall bear a plainly legible identification mark.

1.04 SUBMITTALS

A. Schedule of Values:

1. Submit Preliminary Schedule of Values within fifteen (15) days after the tentative award of the Contract.
2. Submit finalized Schedule of Values within ten (10) days from the approval date of the Overall Construction Progress Schedule.
3. Submit three (3) copies of Schedule.
4. Submit schedule on Contractor's standard form in Excel (.xls) format.

B. Application for Payment Procedure:

1. Submit a draft Application for Payment for review. The cutoff date shall be five (5) working days prior to actual application due date or as otherwise agreed.
2. Submit Five (5) copies of each Application for Payment at time stipulated in Agreement.
3. Submit under transmittal letter.
4. Each Application for Payment shall include the following items, in order to be considered complete:
 - a. Monthly Health & Safety Report.
 - b. Monthly Quality Control Report; QC Backup for Completed Work.
 - c. Updated CPM Schedule and Progress Report.
 - d. Updated Shop Drawing Log.
 - e. Monthly Job Photos and Videos.
 - f. Copy of current Insurance Certifications.
 - g. Copy of Paid Invoices for material stored on-site (if applicable).
 - h. Copy of Paid invoices for material stored off-site (if applicable).
 - i. Application and Certificate for Payment.
 - j. Updated electronic copy of Record Drawings/Red-line Drawings.

- k. Report for payments for public transit use.
- 5. Each Application for Payment shall be consistent with previous applications and payments as certified by the Contractor and paid by the Owner.
- 6. Application for Payment at Substantial Completion: After receipt of the Certificate of Substantial Completion, submit an Application for Payment showing 100 Percent completion for portion of the Work claimed as substantially complete minus the value of the punch list items.
- 7. Final Payment Application: Submit final Application for Payment with releases and supporting documentations not previously submitted and accepted.

1.05 PREPARATION OF APPLICATION

- A. Type required information
- B. Execute certification by signature of authorized officer.
- C. Use data on Bid Form and approved Schedule of Values. Provide dollar value in each column for each line item for portion of Work performed.
- D. List each authorized Change Order and an extension on continuation sheet, listing Change Order number and dollar amount as for an original item of Work.
- E. Prepare Application for Final Payment as required in General Conditions.

1.06 CASH ALLOWANCES

- A. Consult with Engineer in selection of products or services. Obtain proposals from Suppliers and installers, and offer recommendations.
- B. Cash allowances will be administered in accordance with Paragraph 13.02 of General Conditions.
- C. Submit, with application for payment, invoice showing date of purchase, from whom the purchase was made, the date of delivery of the product or service, and the price, including delivery to the Site and applicable taxes.

1.07 SCHEDULE OF VALUES

- A. Format: Type on the Owner-provided forms or approved format.
- B. Prepare a separate Schedule of Values for each schedule of the Work under the Agreement.
- C. Coordinate listings with Progress Schedule.

- D. For items on which payments will be requested for stored products, list sub-values for cost of stored products.
- E. The Contractor's Schedule of Values shall include allocations for the following administrative and contractually required deliveries and related services required to be provided to the Authority throughout the duration of the contract.
 - 1. Health and Safety: Due before any work may take place in the field and updates are required with each monthly payment application.
 - a. Health & Safety.
 - b. Monthly Health & Safety Plan.
 - c. Injury & Accident Reports.
 - d. Monthly Implementation of Health & Safety Program (Maintain Daily - Payment Monthly).
 - e. Monthly Site Housekeeping Program (Maintain Daily - Payment Monthly).
 - f. Temporary Environmental Controls.
 - 2. Quality Control – Due before any work may take place in the field and updates are required with each monthly payment application.
 - a. Quality Control Plan.
 - b. Monthly Quality Control Report.
 - c. Monthly Implementation of Quality Control Program (Maintain Daily - Payment Monthly).
 - 3. Policies, Compliance – Due before any work may take place in the field and updates are required with each monthly payment application.
 - a. Copies of Insurance Policies.
 - b. Copies of Subcontractors Agreements & the Owner Approval Requests.
 - c. Compliance Reports:
 - 1) MBE/WBE Monthly Report.
 - 2) Weekly Statement of Wages (Certified Payrolls).
 - 4. Schedule of Values – Due before any work any take place in the field.
 - a. Schedule of Values:
 - 1) Initial – for first 120 days.
 - 2) Final – tied to the approved Construction Schedule.
 - 5. Schedules – Due before any invoicing may take place and updates are required with each monthly payment application.
 - a. Preliminary Project Schedule.
 - b. Initial Baseline Construction Schedule.
 - c. Approved Baseline Construction Schedule.
 - d. Monthly Schedule Reports & Updates (includes Progress Payments Forecasts, Planned Manpower Histograms and Construction Equipment Utilization Reports).
 - e. Revised Baseline Schedules for Approved Time Extensions by Change Orders.

6. Construction Support: Due before any invoicing may take place and updates are required with each monthly payment application.
 - a. Pre-Construction Photos, Videos.
 - b. Pre-Construction Surveys.
 - c. Pre-Construction Notification of Differing Site Conditions.
 - d. Construction Permits from Regulatory Agencies.
 - e. Monthly Progress Photos, Videos.
 - f. Site Surveys for Maintaining Horizontal & Vertical Controls, Construction Layout.
 - g. Site Surveys for As-built Locations.
7. Construction Reports: Updates are prerequisite to monthly pay applications.
 - a. Daily Progress Reports.
 - b. Weekly Progress Reports.
 - c. Monthly Progress Reports.
8. Submittals for Technical Specifications:
 - a. Submittals, Initial - Final Approval:
 - 1) Delivery Schedule for Technical Submittals Divisions.
 - 2) Products, Materials and Samples to be utilized in the Work.
 - 3) Coordinated Layout Drawings.
 - 4) Shop Drawings.
 - 5) Calculations.
9. O & M Training: Milestones in the schedule are established for these Items and pay application may not be made until these milestones are met. Also, follow on work elements may not be performed until these milestones are satisfied.
 - a. O & M Training.
 - b. Lesson Plans, Preliminary.
 - c. Lesson Plans, Final.
 - d. Training Sessions, Initial.
 - e. Training Sessions, Follow-on.
 - f. Final Deliverables.
10. Equipment and System Commissioning: Milestones in the schedule are established for these Items and pay application may not be made until these milestones are met. Also, follow on work elements may not be performed until these milestones are satisfied.
 - a. Installation Review(s).
 - b. Field Testing.
 - c. Equipment and System Check-out.
 - d. Operational Demonstration.
 - e. Performance Certification Testing.
11. Project Record Drawings: Milestones in the schedule are established for these Items, and pay application may not be made until these milestones are met.
12. Permits, Spares, Warranties: Milestones in the schedule are established for these Items and pay application may not be made until these

- milestones are met. Also, follow on work elements may not be performed until these milestones are satisfied.
- a. Regulatory Agency(s) Approvals:
 - 1) Alexandria Fire Department.
 - 2) Alexandria Permit Center - Certificate(s) of Occupancy.
 - b. Spare Parts Delivery and Turn-over.
 - c. Warranties: All Extended Warranties Delivered and Approved.
13. All Remaining Deliverables: Final payment will not be made until this milestone is accomplished.
- a. Delivery and Turn-over of all Required Final Contract Deliverables.
- F. Submit a sub-schedule for each separate stage of work specified in the Project Manual.
- G. Upon request of Engineer, provide documentation to support the accuracy of the Schedule of Values.
- H. Unit Price Work: Reflect unit price quantity and price breakdown from conformed Bid Form.
- I. Lump Sum Work:
1. Reflect specified cash and contingency allowances and alternates, as applicable.
 2. List bonds and insurance premiums, mobilization, demobilization, preliminary and detailed progress schedule preparation, equipment testing, facility startup, and contract closeout separately.
 - a. Bonds and Project-Specific Insured: Payment shall be based on submitted invoices for premiums directly charged to the Contractor.
 - b. Mobilization: Payment shall not exceed 2 percent of the total Contract amount and shall be prorated over a minimum of a 4-month period.
 - c. Contractor Project Administration: Payment shall be based on Contractor-estimated monthly cost for Project administration and all associated costs, payable with each partial payment application. All costs shall be subject to review and approval by the Engineer.
 3. Breakdown remainder of Lump Sum Value by Activity ID as shown in the Baseline Schedule.
- J. An unbalanced or front-end loaded schedule will not be acceptable.
- K. Summation of the complete Schedule of Values representing all the Work shall equal the Contract Price.

- L. Submit Schedule of Values in a spreadsheet format compatible with latest version of MSExcel.
- M. Action:
 - 1. No payment will be made for work performed on a lump sum contract or a lump sum item until the appropriate Schedule of Values is approved by the Owner.
 - 2. The equitable value of work deleted from a lump sum contract or lump sum item shall be determined from the approved Schedule of Values.

1.08 SCHEDULE OF ESTIMATED PROGRESS PAYMENTS

- A. Within 30 days after the effective date of the Contract, Contractor shall furnish to the Owner a schedule of estimated monthly payments in a form acceptable to the Owner.
 - 1. Provide table of estimated payments by month for entire contract duration aggregating in initial contract price. Table shall be in spreadsheet format compatible with latest version of MSExcel.
 - 2. Base estimated progress payments on initially acceptable progress schedule. Adjust to reflect subsequent adjustments in progress schedule and Contract Price as reflected by modifications to the Contract Documents.
- B. The sum of all items listed shall equal the Contract Price.
- C. The cash flow projection shall be divided into month-by-month cash requirements and shall be equated or tied to the Contractor's construction schedule in sufficient detail to indicate realistic costs and expenses for all elements of the project.
- D. The schedule shall be revised and resubmitted each time an Application for Payment varies more than 10 percent from the estimated payment schedule.
- E. No progress payments will be made until the cash flow schedule has been approved.

1.09 APPLICATION FOR PAYMENT

- A. Transmittal Summary Form: Attach one Summary Form with each detailed Application for Payment for each schedule and include Request for Payment of Materials and Equipment on Hand as applicable. Execute certification by authorized officer of Contractor.

- B. Application for Payment will be generated by Owner based on the updated schedule submittal and the schedule of values. Form will be provided to Contractor for signature.
- C. Provide separate form for each schedule as applicable.
- D. Include accepted Schedule of Values for each schedule or portion of lump sum Work and the unit price breakdown for the Work to be paid on a unit priced basis.
- E. Include separate line item for each Change Order and Work Change Directive executed prior to date of submission. Provide further breakdown of such as requested by Engineer.
- F. Preparation:
 - 1. Round values to nearest dollar.
 - 2. Submit Application for Payment, including a Transmittal Summary Form and detailed Application for Payment Form(s) for each schedule as applicable, a listing of materials on hand for each schedule as applicable, and such supporting data as may be requested by Engineer.

1.10 MEASUREMENT—GENERAL

- A. Weighing, measuring, and metering devices used to measure quantity of materials for Work shall be suitable for purpose intended and conform to tolerances and specifications as specified in National Institute of Standards and Technology, Handbook 44.
- B. Whenever pay quantities of material are determined by weight, weigh material on scales furnished by Contractor and certified accurate by state agency responsible. Obtain weight or load slip from weigher and deliver to Owner's representative at point of delivery of material.
- C. If material is shipped by rail, car weights will be accepted provided that actual weight of material only will be paid for and not minimum car weight used for assessing freight tariff and provided further that car weights will not be acceptable for material to be passed through mixing plants.
- D. Vehicles used to haul material being paid for by weight shall be weighed empty daily and at such additional times as required by Engineer. Each vehicle shall bear a plainly legible identification mark.
- E. Haul materials that are specified for measurement by the cubic yard measured in the vehicle in transport vehicles of such type and size that actual contents may be readily and accurately determined. Unless all vehicles are of uniform capacity, each vehicle must bear a plainly legible identification mark

indicating its water level capacity. Load vehicles to at least their water level capacity. Loads hauled in vehicles not meeting above requirements or loads of a quantity less than the capacity of the vehicle, measured after being leveled off as above provided, will be subject to rejection, and no compensation will be allowed for such material.

- F. Quantities will be based on ground profiles shown. Field surveys will not be made to confirm accuracy of elevations shown.
- G. Where measurement of quantities depends on elevation of existing ground, elevations obtained during construction will be compared with those shown on Drawings. Variations of 1 foot or less will be ignored, and profiles shown on Drawings will be used for determining quantities.
- H. Units of measure shown on Bid Form shall be as follows, unless specified otherwise.

Item	Method of Measurement
AC	Acre—Field Measure by Engineer
CY	Cubic Yard—Field Measure by Engineer within limits specified or shown
CY-VM	Cubic Yard—Measured in Vehicle by Volume
EA	Each—Field Count by Engineer
GAL	Gallon—Field Measure by Engineer
HR	Hour
LB	Pound(s)—Weight Measure by Scale
LF	Linear Foot—Field Measure by Engineer
MFBM	Thousand Foot Board Measure—[Delivery Invoice] [Field Measure by Engineer]
SF	Square Foot
SY	Square Yard
TON	Ton—Weight Measure by Scale (2,000 pounds)

- I. Measurement of Linear Items: Where payment will be made based on linear quantities and on parameters other than length, those parameters shall be as follows:

Item	Measurement Parameters
Trench Safety System	Depth of Trench: 0 foot to 4 feet; 4 feet to 10 feet; over 10 feet in 2-foot increments. The depth of trench will be measured at intervals of 25 feet along the centerline of the trench. The depth of each measuring point will be the depth from existing at grade surface to bottom of pipe base, [A:] inches below pipe invert and will be used for computing the depth of trench for a distance of 25 feet ahead of the point of measurement. The depth figures indicated in Bid Form are inclusive to nearest 0.1 foot; that is, a trench depth measured as 11.9 feet will be paid for at the unit price for excavation 10 feet to 12 feet deep. A trench depth measured as 12 feet will be paid for at the unit price for excavation 12 feet to 14 feet deep.
Unclassified Trench Excavation	Depth of Trench: Same as Trench Safety System above.
Trench Backfill and Compaction	Depth of Trench: Same as Unclassified Trench Excavation above.

1.11 PAYMENT

A. General:

1. Progress payments will be made monthly.
2. The due date for Contractor's submission of monthly Application for Payment shall be established at the Preconstruction Conference.

B. Payment for all Lump Sum Work shown or specified in Contract Documents is included in the Contract Price. Payment will be based on a percentage complete basis for each line item of the accepted Schedule of Values.

C. Payment for Lump Sum Work covers all Work specified or shown within the limits or Specification sections as follows:

1. Limits of Work are as shown on the Drawings.
2. Limits of Work are as defined in Section 01 11 00, Summary of Work.
3. All Work shown on Drawings and in Specifications

1.12 NONPAYMENT FOR REJECTED OR UNUSED PRODUCTS

A. Payment will not be made for following:

1. Loading, hauling, and disposing of rejected material.

2. Quantities of material wasted or disposed of in manner not called for under Contract Documents.
3. Rejected loads of material, including material rejected after it has been placed by reason of failure of Contractor to conform to provisions of Contract Documents.
4. Material not unloaded from transporting vehicle.
5. Defective Work not accepted by Owner.
6. Material remaining on hand after completion of Work.

1.13 PARTIAL PAYMENT FOR STORED MATERIALS AND EQUIPMENT

- A. Partial Payment: No partial payments will be made for materials and equipment delivered or stored unless Shop Drawings and preliminary operation and maintenance data is acceptable to Engineer.
- B. Final Payment: Will be made only for products incorporated in Work; remaining products, for which partial payments have been made, shall revert to Contractor unless otherwise agreed, and partial payments made for those items will be deducted from final payment.

1.14 PARTIAL PAYMENT FOR UNDELIVERED, PROJECT-SPECIFIC MANUFACTURED OR FABRICATED EQUIPMENT

- A. Notwithstanding above provisions, partial payments for undelivered (not yet delivered to Site or not stored in the vicinity of Site) products specifically manufactured for this Project, excluding off the shelf or catalog items, will be made for products listed below when all following conditions exist:
 1. Partial payment request is supported by written acknowledgment from Suppliers that invoice requirements have been met.
 2. Equipment is adequately insured, maintained, stored, and protected by appropriate security measures.
 3. Each equipment item is clearly marked and segregated from other items to permit inventory and accountability.
 4. Authorization has been provided for access to storage Site for Engineer and Owner.
 5. Equipment meets applicable Specifications of these Contract Documents.
- B. Payment of 15 percent of manufacturer's quoted price for undelivered, Project-specific manufactured equipment will be made following Shop Drawing approval. Thereafter, monthly payments will be made based on progress of fabrication as determined by Engineer, but in no case will total of payments prior to delivery exceed 75 percent of manufacturer's quoted price.

- C. Failure of Contractor to continue compliance with above requirements shall give cause for Owner to withhold payments made for such equipment from future partial payments.

1.15 PAYMENTS FOR PUBLIC TRANSIT USE

- A. The Owner will subsidize 50 percent of costs associated with mass transit use by the Contractor's workers for those workers who elect to use Metro, DASH, VRE or other forms of public transit to commute to the Project Site. These costs will not be considered as part of lump sum or unit price bid items included in the Contractor's bid.
- B. On a monthly basis, the Contractor shall collect receipts from workers utilizing public transit and submit copies with a summary of total costs and the amount to be reimbursed by the Owner. The report shall include a statement certifying that all costs associated with public transit use are solely associated with job-related travel to the Project Site. Reimbursement of the subsidized cost will be made to the Contractor. Contractor will be responsible for distributing payment to his employees. The Owner reserves the right to audit the reimbursement documentation.
- C. Documentation shall be submitted with the monthly application for payment as a separate supplemental summary page.
- D. All administrative costs associated with payment of reimbursable public transit costs to individual workers shall be borne by the Contractor.
- E. Include a monthly tally of workers who have used public transit in the Sustainable Construction Log supplement provided in Section 01 32 00, Construction Progress Documentation.

1.16 SUBSTANTIATING DATA

- A. When the Owner requires substantiating information, submit data justifying line item amounts in question.
- B. Provide one copy of data with cover letter for each copy of submittal. Show Application number and date, and line item by number and description.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 31 13 PROJECT COORDINATION

PART 1 GENERAL

1.01 SUMMARY

- A. Work specified in this Section includes coordination requirements with other contractors at the site and with Owner workforce.
- B. Other contractors will be working concurrently at, and adjacent to, the existing AlexRenew Water Resource Recovery Facility (WRRF) site and are to be considered third-party beneficiaries to this Contract in respect to site access and scheduling, and the Contractor is assuming the liability from this contractual relationship. Contractor shall make reasonable adjustments to operations and schedule, as directed by the Owner, to coordinate Work under this Contract with work performed by others at the site.
- C. Development of the means and methods for the Contractor's sequence of construction is solely the responsibility of the Contractor.
- D. Section specifies administrative and supervisor requirements necessary for Project coordination.

1.02 DEFINITIONS

- A. MOPO: Maintenance of Plant Operations.

1.03 WORK BY OWNER AND BY SEPARATE CONTRACTORS

- A. The Owner reserves the right to perform work related to the project and to award separate contracts in connection with other portions of the Project or other Work at the site.
- B. The Contractor shall attend weekly plant-wide coordination meetings which will review look-ahead schedules for all active projects and scheduled plant-work to facilitate site-wide coordination amongst projects and with plant operations. The intent of the meeting to communicate and coordinate work, including lockout/tagout work, confined space entry, partial road closure requests in advance. Owner or Engineer will prepare meeting agenda with regular participant input and distribute with written notice of each meeting, preside at meetings, record minutes to include significant proceedings and decisions, and distribute copies of minutes within 5 days after each meeting to participants and parties affected by meeting decisions.

- C. The Owner reserves the right to add or delete contracts, to modify the scope of contracts, or to modify schedules, any of which are to the benefit of the Owner. The schedule is provided as a tool to assist the Contractor in developing project costs and a project schedule, and to prepare for coordination of Work with the work of other contractors.
- D. Mutual Responsibility:
1. Contractor shall afford other contractors and the Owner reasonable opportunity for the introduction and storage of their materials and equipment and the execution of their work, and shall properly connect and coordinate the Work with that of the Owner, and other contractors to store its apparatus, materials, supplies, and equipment in such orderly fashion at the site of the Work as will not unduly or unreasonably interfere with the progress of the Work or the work of any other contractor.
 - a. If the execution or result of any part of the Work depends upon any work of the Owner or of any separate contractor, the Contractor shall, prior to proceeding with the Work, inspect and promptly report to the Owner in writing any apparent discrepancies or defects in such work that render it unsuitable for such proper execution or result of any part of the Work.
 - b. Failure of the Contractor to so inspect and report shall constitute an acceptance of the Owner's or separate contractor's work as fit and proper to receive the Work, except as to defects which may develop in the Owner's or separate contractor's work after completion of the Work and which the Contractor could not have discovered by its inspection prior to completion of the Work.
 2. Should the Contractor cause damage to the Work or property of any separate contractor on the Project, or to other Work on the Site, or delay or interfere with the Owner's Work on ongoing operations, facilities, or adjacent facilities, or said separate contractor's Work, the Contractor shall be liable for the same; and, in the case of another contractor, the Contractor shall attempt to settle said claim with such other contractor prior to such other contractor's institution of litigation or other proceedings against the contractor.
 3. If such separate contractor sues the Owner on account of any damage, delay, or interference caused by the Contractor, the Owner shall notify the Contractor, who shall defend the Owner in such proceedings at the Contractor's expense. If any judgment or award is entered against the Owner because of the actions or inaction of the Contractor, the Contractor shall satisfy the same and shall reimburse the Owner for all damages, expenses, attorney's fees, and other costs which the Owner incur as a result thereof.

4. Should a separate contractor cause damage to the Work or to the property of the Contractor, or cause delay of interference with the Contractor's performance of the Work, the Contractor shall present directly to said separate contractor any claim it may have as a result of such damage, delay, or interference (with an information copy to the Owner), and shall attempt to settle its claim against said separate contractor prior to the institution of litigation or other proceedings against said separate contractor.
 - a. In no event shall the Contractor seek to recover such damages from the Owner. The Contractor hereby warrants to the Owner that it will not seek to recover any costs, expenses (including, but not limited to, attorney's fees) or damages or other losses incurred by the Contractor as a result of any damage to the Work or property of the Contractor or any delay or interference caused by any separate contractor.
 - b. In order to carry out the intent of this Section, the Contractor agrees that privity of contract exists between Contractor and any separate contractor, as defined herein, for the purpose of disposing of the liabilities of obligations which are imposed upon said parties to each other as specified in this Section; and Contractor agrees to accept service of process and to sue and be sued in Contractor's own name in a litigation which may arise between Contractor and any separate contractor.

- E. Coordination of the Work: By entering into this Contract, Contractor acknowledges that there may be other contractors on the site whose work requires coordination with that of its own. Contractor expressly warrants and guarantees that he will cooperate with other contractors and will do nothing to delay, hinder, or interfere with the work of other separate contractors, or the Owner. The Contractor also expressly agrees that, in the event its Work is hindered, delayed, interfered with, or otherwise affected by a separate contractor, its sole remedy will be a direct action against the separate contractor as described in this Section. Contractor will have no remedy, and hereby expressly waves any remedy, against the Owner on account of delay, hindrance, interference, or other event caused by separate contractor.

1.04 SUBMITTALS

- A. Staff Names: Within 5 days of Notice to Proceed, submit a list of the Contractor's principal staff assignments, including the Superintendent and other personnel in attendance at the site; identify individuals, their duties and responsibilities; list their addresses and telephone numbers.
 1. Post copies of the list in the Project meeting room, the temporary field office, and at each temporary telephone.

- B. Shutdown Period and/or Cut-In Schedule requests.
- C. Lockout/Tagout requests.
- D. Partial or Full Road Closure requests.
- E. List of Scheduled Site Deliveries (24 hours in advance).
- F. Contractor's Daily Reports.

1.05 RELATED WORK AT SITE

- A. General:
 - 1. The available construction working area is limited. The plant must remain in operation and cannot be completely shut down, except for limited outages described in the Contract Documents. The Owner must have access to all plant operational areas. Work must be coordinated with the Owner to allow plant operations.
 - 2. Other work that is either directly or indirectly related to scheduled performance of the Work under these Contract Documents, listed henceforth, is anticipated to be performed at Site by others.
 - 3. Coordinate the Work of these Contract Documents with work of others as including but not limited to those specified in General Conditions and as below:
 - a. RiverRenew Tunnel System Project
 - b. PAC Project
 - c. ACE On-Call
 - d. Effluent Filter Rehabilitation
 - 4. Include sequencing constraints and project milestones specified herein as a part of Progress Schedule.

1.06 UTILITY NOTIFICATION AND COORDINATION

- A. Coordinate the Work with various utilities within Project limits. Notify applicable utilities prior to commencing Work, if damage occurs, or if conflicts or emergencies arise during the Work.
 - 1. Electricity Company: Dominion Virginia Power.
 - a. Telephone: 888-667-3000.
 - 2. Telephone Company: Verizon.
 - a. Telephone: 800-837-4966.
 - 3. Water Department: Virginia American Water Company.
 - a. Telephone: 703-549-0909.
 - 4. City of Alexandria Department of Transportation and Environmental Services.

- a. Telephone: 703-838-4966.
- 5. Gas Company: Washington Gas.
- a. Telephone: 703-750-1000.

1.07 PROJECT MILESTONES

- A. General: Include the Milestones specified herein as a part of the Progress Schedule required under Section 01 32 00, Construction Progress Documentation.
- B. Project Milestones: Generally described in Section 00 52 00, Agreement.

1.08 HAZARDOUS LOCATIONS

- A. General: When construction activities require working in hazardous locations, all Work shall be carried out in accordance with VOSH Regulations.
- B. Refer to Supplemental Documents to this Contract.

1.09 FACILITY OPERATIONS

- A. Continuous operation of Owner's facilities is of critical importance. Schedule and conduct activities to enable existing facilities to operate continuously, unless otherwise specified.
- B. Perform Work continuously during critical connections and changeovers, and as required to prevent interruption of Owner's operations.
- C. When necessary, plan, design, and provide various temporary services, utilities, connections, temporary piping and heating, access, and similar items to maintain continuous operations of Owner's facility.
- D. Do not close lines, open or close valves, or take other action which would affect the operation of existing systems, except as specifically required by the Contract Documents and after authorization by Owner and Engineer. Such authorization will be considered within 10 business days after receipt of Contractor's request.
- E. Process or Facility Shutdown:
 - 1. The following shall require shutdown at some time during the Work:
 - a. Building G1 and IPS HVAC systems.
 - 2. Provide Plant Impact Request (PIR) in e-Builder for approval of need to shut down a process or facility to Owner 10 business days in advance.
 - 3. Power outages will be considered upon 10 business days written request to Owner and Engineer. Describe the reason, anticipated length of time,

- and areas affected by the outage. Provide temporary provisions for continuous power supply to critical facility components by generator or other method acceptable to the Owner.
4. Any HVAC outages shall be coordinated such that the temporary HVAC system is fully in place prior to stopping the HVAC equipment that will be temporary relocated during the roof installation.
- F. Install and maintain bypass facilities and temporary connections required to keep Owner's operations on line. Sequences other than those specified will be considered upon written request to Owner and Engineer, provided they afford equivalent continuity of operations.
- G. Do not proceed with Work affecting a facility's operation without obtaining Owner's and Engineer's advance approval of the need for and duration of such Work.
- H. Relocation of Existing Facilities:
1. During construction, it is expected that minor relocations of Work will be necessary.
 2. Use only new materials for relocated facility. Match materials of existing facility, unless otherwise shown or specified.
 3. Perform relocations to minimize downtime of existing facilities.
 4. Install new portions of existing facilities in their relocated position prior to removal of existing facilities, unless otherwise accepted by Engineer.

1.10 ADJACENT FACILITIES AND PROPERTIES

- A. Examination:
1. After Effective Date of the Agreement and before Work at Site is started, Contractor, Engineer, and affected property owners and utility owners shall make a thorough examination of pre-existing conditions including existing buildings, structures, and other improvements in vicinity of Work, as applicable, which could be damaged by construction operations.
 2. Periodic reexamination shall be jointly performed to include, but not limited to, cracks in structures, settlement, leakage, and similar conditions.
- B. Documentation:
1. Record and submit documentation of observations made on examination inspections in accordance with Section 01 32 33, Construction Photographs.

2. Upon receipt, Engineer will review, sign, and return one record copy of documentation to Contractor to be kept on file in field office.
3. Such documentation shall be used as indisputable evidence in ascertaining whether and to what extent damage occurred as a result of Contractor's operations, and is for the protection of adjacent property owners, Contractor, and Owner.

1.11 PROJECT TASKS

A. General:

1. Major tasks have been identified for the Owner's purposes. Although all Work is not listed herein, the tasks listed shall be understood to include all accompanying tasks such as, but not limited to, sitework, interconnecting utilities and associated infrastructure, and applicable temporary provisions necessary to sequence the Work. Temporary provisions shall include pipeline endcaps, other utility terminations, and temporary utilities as necessary to allow operation of portions of the Work prior to completion of other portions of the Work, consistent with the Contractor's sequence of operations, although such provisions are not shown.
2. Task headings and descriptions set forth are descriptive only and are not intended to define the scope Work included therein.

B. Task 1: Initial Sitework:

1. Task 1.1 – Install erosion control measures around staging areas.
2. Task 1.2 – Install staging area(s).

C. Task 2: Roof Demolition:

1. Task 2.1 – Temporarily remove HVAC for Building G1 and IPS.
2. Task 2.2 – Install temporary HVAC for Building G1 and IPS.
3. Task 2.3 – Perform asbestos abatement.
4. Task 2.4 – Remove existing roof material.
5. Task 2.5 – Remove existing stone screen wall as shown on drawings.
6. Task 2.6 – Roof Replacement of a zone must be complete prior to starting demolition of the next zone.

D. Task 3: Roof Replacement:

1. Task 3.1 – Build up curbs for new insulation thicknesses.
2. Task 3.2 – Reinstall permanent HVAC.
3. Task 3.3 – Install metal screen wall.
4. Task 3.4 – Roof Installation.

5. Task 3.5 – Reinstall lightning protection.

E. Task 4: Final Sitework:

1. Task 4.1 – Erosion control measures continued until temporary facilities removed.

1.12 SEQUENCE CONSTRAINTS

A. General:

1. This section defines specific limitations on the Contractor's sequence of operations to minimize impact of the Work on operation of existing wastewater delivery and treatment facilities and plant electrical infrastructure.
2. To meet the overall objectives of the Project, certain tasks and task elements should be generally performed, completed, or substantially completed in the herein-specified sequences. However, two or more of the tasks or task elements may be pursued simultaneously when consistent with the requirements specified herein: the requirements of Article Sequence of Constraints, specified hereinafter; and the Project Schedule.
3. The specified sequences and tasks are not all-inclusive. They are intended to convey overall sequence requirements. The Contractor shall plan the Work, relocate facilities, reroute utilities, and provide for temporary connections and terminations as necessary in an appropriate sequence of operation to perform the Work, while minimizing interferences with and providing for continuous operation of the Owner's existing wastewater delivery facilities.
4. Major sequences have been identified for the Owner's purposes. Although all Work is not listed herein, the tasks listed shall be understood to include all accompanying tasks such as, but not limited to, sitework, interconnecting utilities and associated infrastructure, and applicable temporary provisions necessary to sequence the Work. Temporary provisions shall include pipeline endcaps, other utility terminations, and temporary utilities as necessary to allow operation of portions of the Work prior to completion of other portions of the Work, consistent with the Contractor's sequence of operations, although such provisions are not shown.
5. To accommodate the Contractor's sequence of operations, subject to the constraints specified herein, it is anticipated that the Owner will assume partial utilization of portions of the Work.
6. The term "finish paving" shall be understood to mean final surfacing of paved areas, excluding base and subgrade. Such final surfacing includes

the asphalt concrete course for asphalt concrete pavement, all asphalt concrete resurfacing, and the concrete portion of concrete paving.

7. All existing Owner facilities shall remain in continuous operation except as specified herein.
8. All outages shall be coordinated per Article Outages above.

B. Task 1 – Initial Sitework:

1. Task 1.1 – Initial erosion control shall be in place prior to any construction in an area served by the erosion control provisions.
2. Task 1.2 – Install staging area(s).

C. Task 2 – Roof Demolition:

1. Task 2.1 – Temporarily remove HVAC for Building G1 and IPS.
2. Task 2.2 – Install temporary HVAC for Building G1 and IPS.
3. Task 2.3 – Asbestos abatement shall occur prior to all other roof demolition.
4. Task 2.4 – Roof demolition is limited to one zone at a time. Remove no more existing roofing than what can be covered in one day by new roofing or temporary waterproofing and ensure that the building interior remains watertight and weathertight. The zones are as follows:
 - a. IPS Flat Roof
 - b. IPS Sloped Tile Roof
 - c. Upper Roof
 - d. Middle Roof
 - e. Lower Roof
5. Task 2.5 – Remove existing stone screen wall as shown on drawings.
6. Task 2.6 – Roof Replacement of a zone must be complete prior to starting demolition of the next zone.

D. Task 3 – Roof Replacement:

1. Task 3.1 – Build up curbs for new insulation thicknesses.
2. Task 3.2 – Upon completion of roof installation reinstall permanent HVAC and remove temporary HVAC equipment.
3. Task 3.3 – Install metal screen wall.
4. Task 3.4 – Roof installation is limited to one zone at a time. The zones are as follows:
 - a. IPS Flat Roof
 - b. IPS Sloped Tile Roof
 - c. Upper Roof
 - d. Middle Roof
 - e. Lower Roof
5. Task 3.5 – Reinstall lightning protection.

E. Task 4—Final Sitework:

1. Task 4.1 – Erosion control must be continued until all temporary facilities have been removed.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL INSTALLATION PROVISIONS

- A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.
- B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
- C. Inspect Materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items. Provide written documentation to the Owner all of Water supplied damaged materials.
- D. Provide attachment and connection devises and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- E. Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Owner for final decision.
- F. Recheck measurements and dimensions, before starting each installation.
- G. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible materials as necessary to prevent deterioration.
- H. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering complete construction for that purpose.
- I. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the

industry for the particular application indicated. Refer questionable mounting height decisions to the Owner for final decision.

3.02 OUTAGE LIMITATIONS

- A. The Contractor shall perform the Work under this Contract to meet the specified time given in the Contract Documents. All Work shall be scheduled and proceed in such sequence as to avoid interference and delays to normal WRRF operations.
- B. During the performance of the Work, the Contractor may need to temporarily interrupt the normal operations of portions of the existing facilities in order to drain, fill, disconnect and reconnect certain items of equipment, piping, conduits, electrical service, and other facilities.
- C. In order to keep a minimum any interference with proper operation of the existing facilities, such disconnections and reconnections shall be made only at such times and in such manner as approved by the Owner in writing. The Contractor shall be prepared to fully operate on a 24-hour per day basis with no additional compensation in order to comply with the limitations as specified herein.
- D. The requirements included herein are necessary to minimize conflicts with ongoing plant operations and other working contracts in the immediate vicinity. Whether or not such work being performed by others is indicated on the Drawings, the Contractor shall make such reasonable adjustments in his operations and schedules as the Owner may direct for the purpose of coordinating his work with that in progress by others.
- E. All roadways affording ingress to and egress from the work area shall be maintained in service and kept free of obstructions at all times.
- F. The Contractor shall submit requests for outages and shutdowns as described in Article Site Management.
- G. Construction of the facilities under this project will be ongoing simultaneously with the daily routine operations of the plant.

3.03 CLEANING AND PROTECTION

- A. During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection damage or deteriorating at Substantial Completion.

- B. Clean and maintain completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

3.04 SITE MANAGEMENT

- A. All requests impacting the MOPO process/systems shall be made 3 weeks in advance.
- B. All other requests impacting the plant or requiring plant staff action (i.e. lockout/tagout minor panel or redundant system shall be made at least 10 business days, respectively, in advance. If approved the Contractor shall provide a confirmation notice at least 1 working day in advance of the approved work task date. The Contractor shall not exceed the approved duration without prior coordination and approval.
- C. The Contractor shall make a written request for Partial or Full Road Closure Requests at least 10 business days, respectively, in advance. If approved the Contractor shall provide a confirmation notice at least 1 working day in advance of the approved closure date. The Contractor shall not exceed the approved duration without prior coordination and approval.
- D. The Contractor shall provide a List of Scheduled Deliveries at least 24 hours in advance of the delivery.
- E. Contractor shall make Contractor's Daily Reports: A daily written and verbal report to the Owner's designated representative advising of the status of the Work, the prior day's accomplishments, activity planned for the current day and for at least 2 subsequent days, and any problems or delays that may be anticipated.

3.05 CUTTING, FITTING, AND PATCHING

- A. Cut, fit, adjust, or patch Work and work of others, including excavation and backfill as required, to make Work complete.
- B. Obtain prior written authorization of Engineer before commencing Work to cut or otherwise alter:
 - 1. Structural or reinforcing steel, structural column or beam, elevated slab, trusses, or other structural member.
 - 2. Weather-resistant or moisture-resistant elements.
 - 3. Efficiency, maintenance, or safety of element.
 - 4. Work of others.

- C. Refinish surfaces to provide an even finish.
 - 1. Refinish continuous surfaces to nearest intersection.
 - 2. Refinish entire assemblies.
 - 3. Finish restored surfaces to such planes, shapes, and textures that no transition between existing work and the Work is evident in finished surfaces.
- D. Make restorations with new materials and appropriate methods as specified for new Work of similar nature; if not specified, use recommended practice of manufacturer or appropriate trade association.
- E. Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces and fill voids.
- F. Remove specimens of installed Work for testing when requested by Engineer.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 31 19 PROJECT MEETINGS

PART 1 GENERAL

1.01 GENERAL

- A. Engineer will schedule physical arrangements for meetings throughout progress of the Work, prepare meeting agenda with regular participant input and distribute with written notice of each meeting, preside at meetings, record minutes to include significant proceedings and decisions, and reproduce and distribute copies of minutes within 5 days after each meeting to participants and parties affected by meeting decisions.

1.02 PRECONSTRUCTION CONFERENCE

- A. Contractor shall be prepared to discuss the following subjects, as a minimum:

- 1. Required schedules.
- 2. Status of Bonds and insurance.
- 3. Sequencing of critical path work items.
- 4. Progress payment procedures.
- 5. Project changes and clarification procedures.
- 6. Use of Site, access, office and storage areas, security and temporary facilities.
- 7. Major product delivery and priorities.
- 8. Contractor's safety plan and representative.
- 9. Sustainable Construction Log and related requirements.
- 10. Critical structures (special inspections).

- B. Attendees will include:

- 1. Owner's representatives.
- 2. Contractor's office representative.
- 3. Contractor's resident superintendent.
- 4. Contractor's quality control representative.
- 5. Subcontractors' representatives whom Contractor may desire or Engineer may request to attend.
- 6. Engineer's representatives.
- 7. Others as appropriate.

1.03 PRELIMINARY SCHEDULES REVIEW MEETING

- A. As set forth in General Conditions and Section 01 32 00, Construction Progress Documentation.

1.04 PROGRESS MEETINGS

- A. Engineer will schedule regular progress meetings at Site, conducted weekly to review the Work progress, Progress Schedule, Schedule of Submittals, Application for Payment, contract modifications, and other matters needing discussion and resolution.
- B. Attendees will include:
 - 1. Owner's representative(s), as appropriate.
 - 2. Contractor, Subcontractors, and Suppliers, as appropriate.
 - 3. Engineer's representative(s).
 - 4. Others as appropriate.

1.05 QUALITY CONTROL MEETINGS

- A. In accordance with Section 01 45 16, Contractor Quality Control.
- B. Scheduled by Engineer on regular basis and as necessary to review test and inspection reports, and other matters relating to quality control of the Work and work of other Contractors.
- C. Attendees will include:
 - 1. Contractor.
 - 2. Contractor's designated quality control representative.
 - 3. Subcontractors and Suppliers, as necessary.
 - 4. Engineer's representatives.

1.06 PREINSTALLATION MEETINGS

- A. When required in individual Specification sections, convene at Site prior to commencing the Work of that section.
- B. Require attendance of entities directly affecting, or affected by, the Work of that section.
- C. Notify Engineer 4 days in advance of meeting date.
- D. Provide suggested agenda to Engineer to include reviewing conditions of installation, preparation and installation or application procedures, and coordination with related Work and work of others.

1.07 COMMISSIONING MEETINGS

- A. Schedule and attend a minimum of six facility startup meetings. The first of such meetings shall be held prior to submitting testing plans, as specified in

Section 01 91 00, Equipment System Commissioning, and shall include preliminary discussions regarding such plans.

- B. Agenda items shall include, but not be limited to, content of testing and commissioning plans, coordination needed between various parties in attendance, and potential problems associated with startup.
- C. Attendees will include:
 - 1. Contractor.
 - 2. Contractor's designated quality control representative.
 - 3. Subcontractors and equipment manufacturer's representatives whom Contractor deems to be directly involved in facility startup.
 - 4. Engineer's representatives.
 - 5. Owner's operations personnel.
 - 6. Others as required by Contract Documents or as deemed necessary by Contractor.

1.08 SITE COORDINATION MEETING

- A. The CM will schedule regular site-wide coordination meetings at the Site, conducted to review site-wide and project specific coordination of schedules, hoisting, road closures, lockout/tagout, testing, issues and concerns.
- B. Attendees will include:
 - 1. Owner's representative(s), as appropriate.
 - 2. Operations and Maintenance representative(s), as appropriate
 - 3. Contractor Project Manager, including Subcontractors, as appropriate.
 - 4. Owner's Resident Engineer
 - 5. Others as appropriate.

1.09 SITE SAFETY MEETING

- A. The CM Safety Manager will schedule regular safety meetings at the Site, conducted to review site-wide and project specific safety observations, trends, successes, issues and concerns.
- B. Attendees will include:
 - 1. Owner's representative(s), as appropriate.
 - 2. Contractor Project Manager and Site Safety Officer, including Subcontractors, as appropriate.
 - 3. Others as appropriate.

1.10 OTHER MEETINGS

- A. Coordination meetings with Other Onsite Contractors: Engineer will schedule regular coordination meetings to coordinate Work among the various onsite contractors. Meetings will be bi-weekly or as determined by the Engineer.
- B. In accordance with Contract Documents and as may be required by Owner and Engineer.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 32 00 CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 GENERAL

1.01 SUMMARY

- A. The Contractor shall prepare and maintain a detailed progress schedule, herein referred to as the "Preliminary Schedule" and the "Contractor's Construction Schedule," as described below. This schedule shall be the Contractor's working schedule and used to plan, organize, and execute the work, record and report actual performances and progress, and show how the Contractor plans to complete all remaining work as of the end of each progress report period, and to enable the Owner to monitor, compute the value of progress payments and evaluate work progress.

1.02 DEFINITIONS AND ABBREVIATIONS

- A. **TIMELY AND ACCEPTABLE** shall mean any construction schedule or schedule update required under the contract which is submitted in accordance with all the requirements set forth in the contract. The determination whether a schedule is timely and acceptable shall be the sole judgment of the Owner.
- B. The schedule shall be in the form of an activity-oriented network diagram (Critical Path Method) and the principles and definitions of the terms used herein shall be as set forth in the Associated General Contractors of America (AGC) publication *The Use of CPM in Construction*. In the event of discrepancies, this section shall govern the development and utilization of the progress schedule;
- C. The *Microsoft Project* software, or higher, shall be used for all scheduling requirements defined in this specification. Schedule updates and revisions shall be submitted on magnetic disc and on four printed copies as specified hereunder.
- D. **Qualifications:**
 - 1. At the Preconstruction Meeting, the Contractor shall provide a statement to the Owner describing its computerized scheduling capability for review and approval. This statement shall include the following as a minimum:
 - a. Identification, qualifications, and experience of the members of the Contractor's scheduling staff or any consultant's staff. The designated scheduling the Owner shall have at least 3 years'

- experience in the computerized scheduling of public or industrial construction work.
- b. Reference of not less than two previous projects on which the Contractor or consultant has satisfactorily utilized computerized CPM scheduling, preferably of not less than one-half of the value of the present Contract. The Owner reference shall be included.
 2. The Owner may reject any member of the Contractor's scheduling staff or any of its consultant's staff for lack of competence. The Contractor shall promptly replace rejected personnel with acceptable personnel at no additional cost to the Owner. The new personnel shall comply with the qualifications listed above.

E. Failure to Perform:

1. For the purpose of this Contract, the terms "timely" and "acceptable schedule" shall mean any Preliminary and/or Construction schedules or schedule updates thereafter required under the Contract which are submitted in accordance with all requirements set forth in the Contract. The determination whether a schedule is timely and acceptable shall be within the sole judgment of the Owner.
2. The Owner will use the Contractor's Preliminary Schedule and subsequently, the Contractor's Construction Schedule to monitor the value of work performed the value of work remaining, and the Contractor's compliance with the Contract Completion Date and any Milestones. In the event the Contractor fails to submit a timely and acceptable construction schedule, any work performed thereafter shall be undertaken at the Contractor's own risk. A failure to provide a timely and acceptable schedule constitutes a material breach of this Contract. The Owner therefore reserves all rights and remedies available to it upon the Contractor's failure to submit a timely and acceptable schedule including, but not limited to, default termination, a stop work order (at no cost to the Owner) and/or a withholding of partial progress payments. A decision by the Owner to permit work to proceed shall not be construed as a waiver by the Owner of any or all of its rights and remedies.
3. In the absence of a timely and acceptable schedule: (1) the Owner is not obligated to determine the impact of delays to the project, (2) the Contractor is not entitled to an equitable adjustment pursuant to Article 3 "Changes" of the General Provisions of the Standard Contract Provisions based upon delays and (3) the Owner is not obligated to abide by the requirements of the fifth full Paragraph of Article 5 "Termination-Delays" of the General Provisions of the Standard Contract Provisions, beginning with the words "The Owner shall ascertain", but may presume, notwithstanding the provisions of Article 5, that the Contract is responsible for any anticipated or actual failure to

complete the work within the time specified in the Contract, or any previously granted extensions thereof. A schedule, which has not been accepted in accordance with all requirements set forth in the Contract, may not be used by the Contractor as a basis for requesting equitable adjustments or partial progress payments.

- F. **EXCUSABLE DELAY:** Any delay of the completion of the work beyond the expiration of the Contract Time caused by conditions beyond the control and without the fault or negligence of the Contractor such as strikes, embargoes, fire, unavoidable casualties, unusual delays in transportation, national emergency, and abnormally inclement weather conditions. An Excusable Delay may entitle the Contractor to an extension of the Contract Time, but shall not entitle the Contractor to any adjustment to Contract Price.
- G. **COMPENSABLE DELAY:** Any delay of the completion of the work beyond the expiration date of the Contract Time caused by gross negligence or willful acts of the Owner or Owner's Representative, or by the Owner's consultants or Separate Contractor (if any), and which delay is unreasonable under the circumstances involved and not within the contemplation of the parties. A Compensable Delay may entitle the Contractor to an extension of the Contract Time, and/or an adjustment of the Contract Sum. Except as provided herein, the Contractor shall have no claim for damage or compensation for any delay, interruption, hindrance or disruption.
- H. **INEXCUSABLE DELAY:** Any delay of the completion of the work beyond the expiration of the Contract Time resulting from causes other than those listed in the above paragraphs.

1.03 SCHEDULE COORDINATION

- A. Project is divided into multiple prime contracts with each contract awarded separately. Construction Coordinator, as designated in the Supplementary Conditions, will be responsible for developing and maintaining a master Progress Schedule using individual Progress Schedules prepared by each Contractor as submitted to Engineer under this section.
- B. Upon review and acceptance, Engineer will transmit one hard copy and one electronic copy of all Contractors' schedules to Construction Coordinator. Within 5 days of receipt, Construction Coordinator shall prepare and transmit to Engineer one hard copy of master Progress Schedule for each designated Contractor and one hard copy for Engineer.
- C. Where Contractor is referred to in the singular, it shall refer to each of separate Contractors as applicable.

1.04 PRELIMINARY PROGRESS SCHEDULE

- A. At the Preconstruction Conference, the Contractor shall submit for approval a preliminary schedule, a supporting narrative and a separate tabulation of cumulative payments. The preliminary schedule shall include all activities the Contractor intends to undertake within the first 120 calendar days after the Notice to Proceed. The Contractor's general approach for the balance of the Project shall be indicated. Cost of activities expected to be completed within the first 120 calendar days of Notice to Proceed shall be included and will be used as a basis for payment. The submittal will not be approved unless it is complete as specified and represents a realistic approach to the work.
- B. The Owner will review and comment on the Preliminary Schedule submittal within 10 days. Upon receipt of the Owner's comments, the Contractor shall make necessary changes and deliver the corrected Preliminary Schedule submittal within 10 calendar days.
- C. The Preliminary Schedule shall be in the form of an activity-oriented network diagram and shall meet all contractual requirements, such as Contract duration, phases, and phasing restraints.
 - 1. The Preliminary Schedule shall cover the following:
 - a. Procurement - Submittals, approvals, fabrication, and delivery of all key and long lead time procurement activities;
 - b. The activities to be accomplished during the first 120 calendar days of the Project, including any phases or sub phases.
 - c. Activity descriptions shall be brief but shall clearly convey the scope of work described. Activities shall be discrete items of work that must be accomplished under the contract and which, when complete, produce definable, recognizable entities or stages within the project. All activities, including work associated with Contract deliverables, shall be shown. Generally, for activities requiring the Owner's approval, durations shall not be less than 30 calendar days for a single review. Unless otherwise approved by the Owner, construction activities shall have durations of 20 working days or less. Non-construction activities such as procurement and fabrication may have longer durations.
 - d. All durations shall be the result of Contractor's definitive labor and resource planning under contractually defined on-site work conditions by the Contractor to perform its responsibilities and contracted work.
 - e. All activities shall be cost loaded.
 - 2. The Narrative Report shall describe the Contractor's general approach for meeting the interim and final completion dates.

3. A Separate Tabulation of Estimated Cumulative Payments will serve as the basis for progress payments up to the first 120 calendar days following the Notice to Proceed on the Contract and shall include the following information for each 30-day period covered by the Preliminary Schedule:
 - a. For each activity to be completed in each 30-day period the activity number, description, scheduled start date, scheduled completion date and the monetary value shall be provided;
 - b. The total of the monetary values of all activities scheduled to be completed during each 30-day period;
 - c. The cumulative total of the monetary values of all activities scheduled to be completed from the Notice to Proceed to the end of each 30-day period;
- D. Summary activities which are necessary (not included under the paragraph (1.b), above) to properly show:
 1. The approach to scheduling the remaining work areas or phases of the Project. The work for each phase or area must be represented by at least one summary activity so that the work cumulatively shows the entire Project schedule including, but not limited to the following:
 - a. Notice to Proceed.
 - b. Permits.
 - c. Submittals, with review time. Contractor may use Schedule of Submittals specified in Section 01 33 00, Submittal Procedures.
 - d. Early procurement activities for long lead equipment and materials.
 - e. Initial Site work.
 - f. Earthwork.
 - g. Specified Work sequences and construction constraints.
 - h. Contract Milestone and Completion Dates.
 - i. Owner-furnished products delivery dates or ranges of dates.
 - j. Major structural, mechanical, equipment, electrical, architectural, and instrumentation and control Work.
 - k. System startup summary.
 - l. Project closeout summary.
 - m. Demobilization summary.
 2. Approximate cost and duration for each summary activity, which is the Contractor's best estimate for all the work represented;
 3. Realistic delivery dates for all procurement activities required and specified.
- E. Approval of Contractor's Preliminary Schedule is a prerequisite to receipt of the initial progress payment.

- F. Computer outputs as described in Sections titled “Submittals of Schedules” and “Schedule Updates” shall be required as part of the Preliminary Schedule submittal and each update thereafter.
- G. Specification Sections titled Revisions to Approved Schedule,” Change Orders and Time Extensions,” and Delays and Time Extension “shall be applicable to the Preliminary Schedule and its updates thereafter.

1.05 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. The Contract Time includes the time needed by the Contractor for preparation and approval of shop and working drawings, obtaining licenses, certificates, approvals and permits, procurement and assembly of equipment and materials needed for satisfactory completion of all work.
- B. The Contractor shall prepare and submit for approval the Contractor's Construction Schedule, a schedule of anticipated payments based upon both early finish and late finish of all activities and a narrative describing the Contractor's approach for meeting the interim and final completion dates to the Owner within 20 calendar days after the Notice to Proceed. The Contractor's Construction Schedule shall be composed of the Detailed Network Diagram, as described in Subsection titled “Detailed Network Diagrams;” the reports described in Subsection titled “Submittals of Schedules;” and all other reports described in subsequent Subsections, and shall be cost loaded in accordance with Subsection titled “Cost Loading and Cash Flow.”
- C. The Construction Schedule shall include time for the activities in the Detailed Network Diagram.
- D. The Construction Schedule shall include time for Owner’s review of submittals with durations of these review periods included herein.
- E. The Contractor’s Construction Schedule shall account for the schedule and site constraints in Section 01 10 00, General Requirements, Section 01 11 00, Summary of Work, and Section 01 31 13, Project Coordination.
- F. The Contractor's Construction Schedule shall show the sequence and interdependence of activities required for complete performance of all the work. The Contractor's Construction Schedule shall begin with the date the Owner issues the Notice to Proceed, include an activity representing attainment of Beneficial Occupancy in accordance with Section 01 71 16, Beneficial Occupancy, and conclude with an activity representing Final Completion of the Contract.

- G. The Contractor will be allowed to submit for approval a shortened schedule showing Contract completion earlier than the date of Final Completion of the Contract. If the shortened schedule is approved by the Owner, the date of Final Completion of the Contract will be revised to the completion date of the approved schedule by the Owner and all Contract provisions such as liquidated damages, etc. will be applicable as of the revised Contract completion date.
- H. Float or slack time is not for the exclusive use or benefit of either the Owner or the Contractor, but is a resource available to both parties, as needed, to meet Contract milestones and the Contract completion date. The Contractor's Construction Schedule shall reflect the sequencing and staging requirements stated in the Contract Documents.
- I. Seasonal weather conditions shall be considered and included in the planning and scheduling of all work influenced by high or low ambient temperatures and/or precipitation to ensure completion of all Work with the Contract Time.
 - 1. Seasonal weather conditions shall be determined by an assessment of average historical climatic conditions based upon the preceding 5 year records published for the locality by the National Ocean and Atmospheric Administration (NOAA) and entitled, "Local Climatological Data – City of Alexandria".
- J. Comments made by the Owner on the Contractor's Construction Schedule during review will not relieve the Contractor of compliance with requirements of the Contract Documents. Review of the Contractor's Construction Schedule, by the Owner, is for general conformance with the schedule concept of the Project and to determine that the Contractor is in compliance with the information given elsewhere in the Contract Documents. The Owner's initial review will require 30 calendar days. Subsequent reviews will require 15 calendar days. Upon the Owner's request, the Contractor shall participate in the review of the Contractor's Construction Schedule submissions. All revisions shall be submitted within 15 calendar days after the Owner's review.
- K. The approved schedule, unless subsequently changed with the approval or at the direction of the Owner, is the schedule to be used by the Contractor for planning, scheduling, managing and executing the work to be accomplished.
- L. The Owner may elect to stop the Contractor from proceeding with Contract work after the first 120 calendar days of the Contract until the Contractor's Construction Schedule submittal is approved. Prior to 120 calendar days after the Notice to Proceed, and until approval of the Contractor's Construction Schedule submittal, progress payments will be based on the Preliminary Schedule submittal.

- M. If, through no fault of the Owner or its representatives, the Contractor's Construction Schedule is not approved within the first 120 calendar days of the Contract and the Contract work is suspended in accordance with Paragraph F above, the Owner will hold the Contractor liable for any fines imposed by the USEPA against the Owner for permit violations that occur as a result of the suspension of the work.
- N. The Contractor's Construction Schedule shall begin with the anticipated date of the Notice to Proceed, which will be revised to reflect the actual date of the Notice to Proceed and conclude with an activity representing Final Completion of the Contract.

1.06 DETAILED NETWORK DIAGRAM

- A. General:
 - 1. Comprehensive computer-generated schedule using Critical Path Method (CPM), generally as outlined in Associated General Contractors of America (AGC) 580, "Construction Project Planning and Scheduling Guidelines." If a conflict occurs between the AGC publication and this specification, this specification shall govern.
 - 2. Incorporate the Owner's WBS framework. Coordinate any modifications with the Owner for review and approval.
- B. The Contractor's Construction Schedule shall include time-scaled network diagrams based on calendar days. The network diagrams shall be CPM precedence format and shall show the sequence and interdependence of activities required for complete performance of all items of work. A calendar shall be shown on all sheets along the entire sheet length. Each activity shall be plotted so that the beginning (and completion dates) of said activity can be determined graphically (by comparison) with the calendar scale.
- C. The Detailed Network Diagram shall provide sufficient detail and clarity of form and technique so that the Contractor can plan, schedule, and control his work properly and the Owner can readily monitor and follow progress for all portions of work. The Detailed Network Diagram shall comply with the various limits imposed by the Contract and by any specified inter-mediate milestone dates and completion dates included in the Contract.
- D. The Detailed Network Diagram shall include all Contract activities, including all Preliminary Schedule activities. The Preliminary Schedule activities, and data as originally approved, shall be included in the Contractor's Construction Schedule submittal without modification to either logic and/or cost loading of activities. The critical path activities shall be identified, including critical paths for interim completion dates. Schedule start or completion dates imposed on the Contractor's Construction Schedule by the Contractor shall be

consistent with Contract milestones dates. Milestone events shall be defined as the scheduled dates specified elsewhere in the Contract Documents and shall be identified and connected to the appropriate activity, denoting its start or completion, as applicable. Each start milestone event shall restrain the start of all dependent activities.

1. Further, all activities included in the scope of work associated with a completion milestone event must be finished before that milestone event can occur.
 2. The Detailed Network Diagram shall be accompanied by a report, in tabular format, prepared, as follows: All activities by activity number and also including precedent and successor relationships, lag, and lead-time. Each listing shall show activity number, description, location, responsibility, total duration in working days, early start, late-start date, early-finish date, late-finish date, total float, free float, and status (whether critical or completed) for each activity in the Network Diagram.
- E. The schedule shall include non-construction activities such as training, service manual preparation, start-up and testing, and the like. The degree of detail shall be to the satisfaction of the Owner, but the following factors shall have a bearing on the required depth of activity detail:
1. The structural breakdown of the Project.
 2. The type of work to be performed and the labor trades involved.
 3. All delivery activities for all major materials and equipment.
 4. Deliveries of Owner furnished equipment.
 5. Submittal and approval of shop and working drawings and material samples.
 6. Plans for all subcontract work.
 7. Assignment of responsibility for performing all activities.
 8. Access and availability to work areas.
 9. Identification of interfaces and dependencies with preceding concurrent, and follow-on Contractors shall be included as milestone events.
 10. Cost for each work activity.
 11. Test, submissions, and approval of test results.
 12. Planning for phased or total takeover by the Owner.
 13. Identification of any labor, material, or equipment restrictions.
 14. A key plan illustrating the geographical subdivisions of work as outlined, for each sheet of the Network Diagram.
 15. Coordination with ongoing existing operations;
 - a. Include a Maintenance of Plant Operations (MOPO) fragnet which captures required scheduled outages/interruption of Owner facilities' systems.

16. In computing the value of progress payments, only one partial payment per activity will be allowed. The level of detail of work activities in the Contractor's Construction Schedule shall be such that each activity can be completed prior to requesting payment for that activity.
17. However, more than one partial payment may be allowed for partially completed activities that the Contractor cannot complete because of acts of the Owner.

F. Contents:

1. Schedule shall begin with the date of Notice to Proceed and conclude with the date of Final Completion.
2. Identify Work calendar basis using days as a unit of measure.
3. Show complete interdependence and sequence of construction and Project-related activities reasonably required to complete the Work.
4. Identify the Work of separate stages and other logically grouped activities, and clearly identify critical path of activities.
5. Reflect sequences of the Work, restraints, delivery windows, review times, Contract Times and Project Milestones set forth in the Agreement and Section 01 31 13, Project Coordination.
6. Include as applicable, at a minimum:
 - a. Obtaining permits, submittals for early product procurement, and long lead time items.
 - b. Mobilization and other preliminary activities.
 - c. Initial Site work.
 - d. Specified Work sequences, constraints, and Milestones, including Substantial Completion date(s) Subcontract Work.
 - e. Major equipment design, fabrication, factory testing, and delivery dates.
 - f. Delivery dates for Owner-furnished products, as specified in Section 01 11 00, Summary of Work.
 - g. Sitework.
 - h. Concrete Work.
 - i. Structural steel Work.
 - j. Architectural features Work.
 - k. Conveying systems Work.
 - l. Equipment Work.
 - m. Mechanical Work.
 - n. Electrical Work.
 - o. Instrumentation and control Work.
 - p. Interfaces with Owner-furnished equipment.
 - q. Other important Work for each major facility.
 - r. Equipment and system startup and test activities.
 - s. Project closeout and cleanup.
 - t. Demobilization.

7. No activity duration, exclusive of those for Submittals review and product fabrication/delivery, shall be less than 1 day nor more than 20 days, unless otherwise approved.
8. Activity duration for Submittal review shall not be less than review time specified unless clearly identified and prior written acceptance has been obtained from Engineer.

G. Network Graphical Display:

1. Schedules shall be submitted electronically, unless otherwise approved.
2. Plot or print on paper not greater than 30 inches by 42 inches or smaller than 22 inches by 34 inches, unless otherwise approved.
3. Title Block: Show name of Project, Owner, date submitted, revision or update number, and the name of the scheduler. Updated schedules shall indicate data date.
4. Identify horizontally across top of schedule the time frame by year, month, and day.
5. Identify each activity with a unique number and a brief description of the Work associated with that activity.
6. Indicate the critical path.
7. Show, at a minimum, the controlling relationships between activities.
8. Plot activities on a time-scaled basis, with the length of each activity proportional to the current estimate of the duration.
9. Plot activities on an early start basis unless otherwise requested by Engineer.
10. Provide a legend to describe standard and special symbols used.

H. Schedule Report:

1. Schedule Report shall be submitted electronically, unless otherwise approved.
2. On 8-1/2-inch by 11-inch white paper, unless otherwise approved.
3. List information for each activity in tabular format, including at a minimum:
 - a. Activity Identification Number.
 - b. Activity Description.
 - c. Original Duration.
 - d. Remaining Duration.
 - e. Early Start Date (Actual start on Updated Progress Schedules).
 - f. Early Finish Date (Actual finish on Updated Progress Schedules).
 - g. Late Start Date.
 - h. Late Finish Date.
 - i. Total Float.

4. Sort reports, in ascending order, as listed below:
 - a. Activity number sequence with predecessor and successor activity.
 - b. Activity number sequence.
 - c. Early-start.
 - d. Total float.
- I. The activities outlined in the Detailed Network Diagram shall be analyzed in detail for normal operational labor and equipment to determine activity time durations in units of whole working days. Activity durations over 20 working days will not be allowed, except in the case of the non-construction activities, such as procurement of materials, delivery of equipment, concrete curing and review of submittals by the Owner.
 1. All durations shall be the result of definitive labor and resource planning under contractually defined on-site work conditions by the Contractor to perform to his responsibilities and Contracted work. The assigned labor, by craft definitions, and equipment will be shown on the construction activities of the network. No more than five crafts will be shown for each activity.
- J. The Contractor may use labor or equipment restraints separately noted to optimize and level labor and equipment requirements. The individual activities involved may be sequenced within the limits of total float. When this leveling technique is used in establishing the working schedule, it shall be reflected in the logic. Critical or near-critical paths developed from the use of labor restraints shall be kept to a minimum. Near-critical paths shall be defined as those paths having 14 calendar days or less of total float at time of initial submission.
- K. A unique system will be used to number construction and non-construction activities, and potential revision activities. The numbering system for construction activities shall include, at a minimum, the drawing number and a sequential number representing each item shown on the drawing. The number system for non-construction activities shall include, at a minimum, the specification section, transmittal number and a sequential number representing each item of work shown in the drawings. The numbering system for potential revision activities shall include, at a minimum, the potential revision number assigned by the Owner and a sequential number representing each work item included in the revision. No two activities shall have the same number identification. Prior to submission of the Contractor's Construction Schedule, the Contractor shall submit the numbering system for approval. In addition, the Contractor shall submit one original and four copies of marked-up Contract Drawings indicating the extent of each activity number assigned to each item of work shown on the marked-up Drawings.

- L. A unique system will be used to code activities by phase, sub phase, etc., responsibility, discipline, subcontractor, work item, area, drawing number, and specification section reference. The coding structure shall be submitted for approval prior to submission of the Contractor's Construction schedule.
 - 1. The numbering system for construction activities shall include, at a minimum, the drawing number and as sequential number representing each item shown on the drawing.
 - 2. The number system for non-construction activities shall include, at a minimum, the specification section, transmittal number and a sequential number representing each item of work shown in the drawings.
 - 3. The numbering system for potential revision activities shall include, at a minimum, the potential revision number assigned by the Owner and a sequential number representing each work item included in the revision.
 - 4. No two (2) activities shall have the same number identification
 - 5. Prior to submission of the Contractor's Construction Schedule, the Contractor shall submit one (1) original and four (4) copies of marked-up Contract Drawings indicating the extent of each activity number assigned to each item of work shown on the marked-up Drawings.
- M. The Contractor's Construction Schedule submittal shall include a schedule of anticipated monthly payments for the entire Contract period. The schedule shall indicate two sets of payments, one based on early finish of all activities and the other based on late finish of all activities.

1.07 SUBMITTAL OF SCHEDULES

- A. Following completion of each monthly progress review meeting or in no case later than the 25th of each month, four (4) copies and one (1) original of the Network Diagram of the Contractor's Construction Schedule shall be submitted to the Owner. The submittal shall include electronic copies and tabular reports.
- B. The following computer outputs shall be required as part of the initial schedule submission and each update thereafter:
 - 1. All activities sorted by activity number and also including precedent and successor relationships, lag, and lead-time. Each listing shall show activity number description, location, responsibility, total duration in working days, early-start date, late-start date, early-finish date, late-finish date, total float, free float, and status (whether critical or completed) for each activity in the Network Diagram.
 - 2. Activity sort by the amount of slack or float, then in order of preceding event number.

3. Activity sort by early start for next 60 working days, then in order of preceding event number.
 4. Activity sort by late finish for next 60 working days, then in order off preceding event number.
 5. Milestones status report to include current status of each milestone events.
 6. Activity Responsibility sorted by early-start and float. The Activity Responsibility listing shall segregate into separate sub listings:
 - a. Work activities for the Contractor.
 - b. Work activities of each subcontractor.
 - c. Submittals to the Owner for all major items of material and equipment.
 - d. Each activity shall list the number of shifts, crew size of each craft, and construction equipment to accomplish the activity.
 7. A sub listing of materials and equipment sorted by Specification number. The sub listing of materials and equipment shall include the following activities:
 - a. Preparation of shop drawings and submittal to the Owner.
 - b. Review by the Owner.
 - c. Fabrication and/or delivery of material and/or equipment.
- C. Outputs (A) and (B) above shall show all activities and restraints for the duration of the Project.
- D. All updated or revised schedules submitted after the original schedule shall be in the same submittal format unless modified in writing by the Owner.

1.08 PROGRESS REPORTS

- A. Update pertains to past activities. Logic calculation configurations should be consistent throughout the project.
1. Use retained logic option.
 2. Calculate start to start lag by using Early Start option.
 3. Calculate Early Start using Contiguous activity duration option.
 4. Calculate total float using most critical option.
- B. Once each week, on a date established by the Owner, the Contractor shall submit a computerized labor/construction equipment report and progress schedule listing the activities completed and in progress for the previous week and activities scheduled for the succeeding two weeks. This report and schedule shall include concrete placements, major equipment installation, testing, and like detail. A simple histogram and bar chart shall be used to display the information in pictorial form. In addition, a detailed list of all

proposed schedule changes (logic revisions, remaining duration status, actual starts, actual finish, and activity additions and deletions).

1. The weekly report shall be complete and accurate, revealing the Contractor's plan of prosecuting the work to meet all Contract stipulated milestones. Upon the Owner's request, the Contractor shall participate in the review of the weekly report submission.
- C. Once each month, on a date established by the Owner, a meeting to review the monthly schedule status will be held. The purpose of this meeting is to review the current status of activities to determine completion status and to determine progress payments. The meeting shall be attended by a duly authorized representative of the Contractor and those subcontractors determined to be necessary by the Owner and/or Contractor.
- D. Prior to the monthly review meeting, the Contractor shall obtain from his subcontractor's, consultants, and suppliers the necessary information required to reflect progress to date. An updated schedule shall be available for review at the meeting including all information available as of the cut-off date established by the Owner. A detailed list of all schedule changes (logic duration status, additions, and deletions) shall be submitted with the update.
- E. The Contractor shall come to the monthly updating meetings with the above data prepared in advance to provide, as of the end of the updating period, a complete and accurate report of current procurement and construction progress, showing how the Contractor plans to continue the work of this Project to meet all Contract completion dates.
- F. The monthly Progress reports shall be submitted in the format described herein shall include, at a minimum:
1. For activities started and/or completed during the previous period: actual start and actual completion dates, number of work days, number of shifts, crew sizes by craft, and construction equipment used to accomplish the activity.
 2. For activities begun but not yet completed: the actual start date, physical percentage complete to date, number of shifts, crew sizes by craft, construction equipment required, the remaining duration of the work, and the estimated completion date.
 3. For activities not yet started: estimated start dates, number of shifts, crew sizes by craft, construction equipment required, revised duration, and estimated completion dates, as necessary; if estimated start dates for activities vary from current schedule, explain variance and effects.

4. For authorized Contract changes: revised activities, number of shifts, crew sizes by craft, construction equipment required, and durations where required.
5. The monthly update of the Contractor's Construction Schedule shall be for the month preceding the meeting and for one month following the meeting. The previous month's activities shall be reported as they actually took place.
6. Portions of the Detailed Network Diagrams on which all activities are complete need not be reprinted and submitted in subsequent updates. However, the file of submitted Detailed Network Diagrams and the related reports shall constitute a clear record of progress of the work from Notice to Proceed to final completion.
7. The monthly submittal to the Owner shall be accompanied by four (4) individually bound copies of a report. The report shall include the information described in the Contractor's Schedule Narrative Report in detail, and shall follow the outline below:
 - a. Contractor's Schedule Narrative:
 - 1) Contractor's transmittal letter.
 - 2) Description of problem areas.
 - 3) Current and anticipated Contractor caused delays:
 - a) Cause of delay.
 - b) Corrective action and schedule adjustments to correct the delay so as to maintain affected original milestone completion dates.
 - c) Impact of the delay on other activities, on milestones, and on completion dates.
 - 4) Current and anticipated non-Contractor caused delays:
 - a) Cause of delay.
 - b) Proposed plan of corrective action and schedule adjustments necessary to correct the delay and maintain affected milestone completion dates, to include anticipated costs and time for which the Contractor considers the Owner liable.
 - c) Impact of the delay on other activities, on milestones, and on completion dates.
 - 5) Approved changes in construction sequence.
 - 6) Pending items and status thereof:
 - a) Permits
 - b) Potential Revisions
 - c) Change Orders
 - d) Time extensions
 - e) Process interfaces and shutdowns
 - f) Other
 - 7) Contract completion date(s) status:
 - a) Ahead of schedule, and number of working days.

- b) Behind schedule, and number of working days.
 - 8) Other project or scheduling concerns.
 - 9) Reviewed and updated Detail Network Diagram and Reports.
 - 10) Revised cost lading and cash flow information.
 - 11) Revised labor information.
 - 12) Revised labor and equipment information.
 8. No revisions or additions to the weekly/monthly Progress Reports shall be made other than those reflecting the Owner's prior written approval (i.e., change orders, potential revisions, stop work orders, etc.).
 9. The Contractor agrees that, whenever it becomes apparent from the current weekly and/or monthly computer-produced calendar-dated schedule that any Contract completion date will not be met, at no fault of the Owner, he will take any or all of the following actions with prior approval of the Owner and at no additional cost to the Owner:
 - a. re-sequencing construction activities,
 - b. providing additional labor,
 - c. working additional shifts, or otherwise accelerating the work to maintain the Contract stipulated completion dates.
 10. Whenever it becomes apparent from the current weekly and/or monthly progress evaluation and updated schedule data that any milestone date(s) and/or contract completion dates will not be met due to the Contractor's slow progress on critical activities, items a, b and c above shall be incorporated in the CPM all in accordance with section titled "Revisions to Approved Schedule." The revised schedule shall be submitted to the Owner for review and acceptance.
 11. A schedule, which has not been accepted in accordance with all requirements set forth in the Contract, may not be used by the Contractor as a basis for requesting equitable adjustments or partial progress payments.
- G. Upon final completion of the project, the Contractor shall submit for approval the final complete as-built Contractor's Construction Schedule. The as-built Contractor's Construction Schedule shall identify all project as-built critical paths and shall include the following:
1. All Contract activities identified in the approved Contractor's Construction Schedule, including all added activities and Change Orders, shall be shown.
 2. Activity durations shall be the actual number of separate workdays during which work was performed on the activity.
 3. Total person-days for an activity shall be the actual number of person-days that were required to complete the activity.
 4. The Detailed Network Diagram shall indicate the actual start date and finish date of each activity.

5. Contract milestone completion dates shall reflect the actual date each milestone was completed, as indicated in the Owner issued acceptance letter or Certificate of Beneficial Occupancy.

1.09 REVISIONS TO APPROVED SCHEDULE

- A. The Contractor shall prosecute the work in accordance with the Contractor's Construction Schedule. Changes made to the Contractor's Construction Schedule for accomplishing the work shall require prior acceptance of the Owner.
 1. No revisions or additions to the Contractor's Construction Schedule shall be made without the Owner's prior written approval (i.e., change orders, potential revisions, stop work orders, etc.). Failure to comply with this requirement may result in rejecting the schedule.
 2. If in the event the Contractor is in disagreement with schedule updates or changes ordered by the Owner, then upon written request by the Contractor, the Owner will render a decision. Notwithstanding the Owner's decision, the Contractor is to incorporate schedule updates or changes as requested by the Owner.
- B. Network changes noted by the Contractor and/or the Owner to compensate for corrections, inadequacies, incompatibilities, and inadequate activity breakdown along with the status data agreed to during each update shall be considered acceptable by both parties unless written notice of any exceptions is given by an objecting party within 15 calendar days after receipt of the Contractor's update submission. For major network logic changes that cannot be agreed to during an updating meeting, the Contractor shall submit such revisions in writing, to the Owner for approval prior to inserting such changes into the network. Submissions may be in the form of marked-up networks or "fragnet" illustrations provided they are submitted with a letter of transmittal. The submission and approved procedures will follow the timetable described for Subsection titled "Change Orders and Time Extensions" and "Delays and Time Extensions," below. Changes to activities having adequate float shall be considered minor changes, except that an accumulation of minor changes may be considered a major change when such change affects the Contract Completion Date.
- C. In the event the Contractor is in disagreement with schedule updates or logic revisions ordered by the Owner, then upon written request by the Contractor, the Owner will render a decision. Notwithstanding the Owner's decision, the Contractor is to incorporate schedule updates or revisions as requested by the Owner.

- D. Construction Schedule updating and/or revisions to compensate for corrections, inadequacies, incompatibilities, and inadequate activity breakdown, including any items and/or logic revisions noted by the Owner, shall be rectified by the Contractor at no additional Owner cost.

1.10 SCHEDULE UPDATES

- A. Once each month, on a date established by the Owner, a meeting to review the monthly schedule status will be held. The purpose of this meeting is to review and update the current status of activities to determine completion status for progress payments. The meeting shall be attended by a duly authorized representative of the Contractor and those subcontractors determined to be necessary by the Owner and/or Contractor.
- B. Prior to the monthly review meeting, the Contractor shall obtain from his subcontractor's, consultants and suppliers the necessary information required reflecting progress to date. An updated schedule shall be available for review at the meeting, including all information available as of the cut-off date established by the Owner. A detailed list of all schedule changes shall be submitted with the update.
- C. The Contractor shall come to the updating meetings with the above data prepared in advance to provide, as of the end of the updating period, a complete and accurate report of current procurement and construction progress, showing how the Contractor plans to continue the work of this Project to meet all Contract completion dates.
- D. Following completion of each monthly progress review meeting, or in no case later than the 25th of each month, four (4) copies of the Contractor's Updated Construction Schedule shall be submitted to the Owner. The updated schedule must include the original (scheduled) duration, remaining duration, percentage of completion (i.e., work completed, not time), scheduled and actual start dates, and scheduled and actual finish dates.
- E. Upon final completion of the project, the Contractor shall submit for approval the final complete as-built Contractor's Construction Schedule. The as-built Contractor's Construction Schedule shall include the following:
 - 1. All Contract activities identified in the approved Contractor's Construction Schedule, including all added activities and Change Orders, shall be shown.
 - 2. Activity durations shall be the actual number of separate workdays during which work was performed on the activity.

1.11 CHANGE ORDERS AND TIME EXTENSIONS

- A. Reference General Conditions and Section 01 26 00, Contract Modification Procedures.
- B. Whenever the Contractor receives a request for proposal for a potential revision from the Owner, it shall submit, within 20 calendar days of said request, a Time Impact Analysis as described hereunder.
- C. The Contractor shall submit a written Time Impact Analysis to the Owner, illustrating the influence of each change on the current Contractor's Construction Schedule completion date. Each Time Impact Analysis shall include a fragment network analysis (fragnet), demonstrating the following:
 - 1. How the Contractor proposes to perform the changed work.
 - 2. A listing of activities required to execute the changed work. These activities shall be cost and resource loaded, all in accordance with Sections titled "Cost Loading and Cash Flow" and "Labor," respectively.
 - a. The estimated cost to perform each work activity shall be noted for each activity included in the fragnet submitted with the Time Impact Analysis. The cumulative total of the monetary values of all "change" activities shall be equal to the monetary value of the Contractor's cost proposal for said change.
 - b. The resources, both labor and equipment, for the "change" activities shall be in substantive agreement with the resources presented in the Contractor's cost proposal for said change.
 - c. All durations for activities shall be the result of definitive labor and resource planning under contractually defined on-site work conditions by the Contractor to perform the changed work.
- D. How the Contractor proposes to incorporate the change into the Detailed Network Diagram. Additionally, the analysis shall demonstrate the time impact based on the following:
 - 1. The date that the Contractor was authorized to proceed with the change or anticipates the issuance of authorization.
 - 2. The status of construction at that point in time as reported in D.1 above.
 - 3. The event time computation of all affected activities. The event items used in the analysis shall be those included in the latest updated copy of the detailed progress schedule or as adjusted by mutual agreement.
 - 4. Contract time extensions will be granted only to the extent that equitable time adjustments for the activity or activities affected exceed the total or remaining float along the path of activities at the time of actual delay or at the time the Contractor was notified that the change was authorized.

- E. Time Impact Analysis shall be submitted in triplicate. In cases in which the Contractor does not submit a Time Impact Analysis for a specific change within the specified period of time, then it is mutually agreed that that particular potential revision has no time impact on the Contract completion date and the Project's critical path and no time extension will be granted. Approval or rejection of each Time Impact Analysis by the Owner or his authorized representative shall be made within 15 calendar days after receipt of each Time Impact Analysis, unless subsequent meetings and negotiations are necessary. Upon approval, a copy of the Time Impact Analysis signed by the Owner or his authorized representative shall be returned to the Contractor. Upon mutual agreement by both parties, fragnets illustrating the influence of Change Order will be incorporated into the Detailed Network Diagram during the first update after agreement is reached.

1.12 DELAYS AND TIME EXTENSIONS

- A. The Owner is not bound by any Contractor's Construction Schedule until approved in writing by the Owner. In the vent the Contractor proceeds with a schedule that is not approved by the Owner, and in the event of a delay claim, the Contractor shall have the burden of proving that the schedule used is reasonable, and based on its actions, throughout the project, the schedule would have been met.
- B. Whenever delays are experienced, the Contractor shall submit a written Time Impact Analysis to the Owner, illustrating the influence of each delay on the current Contractor's Construction Schedule completion date. Each Time Impact Analysis shall include a fragment network analysis (fragnet), demonstrating how the Contractor proposes to incorporate the delay into the Detailed Network Diagram. Additionally, the analysis shall demonstrate the time impact based on the date that the delay began, the status of construction at that point in time, and the event time computation of all affected activities. The event items used in the analysis shall be those included in the latest updated copy of the detailed progress schedule or as adjusted by mutual agreement. Contract time extensions will be granted only to the extent that equitable time adjustments for the activity or activities affected exceed the total or remaining float along the path of activities at the time of actual delay or at the time the Contractor was notified that the change was authorized.
- C. Each Time Impact Analysis shall be submitted in triplicate and within 15 calendar days after a delay occurs or is recognized. In cases in which the Contractor does not submit a Time Impact Analysis for delay within the specified period of time, then it is mutually agreed that that particular delay has no time impact on the Contract completion date and the Project's critical path and no time extension will be granted. Approval or rejection of each Time Impact Analysis by the Owner or his authorized representative shall be

made within 10 calendar days after receipt of each Time Impact Analysis, unless subsequent meetings and negotiations are necessary. Upon approval, a copy of the Time Impact Analysis signed by the Owner or his authorized representative shall be returned to the Contractor. Upon mutual agreement by both parties, fragnets illustrating the influence of Change Order and delays will be incorporated into the Detailed Network Diagram during the first update after agreement is reached.

D. Adjustments to Contract Time for Concurrent Delay:

1. The Contractor may make a claim for an extension of the Contract Time, subject to the following:
 - a. If an Excusable Delay and Compensable Delay occur concurrently, the maximum extension of the Contract Time shall be the number of days from the commencement of the first delay to the cessation of the delay which ends last.
 - b. If an Inexcusable Delay occurs concurrently with either an Excusable Delay and/or a Compensable Delay, the extension of the Contract Time shall be the number of days, if any, for which the Excusable Delay or the Compensable Delay was concurrent with the Inexcusable Delay.

E. Adjustment to Contract Price:

1. If an Excusable Delay and Compensable Delay occur concurrently, the maximum extension of the Contract Time shall be the number of days from the commencement of the first delay to the cessation of the delay which ends last.
2. If an Inexcusable Delay occurs concurrently with Compensable Delay, the maximum number of compensable days shall be the number of days, if any, by which the Compensable Delay exceeds the Inexcusable Delay.
3. The net approved number of compensable days will be determined by adding the approved number of compensable calendar days for each compensable delay, adjusting for any concurrent compensable delay, and subtracting any Owner caused reductions in Contract Time (such as reductions in Contract Scope).

F. In the event that the Contractor fails to submit a timely and acceptable construction schedule, any work performed thereafter shall be undertaken at the Contractor's own risk. A failure to provide a timely and acceptable schedule constitutes a material breach of this contract. The Owner therefore reserves all rights and remedies available to it upon the contractor's failure to submit a timely and acceptable schedule including, but not limited to, default termination, a stop work order (at no cost to the Owner) and/or the withholding of partial progress payments.

- G. A decision by the Owner to permit work to proceed in the absence of a timely and acceptable schedule is not to be construed as a waiver by the Owner of any or all of its rights and remedies. In the event that the Contractor proceeds with a schedule not accepted by the Owner, and in the event of a delay claim, the Contractor will have the burden of proving that the schedule is reasonable, and based on its actions throughout the project, the schedule would have been met.
- H. In the absence of a timely and acceptable schedule:
 - 1. The Owner is not obligated to determine impact of delays to the project,
 - 2. The Contractor is not entitled to an equitable adjustment,
 - 3. The Owner may presume that the Contractor is responsible for any anticipated or actual failure to complete the work within the time specified in the contract, or any previously granted extension thereof.
 - 4. The Contractor as a basis for requesting equitable adjustments or partial progress payments may not use a schedule, which has been accepted but has not been updated in accordance with all requirements set forth in the contract.

1.13 COST LOADING AND CASH FLOW

- A. The Contractor's construction Schedule shall be cost loaded for cash flow analysis purposes and to enable the Owner to compute the value of progress payments and evaluate work progress. Progress payments will be made in accordance with the requirements of Specifications Section 01 29 00 – Payment Procedure.
 - 1. With the initial Contractor's Construction Schedule submittal, each update, and each revision, the Contractor shall also submit a cost loaded schedule and cash flow analysis. The estimated cost to perform each work activity shall be noted for each activity included in the Contractor's Construction Schedule. The sum of the costs assigned shall equal the Contract value. No activity costs are to be assigned to procurement activities such as submittals and manufacturer activities. However, upon the Owner's approval, activities that represent delivery of equipment and major material items may be acceptable to be cost loaded. Payment for such activities will be made after compliance with Section 01 29 00, Payment Procedures.
- B. Using the cost assigned to each work activity of the Construction Schedule, the Contractor shall develop a cash flow analysis in graphic form, and depicting estimated cash draw down in the aggregate, by month, over the life of the job. The cash flow projection will be updated monthly to show a forecast of remaining payments and actual payments to date.

- C. Monthly updates of the cash flow analysis shall be based on the allocation of cost to the Contractor's Construction Schedule and shall equal, in total, the Contractor's bid price, plus Change Orders. Expected payment requests for each month shall be included, as well as the cumulative payment requests to date for each month of the Project. The net payment requests for each month and the cumulative payment requests to date shall also be shown after deducting retainage. The monthly cash flow analysis shall be shown in tabular and in graphic format.
- D. As a part of the regular monthly Contractor's Construction Schedule update submittal, the Contractor's payments shall be shown for each completed activity appearing in the approved Contractor's Construction Schedule. Activities which were added subsequent to the approval of the Contractor's Construction Schedule will be treated as provided in Paragraph E. below. The payments on completed activities (payments-to-date) are to be subtotaled, the payments for the largest pay period are to be computed, the monetary value of non-complete activities (both started but incomplete and un-started activities) are to be subtotaled, and the sum of the payments on completed activities and the monetary value of non-complete activities is to be computed. The latter sum must equal the original Contract value. Under no circumstance shall the monetary value of any activity be changed by the Contractor without written approval of the Owner.
- E. Payment for those activities that were not included in the approved Contractor's Construction Schedule will be made upon issuance of a bilateral or unilateral change order, which shall include all costs and time impacts to the Contractor's Construction Schedule, as a separate item from the original Contract amount, provided the work has been completed.

1.14 LABOR

- A. The Contractor shall submit a histogram with the initial Contractor's Construction Schedule, depicting total project craft labor and craft labor for each of his subcontractors for each month based on person-days. The histogram shall be based upon, and shall be in substantive agreement with, the number of shifts and crew sizes by craft in the Contractor's Construction Schedule, and shall be updated monthly and submitted with the monthly progress report. The update shall show actual labor for each month during the construction period to date and required labor for each month necessary to complete all remaining activities on the early finish date.
- B. This submission will be computerized and correlated with the labor assigned to each activity of the Detailed Network Diagram. The Labor Requirements Forecast will be updated monthly and include labor actually used by trade as

of the report period and the labor required to complete all remaining Contract work.

1.15 CONSTRUCTION EQUIPMENT

- A. The Contractor shall submit a tabular report itemizing each piece of construction equipment planned to be used for the Contract, whether owned or rented, with his Construction Schedule. Construction equipment indicated will be items with a replacement cost exceeding five thousand Dollars (\$5,000.00). He shall also submit the same report of construction equipment used by his subcontractors. This tabular report shall be updated and submitted monthly with the monthly progress report, and shall be based upon, and be in substantive agreement with, the most recently approved Construction Schedule. The updated report shall indicate the equipment used during the previous month and shall forecast the next month's requirements for construction equipment necessary to complete all remaining activities indicated in the most recently approved Contractor's CPM schedule.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

- A. Work under pay items, with the exception of mobilization, shall not commence until the Owner accepts a schedule conforming to all contract requirements.
- B. Contractor's failure to comply with these requirements will result in delay in progress payments, other than mobilization, until such procedural requirements are satisfactorily met.

3.02 PRECONSTRUCTION CONFERENCE

- A. A preconstruction conference will be arranged by the Owner that will include representatives of the Owner, the Contractor and other agencies, both governmental and private, affected by the work to discuss and clarify points of issue involving the construction schedule, restriction, and the general conduct of the work under the Contract.
- B. The Construction Schedule will not be approved and no work shall be started until after this conference.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 32 33 CONSTRUCTION PHOTOGRAPHS

PART 1 GENERAL

1.01 SUMMARY

- A. Contractor shall be responsible for the production of pre-construction and construction photographs as provided herein.

1.02 SUBMITTALS

- A. Informational Submittals:
 - 1. Monthly submittal of photographs with the monthly application for payment.

1.03 DESCRIPTION

- A. Provide a minimum of ten (10) photographs of each element and existing project conditions in the vicinity of, and abutting, proposed construction taken prior to any activity at his site(s) and submitted to the Owner before any activity takes place. The same views shall be re-photographed upon completion of all construction activities.
- B. Provide construction photographs taken no less frequently than biweekly throughout the progress of the work until final completion of project.
- C. Contractor shall have suitable photographs taken before, during and after construction of the project.
- D. Contractor shall indicate construction limits by painting or otherwise conspicuously marking construction boundaries to show on preconstruction photos. Preconstruction photos shall be marked as such in the title block.
- E. Contractor shall have suitable photographs to show the level of work that has been completed during the progress period each month.
- F. The photos shall produce a visual step-by-step record of the progress of construction on the project.
- G. Furnish each month's photos in a digital format (.jpg) on e-Builder or other format approved by the Owner..

1.04 QUALITY ASSURANCE

- A. Visibility: All photographs shall be performed during times of good visibility
- B. All digital image files shall be previewed for color accuracy on a calibrated computer monitor
- C. Digital file images are not to be computer manipulated in any manner which alters the visual information in the original photograph, except for fundamental color and/or density (brightness) corrections required for proper printing or saving.

1.05 DESCRIPTION OF WORK: Preconstruction photographs of the entire roof, including all skylights, rooftop equipment and ventilation.

PART 2 PRODUCTS

2.01 CAMERA

- A. Digital images may be created using original digital photographic equipment. Digital camera capabilities must have a sensor capacity of at least six (6) megapixels and should be capable of utilizing a moderate wide-angle lens system, a moderate telephoto lens and an electronic flash capable of properly illuminating large interior spaces. Camera must produce original uncompressed JPEG format images files that open to display at dimensions which exceed 20x30 inches, at a minimum of 72 dpi resolution, or raw format images which can be computer-processed to these specification in either JPEG or TIF or format approved by Owner.

2.02 CONTACT SHEETS

- A. Thumbnail.
- B. Color.
- C. Finish: Smooth surface, glossy.
- D. Data: digital file name and number of each image.
- E. Mounting: In archival-quality protective pages.
- F. Format: JPEG, or format approved by Owner.

2.03 ELECTRONIC MEDIA FORMAT:

- A. Portable Document Format (PDF):

Submit in PDF format submitted through eBuilder, or in a media format acceptable to the Owner.

- a. Files to be fully functional and viewable in most recent version of Adobe Acrobat.
- b. PDF shall be bookmarked to match Table of Contents as described in 1.04.B.6.

2.04 IDENTIFICATION

- A. Contractor shall maintain a log sheet listing the views photographed which shall include direction of view, station number or street address. The log shall include the name of the photographer and a unique individual sequential photo number Identify the specifications for all products to be incorporated into the Work as addressed in this Section.

PART 3 EXECUTION

3.01 GENERAL

- A. Consult with the Owner for instructions concerning views required at each specified visit to site.
- B. Contractor shall give the Owner the opportunity to accompany the photographer during the photo session(s).
- C. The Owner will request certain views to be taken in select instances.
- D. Photographs shall generally be taken on a random basis throughout each session to document various phases of the construction activities, with particular emphasis on the past month's construction progress.
- E. Contractor shall maintain a log sheet listing the views photographed which shall include direction of view, station number or street address. The log shall include the name of the photographer and a unique individual sequential photo number.
- F. Submit photographic records with the monthly pay request.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 33 00 SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements for submittals required for performance of the Work, including but not limited to:
 - 1. Contractor's Progress Schedule.
 - 2. Schedule of Values.
 - 3. Schedule of Payments.
 - 4. Survey and Layout Data.
 - 5. Submittal Schedule Daily Construction Reports.
 - 6. Shop Drawings.
 - 7. Working Drawings.
 - 8. Product Data.
 - 9. Samples.
- B. Inspection and test reports are included in Section 01 45 16, Contractor Quality Control.

1.02 DEFINITIONS

- A. Action Submittal: Written and graphic information submitted by Contractor that requires Owner's approval.
- B. Deferred Submittal: Information, in accordance with IBC Section 106.3.4.2 submitted by Contractor for portions of design that are to be submitted to permitting agency for approval prior to installation of that portion of the Work, along with the Owner's review documentation that submittal has been found to be in general conformance with Project's design.
- C. Elevation: The figures given on the Drawings or in the other Contract Documents after the work "elevation" or abbreviation of it shall mean the distance in feet above the standard datum used by the Owner.
- D. Informational Submittal: Written information that does not required the Owner's responsive action. Information submitted by Contractor that requires the Owner's review and determination that submitted information is in accordance with the Conditions of the Contract.
- E. Shop Drawings: drawings, diagrams, illustrations, schedules, catalog cuts, performance charts, brochures, and other data prepared by the Contractor or any subcontractor, manufacturer, supplier, or distributor, which illustrates how

specific portions of the work shall be fabricated and/or installed. Drawings prepared by the fabricator or supplier showing the layout and details of components fabricated in a shop for inclusion in the permanent facility (e.g., structural steel, reinforcing steel, railings, etc.).

- F. Working Drawings: Drawings furnished by the Contractor showing the layout and details of temporary construction, procedures and methods of construction, and data for construction equipment which are to be employed in the construction of the permanent facility (e.g., form drawings, erection drawings, load test pile procedures, pile hammer data, etc.).

1.03 PROCEDURES

- A. Direct submittals to Resident Engineer unless specified otherwise.
- B. Electronic Submittals: Submittals shall, unless specifically accepted, be made in electronic format and processed manually until such time that the Owner-Selected Electronic System (OSSES) is implemented on the project.
1. Each submittal shall be an electronic file in Adobe Acrobat Portable Document Format (PDF). Use the latest version available at time of execution of the Agreement.
 2. Electronic files that contain more than 10 pages in PDF format shall contain internal bookmarking from an index page to major sections of the document.
 3. PDF files shall be set to open "Bookmarks and Page" view.
 4. Add general information to each PDF file, including title, subject, author, and keywords.
 5. PDF files shall be set up to print legibly at 8.5-inch by 11-inch, 11-inch by 17-inch, or 22-inch by 34-inch. No other paper sizes will be accepted.
 6. Submit new electronic files for each resubmittal.
 7. Include a copy of the Transmittal of Contractor's Submittal form, located at end of section, with each electronic file.
 8. Provide Engineer with authorization to reproduce and distribute each file as many times as necessary for Project documentation.
 9. Detailed procedures for handling electronic submittals will be discussed at the preconstruction conference.
 10. The Contractor shall assign at least one employee to become the OSSES manager and be certified in the OSSES platform as a "train the trainer" at which time that employee will train the remaining Contractors OSSES users.
- C. Transmittal of Submittal:
1. Contractor shall:

- a. Review each submittal and check for compliance with Contract Documents.
- b. Stamp each submittal with uniform approval stamp before submitting to the Resident Engineer.
 - 1) Stamp to include Project name, submittal number, Specification number, Contractor's reviewer name, date of Contractor's approval, and statement certifying submittal has been reviewed, checked, and approved for compliance with Contract Documents.
 - 2) Engineer will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- c. Fill out and affix the Transmittal of Contractor's Submittal form to each submittal package (see Attachment 1).
 - 1) Transmittal Number.
 - a) Transmittal numbers shall begin with a specification section pre-fix followed by "01" and run consecutively.
 - b) In cases where resubmittals are necessary, subsequent submissions shall carry suffixes "A", "B", etc.
 - c) Example: For the 2nd resubmittal of the eighth submittal under specification section 26 05 70 the entire transmittal number would be: 260570-08-B
 - 2) Specification section and paragraph to which submittal applies.
 - 3) Project title and the Owner's project number.
 - 4) Date of transmittal.
 - 5) Names of Contractor, Subcontractor or Supplier, and manufacturer as appropriate.
 - 6) Identify and describe each deviation or variation from Contract Documents.
 - 7) Complete, sign, and transmit via e-mail to the Resident Engineer, until such time that the Owner-Selected Electronic System comes on-line, with each submittal package, one Transmittal of Contractor's Submittal form attached at end of this section.

D. Format:

1. Do not base Shop Drawings on reproductions of Contract Documents.
2. Package submittal information by individual specification section. Do not combine different specification sections together in submittal package, unless otherwise directed in specification.
3. Present in a clear and thorough manner and in sufficient detail to show kind, size, arrangement, and function of components, materials, and devices, and compliance with Contract Documents.
4. Index with labeled tab dividers in orderly manner.

- E. Timeliness: Schedule and submit in accordance Schedule of Submittals and requirements of individual specification sections.
 - 1. Review time commences on the date the submittal is logged in by the Resident Engineer.
 - 2. Unless specific submittal review periods are indicated in the technical specifications, the Owner's submittal review period shall be 60 consecutive calendar days in length for electrical and instrumentation submittals, complex process system submittals and slurry wall and tie-back anchor submittals and 30 consecutive calendar days in length for all other submittals, and shall commence on the first calendar day immediately following the date of arrival of the submittal or resubmittal in the Owner's office. The time required to mail the submittal or resubmittal back to Contractor shall not be considered a part of the submittal review period.
 - 3. Resubmittals will be subject to same review time.
 - 4. No adjustment of Contract Times or Price will be allowed as a result of delays in progress of Work caused by rejection and subsequent resubmittals.
- F. Resubmittals: Clearly identify each correction or change made.
- G. Incomplete Submittals:
 - 1. Engineer will return entire submittal for Contractor's revision if preliminary review deems it incomplete.
 - 2. When any of the following are missing, submittal will be deemed incomplete:
 - a. Contractor's review stamp; completed and signed.
 - b. Transmittal of Contractor's Submittal; completed and signed.
 - c. Insufficient number of copies.
- H. Submittals not required by Contract Documents:
 - 1. Will not be reviewed and will be returned stamped "Not Subject to Review."
 - 2. Engineer will keep one copy and return submittal to Contractor.

1.04 ACTION SUBMITTALS

- A. Prepare and submit Action Submittals required by individual specification sections.

B. Shop Drawings:

1. Electronically, in the format outlined above.
2. If hard copy submittal is required, eight copies and one reproducible of any documents larger than 11 inches by 17 inches, except copyrighted documents.
3. Identify and indicate:
 - a. Applicable Contract Drawing and Detail number, products, units and assemblies, and system or equipment identification or tag numbers.
 - b. Equipment and Component Title: Identical to title shown on Drawings.
 - c. Critical field dimensions and relationships to other critical features of Work. Note dimensions established by field measurement.
 - d. Project-specific information drawn accurately to scale.
4. Manufacturer's standard schematic drawings and diagrams as follows:
 - a. Modify to delete information that is not applicable to the Work.
 - b. Supplement standard information to provide information specifically applicable to the Work.
5. Product Data: Provide as specified in individual specifications.
6. Foreign Manufacturers: When proposed, include the following additional information:
 - a. Names and addresses of at least two companies that maintain technical service representatives close to Project.
 - b. Complete list of spare parts and accessories for each piece of equipment.

C. Samples:

1. Copies: Two, unless otherwise specified in individual specifications.
2. Preparation: Mount, display, or package Samples in manner specified to facilitate review of quality. Attach label on unexposed side that includes the following:
 - a. Manufacturer name.
 - b. Model number.
 - c. Material.
 - d. Sample source.
3. Manufacturer's Color Chart: Units or sections of units showing full range of colors, textures, and patterns available.
4. Full-size Samples:
 - a. Size as indicated in individual specification section.
 - b. Prepared from same materials to be used for the Work.
 - c. Cured and finished in manner specified.
 - d. Physically identical with product proposed for use.

D. Action Submittal Dispositions: Engineer will review, comment, stamp, and distribute as noted:

1. Approved as Submitted (for incorporation in Work):
 - a. Contractor may begin to implement activities to incorporate specific product(s) or Work covered by Submittal.
 - b. If hard copy submittals are required, the following shall apply:
 - 1) One copy furnished Owner.
 - 2) Two copies furnished Resident Project Representative.
 - 3) One copy retained in Engineer's project office file.
 - 4) One copy retained in Engineer's design office file.
 - 5) Two copies sent to the Building Department, Special Inspections Submittals only.
 - 6) Two copies sent to the permitting agency, Deferred Submittals only.
 - 7) Remaining copies returned to Contractor appropriately annotated.
2. Approved as Noted (for incorporation in Work):
 - a. Contractor may begin to implement activities to incorporate product(s) or Work covered by Submittal, in accordance with Engineer's notations. Contractor shall acknowledge noted comments on Contractor letterhead.
 - b. If hard copy submittals are required, the following shall apply:
 - 1) One copy furnished Owner.
 - 2) One copy furnished Resident Project Representative.
 - 3) One copy retained in Engineer's project office file.
 - 4) One copy retained in Engineer's design office file.
 - 5) Two copies sent to the Building Department, Special Inspections Submittals only.
 - 6) Two copies sent to the permitting agency, Deferred Submittals only.
 - 7) Remaining copies returned to Contractor appropriately annotated.
3. Rejected:
 - a. Submittal is not approved.
 - b. If hard copy submittals are required, the following shall apply:
 - 1) One copy retained in Engineer's project office file.
 - 2) Remaining copies returned to Contractor appropriately annotated.
4. Revise and Resubmit:
 - a. Submittal is not approved; resubmittal is required.
 - b. If hard copy submittals are required, the following shall apply:
 - 1) One copy furnished Resident Project Representative.
 - 2) One copy retained in Engineer's file.
 - 3) Remaining copies returned to Contractor with one copy appropriately annotated.

- 4) Contractor shall complete and resubmit or submit missing portions.
5. Partially Approved (PA), Approved as Noted:
 - a. Submittal is Partially Approved. Contractor shall resubmit items not approved. Contractor shall acknowledge noted comments on Contractor letterhead for items Approved as noted.
 - b. If hard copy submittals are required, the following shall apply:
 - 1) One copy furnished Owner.
 - 2) One copy furnished Resident Project Representative.
 - 3) One copy retained in Engineer's project office file.
 - 4) One copy retained in Engineer's design office file.
 - 5) Two copies sent to the Building Department, Special Inspections Submittals only.
 - 6) Two copies sent to the permitting agency, Deferred Submittals only.
 - 7) Remaining copies returned to Contractor appropriately annotated.

1.05 INFORMATIONAL SUBMITTALS

A. General:

1. Submit electronically, in the format outlined above.
2. If hardcopy submittals are required, submit six copies, unless otherwise indicated in individual specification section.
3. Refer to individual specification sections for specific submittal requirements.
4. Engineer will review each submittal. If submittal meets conditions of the Contract, Engineer will forward copy to appropriate parties. If Engineer determines submittal does not meet conditions of the Contract and is therefore considered unacceptable, Engineer will return submittal electronically with review comments to Contractor and require that submittal be corrected and resubmitted.

B. Certificates:

1. General:
 - a. Provide notarized statement that includes signature of entity responsible for preparing certification.
 - b. Signed by officer or other individual authorized to sign documents on behalf of that entity.
2. Welding: In accordance with individual specification sections.
3. Installer: Prepare written statements on manufacturer's letterhead certifying installer complies with requirements as specified in individual specification section.

4. Material Test: Prepared by qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.
 5. Certificates of Successful Testing or Inspection: Submit when testing or inspection is required by Laws and Regulations or governing agency or specified in individual specification sections.
 6. Manufacturer's Certificate of Compliance: In accordance with Section 01 61 00, Common Product Requirements.
 7. Manufacturer's Certificate of Proper Installation: In accordance with Section 01 43 33, Manufacturers' Field Services.
- C. Construction photographs and video in accordance with Section 01 32 33, Construction Photographs, and as may otherwise be required in Contract Documents.
- D. Closeout Submittals: In accordance with Section 01 77 00, Contract Closeout.
- E. Contractor-design Data (related to temporary construction):
1. Written and graphic information.
 2. List of assumptions.
 3. List of performance and design criteria.
 4. Summary of loads or load diagram, if applicable.
 5. Calculations.
 6. List of applicable codes and regulations.
 7. Name and version of software.
 8. Information requested in individual specification section.
- F. Deferred Submittals: See Drawings for list of deferred submittals.
1. Contractor-design data related to permanent construction:
 - a. List of assumptions.
 - b. List of performance and design criteria.
 - c. Summary of loads or load diagram, if applicable.
 - d. Calculations.
 - e. List of applicable codes and regulations.
 - f. Name and version of design software.
 - g. Factory test results.
 - h. Informational submittals requested in individual specification section.
 2. Prior to installation of indicated structural or nonstructural element, equipment, distribution system, or component or its anchorage, submit calculations and test results of Contractor-designed components for review by Engineer. Documentation of review and indication of compliance with general design intent and project criteria provided on Engineer's comment form as meets conditions of the Contract, along

with completed submittal, shall be filed with permitting agency by Contractor and approved by permitting agency prior to installation.

- G. Manufacturer's Instructions: Written or published information that documents manufacturer's recommendations, guidelines, and procedures in accordance with individual specification section.
- H. Operation and Maintenance Data: As required in Section 01 78 23, Operation and Maintenance Data.
- I. Payment:
 - 1. Application for Payment: In accordance with Section 01 29 00, Payment Procedures.
 - 2. Schedule of Values: In accordance with Section 01 29 00, Payment Procedures.
 - 3. Schedule of Estimated Progress Payments: In accordance with Section 01 29 00, Payment Procedures.
- J. Quality Control Documentation: As required in Section 01 45 16, Contractor Quality Control.
- K. Schedules:
 - 1. Schedule of Submittals: Prepare separately or in combination with Progress Schedule as specified in Section 01 32 00, Construction Progress Documentation.
 - a. Show for each, at a minimum, the following:
 - 1) Specification section number.
 - 2) Identification by numbering and tracking system as specified under Paragraph Transmittal of Submittal.
 - 3) Estimated date of submission to Engineer, including reviewing and processing time.
 - 4) On a monthly basis, submit updated Schedule of Submittals to Engineer if changes have occurred or resubmittals are required.
 - b. Schedule of Values: In accordance with Section 01 29 00, Payment Procedures.
 - c. Schedule of Estimated Progress Payments: In accordance with Section 01 29 00, Payment Procedures.
 - d. Progress Schedules: In accordance with Section 01 32 00, Construction Progress Documentation.
- L. Special Guarantee: Supplier's written guarantee as required in individual specification sections.

- M. Statement of Qualification: Evidence of qualification, certification, or registration as required in Contract Documents to verify qualifications of professional land surveyor, engineer, materials testing laboratory, specialty Subcontractor, trade, Specialist, consultant, installer, and other professionals.
- N. Submittals Required by Laws, Regulations, and Governing Agencies:
 - 1. Promptly submit promptly notifications, reports, certifications, payrolls, and otherwise as may be required, directly to the applicable federal, state, or local governing agency or their representative.
 - 2. Transmit to Engineer for Owner's records one copy of correspondence and transmittals (to include enclosures and attachments) between Contractor and governing agency.
- O. Test, Evaluation, and Inspection Reports:
 - 1. General: Shall contain signature of person responsible for test or report.
 - 2. Factory:
 - a. Identification of product and specification section, type of inspection or test with referenced standard or code.
 - b. Date of test, Project title and number, and name and signature of authorized person.
 - c. Test results.
 - d. If test or inspection deems material or equipment not in compliance with Contract Documents, identify corrective action necessary to bring into compliance.
 - e. Provide interpretation of test results, when requested by Engineer.
 - f. Other items as identified in individual specification sections.
 - 3. Field:
 - a. as a minimum, include the following:
 - 1) Project title and number.
 - 2) Date and time.
 - 3) Record of temperature and weather conditions.
 - 4) Identification of product and specification section.
 - 5) Type and location of test, Sample, or inspection, including referenced standard or code.
 - 6) Date issued, testing laboratory name, address, and telephone number, and name and signature of laboratory inspector.
 - 7) If test or inspection deems material or equipment not in compliance with Contract Documents, identify corrective action necessary to bring into compliance.
 - 8) Provide interpretation of test results, when requested by Engineer.
 - 9) Other items as identified in individual specification sections.

- P. Testing and Startup Data: In accordance with equipment specification sections.
- Q. Training Data: In accordance with Section 01 43 33, Manufacturers' Field Services.

1.06 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 - 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. The Owner reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- B. All shop drawings submitted by subcontractors for approval shall be sent directly to the Contractor for checking. The Contractor shall be responsible for their submission at the proper time so as to prevent delays in delivery of materials.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 SAMPLES, SHOP AND WORKING DRAWINGS

- A. When requested, the Contractor should submit sufficient data relating to proposed materials and equipment to enable the Owner to identify and evaluate the particular product. Manufacturers test reports and certifications shall be submitted as requested. Such data shall be submitted in a manner similar to that specified for submission of shop and working drawings.
- B. When requested, the Contractor should submit samples of material for tests, as the Owner deems necessary to demonstrate conformity with specifications. Such samples shall be furnished, taken, stored, packed, and shipped by the

Contractor so as to reach their destination in good condition, and shall be labeled to indicate material represented, name of project, intended location of the material and the a name of the Contractor submitting the sample. To ensure consideration of samples, the Contractor shall notify the Owner by letter that samples have been shipped and shall properly describe the samples in the letter. Then notification letter shall be sent separately from, and should not be enclosed, with, the samples.

- C. Contractor shall submit data and samples sufficiently early to permit consideration, inspection, testing, and approval before the materials and equipment are needed for the work. Failure to do so shall be the Contractor's sole responsibility.
- D. To demonstrate the proficiency of workmen or to facilitate the choice among several textures, types, finishes, surfaces, etc., the Contractor shall provide such samples of workmanship of wall and floor finish, etc. as may be requested.
- E. No material or equipment shall be purchased or fabricated for the Contract until the shop drawings have been approved. Materials and equipment used in the work shall in all respects conform to approved data and samples.
- F. The Contractor shall give written notice to the Owner of the place and time where fabrication, manufacture, testing, and shipping will take place for all materials and products for which off-site testing is specified in the Contract or as specifically requested by the Owner. Such notice shall be in writing and delivered to the Owner no less than ten (10) days before the event so that arrangements for inspection may be made.
- G. The Contractor shall not use any shop drawing which does not bear the Owner's authorized approval stamp.
- H. No changes shall be made to approved shop drawings and submitted working drawings without resubmission and approval.
- I. Shop and working drawings shall be prepared by the Contractor and submitted to the Owner sufficiently ahead of proposed work so that review, correction and approval actions as described herein will not delay construction operations.
- J. At the time of each submission, the Contractor shall give specific written notice of each variation that the shop and working drawings or samples may have deviated from the requirements of the Contract Documents, and in addition, shall cause a specific notation to be made on each shop and working drawing submitted for review of each variation. The review of shop drawings or samples shall not relieve the Contractor from the responsibility for any

variation from the requirements of the Contract Documents unless the Contractor has in writing called attention to each such variation at the time of submission and the Owner has given written acceptance of each such deviation by a specific written notation incorporated in or accompanying the shop or working drawing or sample review; nor will any review relieve the Contractor from responsibility for errors or omissions in the shop or working drawings.

- K. Each submittal shall list the codes and standards governing the materials, design, and manufacture of the items covered by the submittal, with particular attention to the codes and standards set forth in the Specifications. The list shall indicate the year or date of issue of each code or standard utilized by the manufacturer or Supplier in the production of the items in question.
- L. Identify field dimensions; show relation to adjacent or critical features or work or products.
- M. The data shall include drawings and descriptive information in sufficient detail to show the kind, size, arrangements, and operation of component materials and devices; the external connections, anchorages, and supports required; performance characteristics; and dimensions needed for installation and correlation with other materials and equipment.
- N. When catalog pages are submitted, applicable items shall be clearly identified and inapplicable data crossed out. The current revision, issue number, and date shall be indicated on all drawings and other descriptive data.
- O. Contractor's stamp of approval is a representation to the Owner that Contractor accepts full responsibility for determining and verifying all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data, and that he has reviewed and coordinated each submittal with the requirements of the Work and the Contract Documents. Contractor shall correct all field dimensions and criteria and shall be responsible for the coordination of work by all Subcontractors.
- P. Contractor shall accept full responsibility for the completeness of each submission. When an item consists of components from several sources, Contractor shall submit a complete initial submittal including all components.
- Q. All variations from the Contract Documents shall be identified on each submittal and shall be tabulated in Contractor's letter of transmittal. Such submittals shall, as pertinent to the variation, indicate essential details of all changes proposed by Contractor (including modifications to other facilities that may be a result of the variation) and all required piping and wiring diagrams.

- R. Assemble complete submittal into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation of each item.
- S. The Owner will not accept submittals from anyone but the Contractor. Facsimile (fax) copies will not be acceptable.
- T. Additional Requirements for Electronic Submittals:
 - 1. All Electronic submittals on CD or DVD shall adhere to the following.
 - a. All submissions shall be complete; partial submissions will not be acceptable.
 - b. Contractor shall QA/QC all electronic documents and files prior to submission. All documents must be legible, have clarity, be positioned upright, and have page/document copied in full.
 - c. The transmittal sheet for each submittal shall be scanned as one searchable pdf document and included with the electronic submittal.
 - d. When submitting multiple required copies of a document, multiple copies in one pdf document on one CD or DVD will not be acceptable.
 - e. All digital or electronic drawing submittals shall be prepared using the following naming convention:
 - f. PROJECT ACRONYM – DISCIPLINE CODE – DRAWING NUMBER.FILE EXTENSION (dwg or pdf)
 - 2. Information on loose or uncased CDs or DVDs, etc. will not be accepted by the Authority for this Contract.
 - 3. All CD and DVD submittals shall include printed labels identifying the Contract name and number, the contents of the CD or DVD and the Manufacturer or source of the files.
 - 4. Each CD or DVD shall include a digital index of the file contents with links to facilitate quick access to each section, chapter, topic, document file, etc. All documents must be in acceptable standard formats (MS Word, MS Excel, PowerPoint, Adobe Acrobat, AutoCAD, HTML), fully indexed, and searchable.
 - 5. Each CD or DVD shall be contained in a clear plastic jewel case, Fellowes No. 98310 or equal. Thin jewel cases, paper sleeves, etc. will not be acceptable. Each jewel case shall include printed jewel case cover and spine labels:
 - a. Cover information shall identify the construction contract name and contract number; submittal number; submittal revision number; Specification Section(s) and/or Drawing Number(s) referenced; Submittal title and purpose; Manufacturer's or Vendor's name (or originator of the files); Contractor's name; index or other pertinent information to describe the contents.

- b. Spine information shall include Contract Number and CD/DVD title or purpose.
 - c. CDs and DVDs containing numerous files shall include a printed Table of Contents page identifying location and nature of all major files. Printed index shall match the digital index contained on the CD/DVD
 - 6. Each CD/DVD and jewel case shall be contained in pockets of polyethylene binder sheets (Fellowes No. 95304, or equal) with reinforced binding edge and hole punching suitable for 3-ring binders (Binders will be provided by others, unless noted otherwise for specific types of Submittal).
 - 7. Submittals which include multiple CD/DVDs (for example: construction photos, record documents, complex technical submittals, etc.) shall include white 3-ring binders to contain and organize the binder sheets.
 - a. Each binder shall be maximum 3-inch size. Multiple binders shall be provided if necessary to contain all CD/DVD binder sheets.
 - b. The cover and spine of each binder shall be labeled to identify: the project name and contract number; the binder contents; the submission date; and the Contractor's name and pertinent equipment vendor's or supplier's names.
 - c. Each binder shall include a printed title page (similar to the binder cover) and a printed Table of Contents. The Table of Contents shall identify each binder sheet pocket and its contents including each CD/DVD's document file names and file paths, and a brief written description of the file contents for each file contained on each CD/DVD.
 - d. Each CD/DVD and jewel case label shall also include corresponding information to identify the binder name/number and binder sheet page number and pocket location where the CD/DVD is to be stored.
 - 8. Submittals which include only one binder sheet (2 CD/DVDs maximum) do not require 3-ring binders, unless the binders are specifically required or specified elsewhere to be provided.
- U. Specific Shop Drawing Requirements: All shop drawing submittals shall conform to the following specific requirements for all Mechanical, Electrical, Instrumentation, Special Construction, Facility, Furniture, Plumbing, etc. submittals, where applicable:
 - 1. Technical bulletins, technical data sheets from "soft-cover" catalogs, standard equipment operations and maintenance (O&M) manuals, and descriptive literature or catalog information which is "highlighted" or somehow identifies the specific equipment items the Contractor intends to provide are acceptable for each individual equipment component. Manuals shall contain all illustrations, detailed drawings, wiring

- diagrams and instructions necessary for installing, operating and maintaining the equipment. The illustrated parts shall be numbered for identification. All information shall apply specifically to the equipment furnished and shall only include instructions that are applicable.
2. System Description: Describes the equipment and how it functions, identifies the installation location, number of units furnished; the equipment tag number or unit ID, and a list of principal components that includes the equipment name, model number, manufacturer, size, performance data, operating conditions and design requirements.
 3. Equipment Operation: Provide written pre-startup, startup, normal operation and shutdown instructions for the equipment provided. Also include emergency shutdown procedures. The written descriptions are specially prepared to describe the operation of the equipment and control system. Include contract document control diagrams and process and instrumentation diagrams relating to the equipment operation.
 4. Safety: Address all safety and tag-out procedures necessary to safely operate and maintain the equipment.
 5. Dimensional Drawings: General dimensions to confirm the size of pumps, motors, drives and specified appurtenances; piping connections; construction details and layout diagram of equipment; wiring details and weight of equipment.
 6. Installation: Method recommended for installation of all component assemblies, operating characteristics, and application data for the equipment. Include layout drawings showing fabrication, assembly and typical installation details.
 7. Equipment Lubrication: Provide the required lubricant recommended by the manufacturer for the equipment. Furnish a list of recommended lubricants from four different manufacturers and their model and part number. Include an estimated quantity of lubricant required for a full year's operation and lubrication frequency.
 8. Statistical Information: Equipment performance such as pump curves, flow charts, total dynamic head, rpm, horsepower or size. Instrument data obtained such as range, set points, input/output characteristics, calibration, configuration parameters, size and graduations in the Owner units. Insulation resistance, calibration, or test data sheets to use as documentation for acceptance testing.
 9. Preventative Maintenance: Identify tasks and frequency for performing equipment inspections. Address tasking for equipment inspection, testing and routine adjustments. Include all applicable visual examinations and the adjustments necessary for periodic preventive maintenance of the system. Maintenance tasking includes procedures covering checkout, troubleshooting and equipment testing. Checkout procedures provide the ability to verify the satisfactory operation of equipment. Troubleshooting procedures serve as a guide in determining

faulty components. Equipment testing procedures cover requirements and recommended intervals for calibration, configuration and incorporate inspection reports, test results and all measurements and data.

10. **Materials List:** A complete list of all component assemblies, materials and equipment proposed to be furnished and installed under this portion of the work, giving manufacturer's name, catalog number, Original Equipment Manufacturers (OEM) parts number, and catalog cut for each item. Identify all parts with manufacturer's catalog number and other pertinent information. Include equipment drawing or catalog cut for each part listed in parts list. All parts on a parts list shall be properly identified, including manufacturer's catalog number and other pertinent information.
11. **Recommended Spare Parts:** A list of the manufacturer's recommended spare parts and the suggested replacement frequency of wear parts for equipment components with the manufacturer's current price for each item.
12. **Troubleshooting Procedures:** Corrective action proposed for any mechanical or electrical problems related to the equipment operation. Include guides for locating malfunctions. These guides shall include adequate details for quickly and efficiently locating the cause of an equipment malfunction and shall state the probable source(s) of trouble, the symptoms, probable cause and instructions for remedying the malfunction.
13. **Assembly/Disassembly:** Equipment shall be detailed for complete disassembly and assembly with procedures to remove & install, to assist with servicing the equipment and to facilitate repairs. The equipment shall be covered by cross-sectional drawings or exploded views with all parts numbered to correspond with the numbers in the parts list to permit identification of the various parts.
14. **Diagrams and Schematics:** Provide complete wiring diagrams, control circuits and field interconnection diagrams for all electrical and control equipment including panel drawings, fabrication drawings, loop diagrams, and point-to-point wiring diagrams. Drawings shall depict all components, piping and electrical connections of the systems supplied under this Section.
15. **Electrical As-Built Drawings:** "As Built" wiring and interconnection drawings shall be provided for all field installed and applied wiring as part of the Contract for all electrically powered devices. The drawings shall be supplied in addition to the wiring and interconnection diagrams specified and required in the individual sections of the technical specifications. The drawings shall illustrate electrical control devices, instruments and systems, and all instrumentation and/or control devices, instruments and systems, and all instrumentation and/or control systems.

16. Warranty/Guarantee: Provide manufacturer's guarantee of equipment operation and warranties of individual components.
17. Field Test Records: Equipment performance data at the specified operating conditions is used as a bench mark for future routine maintenance and trouble shooting.
18. Equipment Data for Mechanical, Special Construction and Facilities: Required for all equipment furnished under the Contract involving motors over 1/3 horsepower. Equipment data sheet forms are supplied by the Owner.
19. Equipment Data for Instrumentation: Required for all instrumentation equipment furnished under the Contract:
 - a. A complete system block diagram(s) showing in schematic form, the interconnections between major hardware components such as control centers, panels, power supplies, consoles, computer and peripheral devices, telemetry equipment, local digital processors and like equipment. The block diagram shall reflect the total integration of all digital devices in the system. All components shall be clearly identified with appropriate cross references to the location of each.
 - b. Data sheet for each hardware component listing all model numbers, optional, auxiliary and ancillary devices that are being provided.
 - c. Equipment specification sheets which shall fully describe the device, the intended function, how it operates and its physical environmental and performance characteristics. Each data sheet shall have appropriate cross references to loop or equipment identification tags.
 - d. Detailed drawings covering control consoles and/or enclosures.
 - e. The System Hardware submittal shall also contain all planning information, site preparation instructions, grounding and bonding procedures, cabling diagrams, plug identifications, safety precautions or guards and equipment layouts in order to proceed with the detailed site preparation for all equipment.
 - 1) A comprehensive index.
 - 2) A complete "As Constructed" set of approved shop drawings.
 - 3) A complete list of the equipment supplied, including serial numbers, ranges and pertinent data.
 - 4) Full specifications on each item.
 - 5) System schematic drawings "As Constructed", illustrating all components, piping and electrical connections of the systems supplied under this Section.
 - 6) Detailed service, maintenance and operation instructions for each item supplied.

- 7) Special maintenance requirements particular to this system shall be clearly defined, along with special calibration and test procedures.
 - 8) The operating instructions shall also incorporate a functional description of the entire system, with references to the systems schematic drawings and instructions.
 - 9) Complete parts lists with stock numbers and name, address and telephone number of the local supplier/manufacturer.
- f. The Hardware Maintenance Documentation shall describe the detailed preventive and corrective procedures required to keep the system in good operating condition. Within the complete Hardware Maintenance Documentation, all hardware maintenance manuals shall make reference to appropriate diagnostics, where applicable, and all necessary timing diagrams shall be included. A maintenance manual or a set of manuals shall be furnished for all delivered hardware, including peripherals. The Hardware Maintenance Documentation shall include, as a minimum, the following information:
- 1) Operation Information: This information shall include a detailed description of how the equipment operates and a block diagram illustrating each major assembly in the equipment.
 - 2) Preventative-Maintenance Instructions: These instructions shall include all applicable visual examinations, hardware testing and diagnostic routines and the adjustments necessary for periodic preventive maintenance of the System.
 - 3) Corrective Maintenance Instructions: These instructions shall include guides for locating malfunctions down to the card-replacement level. These guides shall include adequate details for quickly and efficiently locating the cause of an equipment malfunction and shall state the probable source(s) of trouble, the symptoms, probable cause and instructions for remedying the malfunction.
 - 4) Parts Information: This information shall include the identification of each replaceable or field repairable module. All parts shall be identified on a list in a drawing; the identification shall be of a level of detail sufficient for procuring any repairable or replaceable part.
- g. The Software Maintenance documentation shall provide a detailed description of the entire software system. This documentation shall be sufficient for software maintenance and modification of the entire software system. The following items shall be included with the software maintenance documentation.

- 1) Manufacturer's User Manuals: All Manufacturer's manuals applicable to the system being provided.
 - 2) Software User Manuals: All applicable software manuals developed for the application software shall be provided.
 - 3) Application/Custom Software Manuals: These manual(s) shall include all software maintenance information not included in the manufacturer's standard manuals. Each custom program developed specifically for the system shall include the following information as a minimum:
 - a) Table of contents.
 - b) Overview of the program.
 - c) Narrative describing exactly how the program works. All calculations, references to process I/O points and operator inputs should be mentioned.
 - d) A flowchart shall be provided to clarify the narrative description.
 - e) A List of Variables used by the program including the function of each. A cross reference to the Software Functional Design Documentation shall be provided where appropriate.
 - 4) Software Listings: Two sets of well-annotated program listings of all software provided shall be furnished for all software items. These shall include, but not be limited to, the following:
 - a) All listings associated with the system generation and software configuration of the specific system (i.e., system parameterization tables, build maps, disk maps, etc.).
 - b) Listings of all data bases configured for and associated with the system.
 - c) Listing of all custom or modified software developed specifically for the system.
 - d) These listings shall reflect any changes made after the factory acceptance test.
20. Equipment Data for Electrical: Catalog cuts of equipment components by any other manufacturer must be included with any submittal.
 21. Electric Motor Data: Product data for electric motors shall include motor data sheets, dimensional drawings, wiring diagrams identifying electric characteristics and design, mechanical construction, manufacturer's name, type and pertinent specifications for the use intended, along with the name of the equipment to be driven. A complete tabulation shall include:
 22. Design data and computations shall be included in drawing submissions for sewer and water main pipe work.

23. For pressure conduits and rubber gasket jointed pipe, a checklist shall be submitted showing sequence of submission of anticipated drawings, geometry sheets, bills of material, and laying schedules.
24. Contractor shall submit for approval shop drawings for concrete reinforcement, structural details, railing, wiring, piping layouts, pipe joints and pipe harnessing, pipe thrust block layout, valves, material fabricated especially for the Contract, and materials and equipment for which such drawings are specifically requested.
25. Shop drawings shall show the principal dimensions, weight, structural features, clearances, types and/or brand of finish or shop coat, grease fittings, etc. to establish the intent of drawings and specifications. Grade, class or strength of materials shall be included. When it is customary to do so, when dimensions are of particular importance, or when so specified, shop drawings shall be certified by the manufacturer or fabricator as correct for the Contract.
26. Any proposed option shall be clearly marked, with a reference indicated on the detail the option is intended to replace.
27. Working drawings for sheeting, shoring, concrete forms for structures, staging, cofferdams, underpinning and temporary structures shall be submitted, accompanied by a description of the design basis, applicable codes and loads, and calculations for all stress carrying members.
28. Working Drawings shall be prepared under the direction and bear the seal of a registered professional engineer with a valid Commonwealth of Virginia P.E. license.
29. Any changes to working drawings will require resubmission and resealing. Whenever working drawings are submitted for structural supports and systems, the P.E. certifying said drawings shall have a valid civil/structural license.

V. The Owner's Review:

1. The Owner's review of shop drawings and data submitted by Contractor will cover only general conformity to the Drawings and Specifications, external connections and dimensions which affect the layout. The Owner's review does not indicate a thorough review of all dimensions, quantities, and details of the material, equipment, device, or item shown. The Owner's review shall not relieve Contractor of Contractor's responsibility for errors, omissions, or deviations in the drawings and data, nor of sole responsibility for compliance with the Contract Documents.
2. The Owner reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
3. Approval will be general and will not relieve the Contractor of the responsibility for accuracy, proper fit, and construction of work per the Contract nor for furnishing of material or work required but not indicated.

W. Resubmittal of Drawings and Data:

1. Contractor shall accept full responsibility for the completeness of each resubmittal. Contractor shall verify that all corrected data and additional information previously requested by the Owner are provided on the resubmittal.
2. When corrected copies are resubmitted, Contractor shall in writing direct specific attention to all revisions and shall list separately any revisions made other than those called for by the Owner on previous submissions.
3. If more than one resubmission is required because of failure of Contractor to provide all previously requested corrected data or additional information, Contractor shall reimburse the Authority for the charges of the Owner for review of the additional resubmissions. This does not include initial submittal data such as shop tests and field tests which are submitted after initial submittal.
4. Upon the 2nd return of a submittal requiring a resubmission or any resubmittal thereafter, a meeting will be held at the site with the CM, Design Engineer, Contractor project manager and vendor representatives of the submitted item to review and reconcile, to the extent possible, outstanding review comments.
5. Any need for more than one resubmission, or any other delay in obtaining the Owner's review of submittals, will not entitle Contractor to extension of the Contract Times unless delay of the Work is directly caused by a change in the Work authorized by a Change Order or other reason beyond the control of the Contractor.
6. Resubmittals shall be made within 14 days of the date of the letter returning the material to be modified or corrected, unless within 7 days Contractor submits an acceptable request for an extension of the stipulated time period, listing the reasons the submittal cannot be completed within that time.

3.02 REQUESTS FOR INFORMATION (RFI)

- A. Questions during construction shall be submitted to the Construction Manager in a form that is approved prior to the start of construction (see Attachment 2).
- B. RFI's shall be submitted as a Word Document with discrete cells for data entered and in pdf form to the Owner. All attachments to RFIs shall be submitted in pdf form.
- C. Minimum information that must be included within the RFI form shall include, but not necessarily be limited to:
 1. Contractor's contact name.
 2. Project Number and name.

3. Date.
4. Sequential number of RFI.
5. RFI subject.
6. Contract Document References.
7. Detailed description of issue/request.
8. Recommended disposition.

3.03 SUBCONTRACT

- A. Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 1. Name, address, email address, and telephone number of entity performing subcontract or supplying products.
 2. Number and title of related Specification Section(s) covered by subcontract.
 3. Drawing number and detail references, as appropriate, covered by subcontract.
 4. Submit the Owner Subcontractor Form.
 5. Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architect, engineers and the Owner.
 6. Submit six (6) copies, the Owner will return two (2) copies. Markup and retain one (1) returned copy as a Project Record Document.

3.04 CERTIFICATES

- A. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements
- B. Buy American Compliance Documentation: Submit certificates of compliance, exceptions clause citation, de minimus exception documentation, or executed EPA waiver.
- C. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements. Submit record of Welding Procedures Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- D. Installation Certificates: Prepared written statements on manufacturer's letterhead certifying that Installer complied with manufacturer's installation requirements.

- E. Material & Product Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard forms, indicating and interpreting test results of material for compliance with Contract Documents.
- F. Field Test Reports: Prepared reports written by a qualified testing agency, on testing agency's standard form, 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 Contract Documents.

3.05 OTHER SUBMITTALS

- A. Contractor shall submit reports, plans, permits, working drawings and other submittals as specified elsewhere or shown on the Drawings.
- B. Material Safety Data Sheets (MSDSs): Submit four (4) copies to the Owner.

3.06 SUPPLEMENTS

- A. The supplement listed below, following "End of Section," is part of this Specification.
 - 1. Transmittal of Contractor's Submittal.
 - 2. Request for Information Form.
 - 3. Contractor Submittal Routing Form

END OF SECTION

TRANSMITTAL OF CONTRACTOR'S SUBMITTAL										[INSERT GC LOGO]		
Alexandria Renew Enterprises												
Contract Name: TBD					Submittal No.							
					Contract No.		Spec. Section			Seq. No.		Rev.
Contractor: TBD												
TO:					<input type="checkbox"/> New Submittal <input type="checkbox"/> Resubmittal							
					(Cover only one section with each transmittal)							
					Referenced Drawings:							
FROM:					Scheduled Date of Submittal:							
					Actual Date of Submission:							
					Submittal Type							
					<input type="checkbox"/> Shop Drawing <input type="checkbox"/> Sample							
					<input type="checkbox"/> Informational <input type="checkbox"/> Deferred							
The following items are hereby submitted:												
Number of Copies	Description of Item Submitted (Type, Size, Model Number, Etc.)				Spec. and Paragraph No.	Drawing or Brochure Number (including Brochure page nos.)				Contains Variation to Contract		
										No	Yes	
Contractor hereby certifies that (i) submittal has been reviewed, checked, and approved for compliance with Contract Documents and (ii) the Submittal is complete and in accordance with the Contract Documents and requirements of laws and regulations and governing agencies.												
					By:			Date:				
					Contractor (Authorized Signature)							

REQUEST FOR INFORMATION/CLARIFICATION FORM											
[Project Name]											
										Page	of
DATE:		CONTRACT NO.				RFI NO.					
TO:		FROM:				REFERENCED OR AFFECTED DESIGN DOCUMENTS:					
Resident Engineer						SPEC. SECTION:					
						DWG:					
		ORIGINATOR:				REV:					
SUBJECT (for tracking purposes):											
DESCRIPTION OF REQUEST:											
Additional Info. Attached: y n Response Need By: Signed: Date:											
Contractor											
Disposition Assigned to: Signed: Date:											
Resident Engineer											
RESPONSE TO REQUEST:											
Signed: Date:											
Concur with DE: Date:											
1. Does the DE propose to change Contract Documents?		y		n		Distribution:					
2. Additional information attached by responder?		y		n		RE					
3. Are other contracts affected?		y		n		Document Control					
4. Are site or Plant-wide issues involved?		y		n		DE					
Answered by FTM No.				Date:		RFI file/Original					
						CM					
						AlexRenew PM					

SECTION 01 33 10 DOCUMENT MANAGEMENT

PART 1 GENERAL

1.01 SUMMARY

- A. The Owner uses a eCMIS platform (e-Builder) to manage the life-cycle of project generated documents.
- B. The Owner and the Contractor shall use e-Builder for electronic submittal of all data and documents required by the Contract Documents as the platforms' workflow functions become operational. The CMIS platform site is owned and operated by the Owner. The joint use of this application is to:
 - 1. Facilitate electronic exchange of information.
 - 2. Expedite the review process for submitted documents.
 - 3. Centralize project information.
- C. Project communications shall be submitted and processed using e-Builder. This CMIS platform shall be the primary communication tool for all contact between the Owner and the Contractor.
- D. Hard copies of all documents shall be provided in accordance with the Contract Documents.
 - 1. CMIS platform shall be used to track and expedite processing of these items.
 - 2. The Owner's acceptance of documents submitted via CMIS platform shall not relieve the Contractor from responsibility for any variation from the requirements of the Contract Documents.
 - 3. In the event of a discrepancy between the electronic version and paper documents, the paper documents will govern.
- E. If the Contractor is not familiar with eCMIS platforms they are highly encouraged to search on-line.

1.02 USER ACCESS LIMITATIONS

- A. The Owner shall provide the Contractor with a minimum of two (2) licenses of CMIS platform for participants designated by the Contractor to process submittals.
- B. The Contractor shall assign at least one employee to become the CMIS Administrator who will participate in an on-site two-day training to become

an e-Builder “train the trainer” at which time that employee will train the remaining Contractors CMIS users.

- C. User access and access rights to the CMIS platform site will be established, assigned and managed, by the Owner for the Contractor.
- D. The Owner will provide the Contractor access to CMIS platform to allow submittal of documents including, but not limited to: letters, shop drawings, submittals, meeting minutes, daily reports, drawings, specifications, memorandums, payment requisitions, change order requests, testing reports, warranties, guarantees and correspondence. Requests for Information will be directly entered into CMIS platform and generated by the application unless specified otherwise.
- E. Sub-Contractors and suppliers will not have direct access to CMIS platform unless specified or approved otherwise by the Owner. Entry of information exchanged and transferred between the Contractor and sub-contractors and suppliers shall be the responsibility of the Contractor.
- F. Access to modules is managed by permission levels configured by the Owner. Request to change permission levels must be submitted to the Owner through the Owner’s Construction Manager.

1.03 OWNERSHIP OF DATA

- A. All Data entered into CMIS platform shall be the sole property of the Owner.

1.04 COMPUTER REQUIREMENTS

- A. CMIS platform is accessed via the internet through a web browser using Java run-time plug-in technologies. The Contractor shall use computer hardware and software that meets the requirements of the Owner and the CMIS platform system. The Owner staff will not operate, install, or troubleshoot any of the Contractor’s hardware or software. The Contractor is solely responsible for the functionality of their systems.
- B. Should the version of CMIS platform be upgraded during the Contract Time the Contractor will not upgrade their system(s) to meet the requirements of the upgraded application unless directed by the Owner. Upgrading of the Contractor’s computer systems will not be justification for a time modification to the Contract.
- C. The Owner will accept no liabilities arising from the Contractor’s use of CMIS Platform.

1.05 CONTRACTOR RESPONSIBILITY

- A. The Contractor shall be responsible for the validity of the information placed in CMIS platform as well as the abilities of their personnel to use the application.
- B. An overview of the setup and submittal processes associated with CMIS platform will be presented to the Contractor. The Contractor is responsible for training their personnel in the use of CMIS platform, except as noted above in paragraph 1.1.A. All costs associated with the use of this system will be evenly distributed in the project overheads and spread across the duration of the contract; a separate added cost will not be allowed.
- C. The Contractor shall meet with the Owner authorized representative within fifteen (15) days after the Notice of Selection to discuss the Contractor's use of CMIS Platform. An Owner CMIS platform "User Account Request Form" shall be filled out, signed by each user and submitted to the Owner to receive access to CMIS platform is required. The Contractor must also submit their Company data.
- D. Notify the Owner immediately of any users who no longer require CMIS platform access. Their user account will be de-activated by the Owner and the license will again be available to the Contractor.
- E. User access changes will take effect within 3 working days of receipt of the request from the Contractor, but no earlier than NTP.
- F. The Contractor shall maintain a list of authorized the Owner network and CMIS platform accounts to reflect current authorized users. This list must be submitted to the Owner monthly.
- G. The Contractor shall protect the security of the CMIS platform system by limiting access to authorized users only and not allow 'sharing' of usernames.
- H. The Contractor shall comply with applicable laws and regulations regarding electronic transmission of documents requiring professional architects', engineers', geologists', and surveyors' stamps or signatures, including provision of hard copies of such documents as appropriate.
- I. The Contractor nor his representatives, users, sub-consultants and subcontractors shall not enter, attach or store sensitive personal information such as Social Security numbers in CMIS Platform.
- J. The Contractor will be allocated a minimum of two (2) user accounts and a maximum of five (5) user accounts based on the size of the contract.

- K. Project Communications that require the signature of authorized persons will use either:
 - 1. An approved “image” of the official signature affixed to the document. Also provide the Owner with the original signed hard copy/paper document.
 - 2. An electronic Copy or electronic image of a fully executed document containing the required signatures. Also provide the Owner with the original signed hard copy/paper document.

1.06 INTERNET CONNECTIVITY

- A. CMIS platform is a web-based environment and therefore subject to the inherent speed and connectivity issues of the internet service provider. The Contractor is responsible for his own connectivity to the internet outside of the Owner provided network. CMIS Platform’s response time is dependent on user’s equipment, including processor speed, network interface equipment, internet service provider access speed, etc. and current traffic on the internet.
- B. The Owner will not be liable for any delays associated from the usage of CMIS platform or Owner furnished internet service including, but not limited to: slow response time, down time periods, connectivity problems, or loss of information on the Contractor’s equipment.
- C. Under no circumstances shall the usage of the CMIS platform be grounds for a time extension or cost adjustment to the contract.
- D. Access to the internet for CMIS platform shall be operational upon receipt of the Notice to Proceed.

1.07 CMIS PLATFORM DOWNTIME

- A. In the event that the CMIS Platform system is temporarily unavailable, the Contractor shall continue with Project Communications utilizing alternate secure means (e-mail) or hard copies to transmit and receive Project Communications.
- B. Maintain records of all Project Communications during the CMIS Platform downtime and upload the records to CMIS Platform when it is operational.
- C. Notify the Owner by telephone and/or email when CMIS Platform is not functional.

PART 2 PRODUCTS

2.01 CMIS PLATFORM NAME

- A. The Owner has selected e-Builder to develop and implement an AlexRenew CMIS Platform.
- B. Web-based electronic information management application owned and operated by the Owner.

PART 3 EXECUTION

3.01 CMIS PLATFORMUTILIZATION AND ROLLOUT EXAMINATION

- A. Prior to providing access to CMIS platform an overview for the Contractor will be held at the site. The overview will include:
 - 1. CMIS platform site location (URL) and log on process.
 - 2. Navigation through CMIS Platform.
 - 3. Uploading documents.
 - 4. The Owner Submittal Review process.
 - 5. The Owner RFI Review process.
 - 6. The Owner Correspondence requirements.
 - 7. Submittal of Payment Requisitions.
 - 8. User Access Requirements.
- B. The Contractor shall provide the Owner with completed account forms for all its intended CMIS Platform users and information on contacts such as key personnel, sub-consultants, sub-contractors, vendors, etc. as required by the Owner.

3.02 COMMUNICATIONS

- A. All official documents attached to CMIS Platform shall be in one complete Portable Document Format (PDF) electronic file. These official PDF document files shall include duly executed signatures as required by the Contract. Supporting source document files may also be attached when so required.
- B. Date that the Contractor enters a document into CMIS platform will be recorded as the date received by the Owner with the following exceptions:
 - 1. All Project Communications submitted to the Owner through CMIS platform after 3:00 p.m., Eastern Time, Monday through Friday, will be acknowledged no earlier than the following regular business day.

2. For Project Communication purposes, business days and hours are defined as Monday through Friday, 8:00 a.m. to 3:00 p.m., Eastern Time, excluding Owner holidays.

END OF SECTION

SECTION 01 33 29 SUSTAINABLE CONSTRUCTION AND REPORTING

PART 1 GENERAL

1.01 SUMMARY

- A. The Contractor is responsible to track and log their efforts in achieving sustainable construction.

1.02 SUBMITTALS

- A. Informational Submittals:
 - 1. Sustainable construction log.

1.03 SUSTAINABLE CONSTRUCTION LOG

- A. Format: Electronic format using the Attachment 1 log template included at the end of this Section. Identify reporting period, date of submittal and author.
- B. Contents: Utilize the log to document all sustainable construction activities employed, reporting of quantitative metrics, lessons learned, innovative measures, recommended refinements, etc. to the requirements of the contract documents and other means utilized by the Contractor. Items for the log shall include the following, as applicable.
 - 1. Reductions in paper use via electronic media for project and workforce meetings. Document recycled content in copy paper.
 - 2. Use of City Water in lieu of bottled water for potable consumption.
 - 3. Use of teleconferencing and videoconferencing for project meetings where attendees are not typically on site.
 - 4. Use of any high efficiency equipment or lighting including electric or solar-powered equipment.
 - 5. Compliance with controls specified in Section 01 10 00, General Requirements.
 - 6. Compliance with operation of temporary facilities including field offices as described in Section 01 52 00, Contractor Facilities.
 - 7. Percent of monthly construction and demolition debris that is recycled compared to debris disposed in landfill in accordance with Section 01 74 19, Waste Management.
 - 8. Reductions in packaging from equipment and material suppliers or reuse and recycling of such packaging.
 - 9. Employment of any carpooling, shuttling programs, Metro, or DASH use by field staff.

10. Percentage of Regional Materials:
 - a. At the commencement of the Project, include a bill of materials list by Specification section in Divisions 3 through 44 that identifies the location of origin or manufacture of materials, products, and equipment to be provided in the Project. For minor items such as anchor bolts and small accessory items whereby the origin may fluctuate, denote the origin as "variable."
 - b. The location of origin of equipment shall be defined as the point of final assembly of components into a product to be furnished.
 - c. Based on material costs of all items, provide a calculation showing percent of materials that are anticipated to come from within 500 miles of the Project Site versus the total material cost of the Project. A detailed listing of material costs by item is not required.
 - d. If procurement of major equipment or mechanical/electrical items that deviate from the original list is realized during the construction period, submit updated calculation to document the impact on the regional materials metric.
11. Total duration in number of weeks of active pile-driving activity.
12. Quantity of biodiesel fuel ordered for construction equipment versus regular diesel.
13. Use of any Tier 4 compliant construction equipment.
14. Report number of workdays lost in work schedule due to traffic congestion within plant Site resulting from Contractor's vehicles, other contractor vehicle, or Owner's fleet, if such incidents occur.
15. Running total of recordable and reportable safety incidents.
16. Other successes, etc.

1.04 REQUIREMENTS

- A. Lighting: Install and use lights only where needed to reduce light pollution.
- B. Water Use: Minimize water use and utilize AlexRenew reclaimed water whenever possible. Coordinate reclaimed water usage and source locations with the Owner.
- C. Cleaning Products: All cleaning products utilized in the Contractor's field office and at the construction site must be certified by Green Seal.
- D. Fuel:
 1. A minimum of 50 percent of fuel consumed on the Project for operation of heavy construction equipment shall be a blend of 20 percent biodiesel and 80 percent diesel (B20 blend). Blends of greater than 20 percent biodiesel are permitted. Biodiesel shall meet the requirements of ASTM D6751.

2. Biodiesel shall be delivered pre-blended from suppliers accredited by the BQ 9000 Quality Management Program of the National Biodiesel Board.
3. The Contractor shall follow the equipment manufacturer's guidelines for blend type, length of storage, and maintenance requirements.
4. Report all biodiesel use in the Contractor's and Subcontractors' equipment as instructed in Section 01 32 00, Construction Progress Documentation.

1.05 PUBLIC TRANSIT

- A. Per Section 01 29 00, Payment Procedures, The Owner will subsidize 50 percent of costs associated with mass transit use by the Contractor's workers for those workers who elect to use Metro, DASH, VRE or other forms of public transit to commute to the Project Site.

1.06 WASTE MANAGEMENT

- A. Report type and quantity of materials, by weight tickets, sent to salvage yards, recycling centers, and landfills, as specified in Section 01 74 19, Waste Management.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOTE USED)

3.01 SUPPLEMENTS

- A. Sustainable Construction Log.

END OF SECTION

Sustainable Construction Log			
Issued by: _____ Issue Date: _____			
Project Number: _____ Report Period: _____		Construction Manager: _____ Project Start (month/year): _____	
Waste Management: Weight Recycled/Salvaged: _____ tons Weight Landfilled: _____ tons Total: _____ Tons Percent Recycled/Salvaged: _____ %		Heavy Equipment Fuel Received: Biodiesel: _____ gallons Regular Diesel: _____ gallons Percent Biodiesel: ____ %	
Safety: Number of Recordable Incidents: _____ Number of Reportable Incidents: _____		Traffic: Number of Days Lost to Site Traffic Congestion: _____	
Documentation of Other Practices and Specified Metrics			
Entry No.	Date	Item Description	Follow-up Actions/Recommendations
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

SECTION 01 43 33 MANUFACTURERS' FIELD SERVICES

PART 1 GENERAL

1.01 DEFINITIONS

- A. Person-Day: One person for 8 hours within regular Contractor working hours.

1.02 SUBMITTALS

- A. Informational Submittals:
 - 1. Qualifications of Manufacturer's representatives.
 - 2. Training Schedule: Submit, in accordance with requirements of this Specification, not less than 45 days prior to start of equipment installation and revise as necessary for acceptance.
 - 3. Lesson Plan: Submit, in accordance with requirements of this Specification, proposed lesson plan not less than 60 days prior to scheduled training and revise as necessary for acceptance.

1.03 QUALIFICATION OF MANUFACTURER'S REPRESENTATIVE

- A. Authorized representative of the manufacturer, factory trained, and experienced in the technical applications, installation, operation, and maintenance of respective equipment, subsystem, or system, with full authority by the equipment manufacturer to issue the certifications required of the manufacturer. Additional qualifications may be specified in the individual specification section.
- B. Representative subject to acceptance by Owner and Engineer. No substitute representatives will be allowed unless prior written approval by such has been given.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 FULFILLMENT OF SPECIFIED MINIMUM SERVICES

- A. Furnish certified welding inspector(s) when these services are required by individual Specification sections.
- B. Furnish manufacturers' services, when required by an individual specification section, to meet the requirements of this section.

- C. Where time is necessary in excess of that stated in the Specifications for manufacturers' services, or when a minimum time is not specified, time required to perform specified services shall be considered incidental.
- D. Schedule manufacturer' services to avoid conflict with other onsite testing or other manufacturers' onsite services.
- E. Determine, before scheduling services, that conditions necessary to allow successful testing have been met.
- F. Only those days of service approved by Engineer will be credited to fulfill specified minimum services.
- G. When specified in individual specification sections, manufacturer's onsite services shall include:
 - 1. Assistance during product (system, subsystem, or component) installation to include observation, guidance, instruction of Contractor's assembly, erection, installation or application procedures.
 - 2. Inspection, checking, and adjustment as required for product (system, subsystem, or component) to function as warranted by manufacturer and necessary to furnish Manufacturer's Certificate of Proper Installation.
 - 3. Providing, on a daily basis, copies of manufacturers' representatives' field notes and data to Resident Engineer.
 - 4. Revisiting the Site as required to correct problems and until installation and operation are acceptable to Engineer.
 - 5. Resolution of assembly or installation problems attributable to or associated with respective manufacturer's products and systems.
 - 6. Assistance during functional and performance testing, and facility startup and evaluation.
 - 7. Training of Owner's personnel in the operation and maintenance of respective product as required.
 - 8. Additional requirements may be specified elsewhere.

3.02 MANUFACTURER'S CERTIFICATE OF COMPLIANCE

- A. When so specified, a Manufacturer's Certificate of Compliance, a copy of which is attached to this section, shall be completed in full, signed by the entity supplying the product, material, or service, and submitted prior to shipment of product or material or the execution of the services.
- B. Engineer may permit use of certain materials or assemblies prior to sampling and testing if accompanied by accepted certification of compliance.
- C. Such form shall certify that the proposed product, material, or service complies with that specified. Attach supporting reference data, affidavits, and certifications as appropriate.

- D. May reflect recent or previous test results on material or product, if acceptable to Engineer.

3.03 MANUFACTURER'S CERTIFICATE OF PROPER INSTALLATION

- A. When so specified, a Manufacturer's Certificate of Proper Installation form, a copy of which is attached to this section, shall be completed and signed by equipment manufacturer's representative.
- B. Such form shall certify signing party is a duly authorized representative of manufacturer, is empowered by manufacturer to inspect, approve, and operate their equipment and is authorized to make recommendations required to ensure equipment is complete and operational.

3.04 TRAINING

A. General:

1. Furnish manufacturers' representatives for detailed classroom and hands-on training to Owner's personnel on operation and maintenance of specified product (system, subsystem, component) and as may be required in applicable Specifications.
2. Furnish trained, articulate personnel to coordinate and expedite training, to be present during training coordination meetings with Owner, and familiar with operation and maintenance manual information specified in Section 01 78 23, Operation and Maintenance Data.
3. Manufacturer's representative shall be familiar with facility operation and maintenance requirements as well as with specified equipment.
4. Furnish complete training materials, to include operation and maintenance data, to be retained by each trainee.

B. Training Schedule:

1. List specified equipment and systems that require training services and show:
 - a. Respective manufacturer.
 - b. Estimated dates for installation completion.
 - c. Estimated training dates.
2. Multiple training sessions will be required. Provided for a minimum of five training sessions over a period of four separate weeks. Sessions may only be scheduled between the hours of 6:00 a.m. and 2:00 p.m.
3. Adjust schedule to ensure training of appropriate personnel as deemed necessary by Owner, and to allow full participation by manufacturers' representatives. Adjust schedule for interruptions in operability of equipment.

4. Coordinate with Section 01 32 00, Construction Progress Documentation, and Section 01 91 00, Equipment Systems Commissioning.
- C. Lesson Plan: When manufacturer or vendor training of Owner personnel is specified, prepare a lesson plan for each required course containing the following minimum information:
1. Title and objectives.
 2. Recommended attendees (such as, managers, engineers, operators, maintenance).
 3. Course description, outline of course content, and estimated class duration.
 4. Format (such as, lecture, self-study, demonstration, hands-on).
 5. Instruction materials and equipment requirements.
 6. Methods used to validate training effectiveness (such as teach back, testing, etc.).
 7. Resumes of instructors providing training.
- D. Pre-Startup Training:
1. Coordinate training sessions with Owner's operating personnel and manufacturers' representatives, and with submission of operation and maintenance manuals in accordance with Section 01 78 23, Operation and Maintenance Data, and any other handouts, if applicable,.
 2. Complete at least 14 days prior to beginning of facility startup.
- E. Post-startup Training: If required in Specifications, furnish and coordinate training of Owner's operating personnel by respective manufacturer's representatives.
- F. Recording of Training Sessions:
1. Furnish audio and color recording of pre-startup and post-startup instruction sessions, including manufacturers' representatives' hands-on equipment instruction and classroom sessions.
 2. Video training materials shall be produced by a qualified, professional video production company.
 3. Use MP4 format, or other media approved by Owner, suitable for playback on YouTube.
 4. Include one training session per individual record.
 5. Submit a multiple choice quiz with no more than ten (10) questions and include answers.

3.05 SUPPLEMENTS

- A. The supplement listed below, following “End of Section,” is part of this specification.
1. Manufacturer’s Certificate of Compliance.
 2. Manufacturer’s Certificate of Proper Installation.

END OF SECTION

MANUFACTURER'S CERTIFICATE OF COMPLIANCE

OWNER: Alexandria Renew Enterprises

PRODUCT, MATERIAL, OR SERVICE
SUBMITTED:

PROJECT NAME:

PROJECT NO:

Comments: _____

I hereby certify that the above-referenced product, material, or service called for by the contract for the named project will be furnished in accordance with all applicable requirements. I further certify that the product, material, or service are of the quality specified and conform in all respects with the contract requirements, and are in the quantity shown.

Date of Execution: _____, 20__

Manufacturer: _____

Manufacturer's Authorized Representative (*print*): _____

(Authorized Signature)

MANUFACTURER'S CERTIFICATE OF PROPER INSTALLATION

OWNER Alexandria Renew Enterprises EQPT SERIAL NO: _____

EQPT TAG NO: _____ EQPT/SYSTEM: _____

PROJECT NO: _____ SPEC. SECTION: _____

I hereby certify that the above-referenced equipment/system has been:

(Check Applicable)

- ☐ Installed in accordance with Manufacturer's recommendations.
- ☐ Inspected, checked, and adjusted.
- ☐ Serviced with proper initial lubricants.
- ☐ Electrical and mechanical connections meet quality and safety standards.
- ☐ All applicable safety equipment has been properly installed.
- ☐ Functional tests.
- ☐ System has been performance tested, and meets or exceeds specified performance requirements. (When complete system of one manufacturer)

Note: Attach any performance test documentation from manufacturer.

Comments: _____

I, the undersigned Manufacturer's Representative, hereby certify that I am (i) a duly authorized representative of the manufacturer, (ii) empowered by the manufacturer to inspect, approve, and operate their equipment and (iii) authorized to make recommendations required to ensure equipment furnished by the manufacturer is complete and operational, except as may be otherwise indicated herein. I further certify that all information contained herein is true and accurate.

Date: _____, 20____

Manufacturer: _____

By Manufacturer's Authorized Representative: _____
(Authorized Signature)

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 45 16 CONTRACTOR QUALITY CONTROL

PART 1 GENERAL

1.01 SUMMARY

- A. This Section describes the responsibilities pertaining to quality assurance (QA) and quality control (QC) of the Work and applies to construction work including identification, stocking and issue of materials and supplies; the entire process of construction; and the installation and testing of equipment.
- B. Contractor is responsible for both the QA and QC of the Work, including that performed by Subcontractors and Suppliers in order to ensure all Work meets the requirements in the Contract Documents.
- C. The Owner shall hold the final authority for determining acceptance of materials incorporated into this project.

1.02 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
 - 1. ASTM International (ASTM):
 - a. D3740, Evaluation of Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
 - b. E329, Use in the Evaluation of Testing and Inspection Agencies as Used in Construction.

1.03 DEFINITIONS

- A. Contractor Quality Control (CQC): The means by which Contractor ensures that the construction, to include that performed by subcontractors and suppliers, complies with the requirements of the Contract.
- B. Quality Control (QC): The successful execution of a realistic plan which ensures that the required standards of quality construction are met and which will preclude problems resulting from poor quality or lack of quality. QC includes tests, inspections, procedures and related actions during and after execution of the Work to evaluate that completed construction complies with requirements. Contract enforcement services performed by Owner are not included.

- C. Quality Assurance (QA): The performance of tasks that ensure that construction is performed according to Contract requirements. QA includes activities, actions and procedures performed before and during execution of the Work to guard against defects and deficiencies and ensure that proposed construction complies with requirements.
- D. Corrective Action Report (CAR): A written notice given by the Contractor to the Owner that defective or non-conforming work has been corrected or will be corrected within a mutually acceptable time frame.
- E. Non-Conformance Notice (NCN): A written notice to the Contractor from either the Owner or the Contractor's QC staff to the effect that a deficiency has been found in the work such that that portion of the work is considered to be defective as failing to conform to the Contract Documents, .
- F. Nonconformance: A condition which deviates from Contract Document requirements and cannot be corrected to meet such requirements or otherwise requires an engineering determination.
- G. CQC Manager: Member of Contractor's organization designated to manage and administer the Contractor's Construction CQC Program.
- H. Audit: A planned and documented activity performed by qualified personnel to determine the adequacy and compliance of the QA/QC work done in the field with established procedures in the Quality Assurance and Quality Control Program, or applicable documents, and the effectiveness of their implementation.
- I. Project Sponsor: Person responsible for assuring delivery of the project on schedule, on budget and meeting quality expectations. The Project Sponsor serves as a key link between the day-to-day project management team and the organization's executive management. The Project Sponsor is not responsible for day-to-day running of the project but helps the project manager facilitate the necessary organizational support needed to make strategic decisions and create a successful project.
- J. Mockups: Full-size, physical examples assemblies to illustrate finishes and materials. Mockups are used to verify selections made under Sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution and to review construction, coordination, testing or operation. They are not Samples. Mockups establish the standard by which the Work will be judged.
- K. Pre-construction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

- L. Product Testing: Tests and inspections that are performed by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
- M. Source Quality Control Testing: Tests and inspections that are performed at the source (i.e., plant, mill, factory or shop).
- N. Field Quality Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- O. Testing Agency: An entity engaged to perform specific tests, inspections or both. Testing laboratory shall mean the same as testing agency.
- P. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor to perform a particular construction operation, including installation, erection, application and similar operations.

1.04 SUBMITTALS

- A. Informational Submittals:
 - 1. CQC Plan: Submit, not later than 30 days after receipt of Notice to Proceed.
 - 2. CQC Reports: an original and one copy in report form
 - a. Submit daily the report referenced in 3.08.C
 - b. Submit, weekly CQC Report, an original and one copy in report form.
 - c. Issue monthly CQC report to the Owner within 7 calendar days of the end of the month being reported. Address the status of the CQC Program including procedure development, status of Subcontractor/Supplier CQC Programs and procedures, number of inspections and tests performed during the month, unsatisfactory and nonconforming items identified as well as those that remain open or were closed during the month, and any other quality problems experienced.

1.05 OWNER'S QUALITY ASSURANCE

- A. All Work is subject to Owner's quality assurance inspection and testing at all locations and at all reasonable times before acceptance to ensure strict compliance with the terms of the Contract Documents.
- B. Owner has the right but not the responsibility to perform inspections, witness tests, or otherwise monitor or assess the Work and activities. All products,

materials, and equipment are subject to inspection by the Owner at the place of manufacture. Work to be done away from the Construction Staging Area may be subject to inspection by the Owner during its fabrication, manufacture, testing, or before shipment. Give notice to the Owner of the place and time where such fabrication, manufacture, testing, or shipping is to be done. Provide such notice in writing and deliver in ample time so that the necessary arrangements for inspections and witnessing of shop tests can be made.

- C. Owner will, throughout the duration of construction, inspect construction materials, test materials, collect measurements and survey data, and monitor settlements to assure conformance with the Contract Documents and as a basis of acceptance. The Owner may conduct testing to verify earthwork compaction, verify concrete compressive strength, monitor dewatering water quality, monitor noise levels at nearby receptors, and perform independent settlement monitoring during construction activities.
- D. The Contractor shall assist the Owner with the implementation of the Independent Assurance Sampling and Testing Program as required. Findings of all Independent Assurance observations and test results will be provided to the Contractor's CQC Manager by the Owner. Failing test results will be communicated immediately to the CQC Manager by the Owner or designated authorized representative. The Contractor shall immediately take corrective action to resolve any noted deficiencies.
- E. Owner's quality assurance inspections and tests are for the sole benefit of Owner and do not:
 - 1. Relieve Contractor of responsibility for providing adequate quality control measures;
 - 2. Relieve Contractor of responsibility for damage to or loss of the material before acceptance;
 - 3. Constitute or imply acceptance; or
 - 4. Affect the continuing rights of Owner after acceptance of the completed Work.
- F. The presence or absence of a quality assurance inspector does not relieve Contractor from any Contract requirement.
- G. Promptly furnish all facilities, labor, and material reasonably needed for performing such safe and convenient inspections and tests as may be required by Engineer.
- H. Owner may charge Contractor for any additional cost of inspection or test when Work is not ready at the time specified by Contractor for inspection or test, or when prior rejection makes re-inspection or retest necessary. Quality

assurance inspections and tests will be performed in a manner that will not unnecessarily delay the Work.

1.06 SPECIAL TESTS AND INSPECTIONS

- A. Owner will engage a qualified testing agency and/or qualified personnel to conduct special tests and inspections required by authorities having jurisdiction and delegated to Owner to perform.
- B. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of the types of testing and inspecting they are engaged to perform.
- C. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to the Contractor, and the Contract Sum will be adjusted by Change Order.
- D. These tests and inspections include:
 - 1. Verifying that manufacturer maintains detailed fabrication and quality control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
 - 2. Submitting a certified written report of each test, inspection and similar quality control service to Owner with copy to Contractor and to authorities having jurisdiction.
 - 3. Submitting a final report of special tests and inspections at Substantial Completion (including a list of unresolved deficiencies).
 - 4. Interpreting tests and inspections and stating in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
 - 5. Retesting and re-inspecting corrected Work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

- A. Maintain an adequate inspection system and perform such inspections as will ensure that the Work conforms to the Contract Documents.
- B. Maintain complete inspection records and make them available at all times to Owner and Engineer.

- C. The quality control system shall consist of plans, procedures, and organization necessary to produce an end product that complies with the Contract Documents. The system shall cover all construction and demolition operations, both onsite and offsite, including Work by subcontractors, fabricators, suppliers and purchasing agents, and shall be keyed to the proposed construction sequence.

3.02 COORDINATION MEETING

- A. After the Preconstruction Conference, but before start of construction, and prior to acceptance of the CQC Plan, schedule a meeting with Engineer and Owner to discuss the quality control system.
- B. Develop a mutual understanding of the system details, including the forms for recording the CQC operations, control activities, testing, sampling, inspection administration of the system for both onsite and offsite Work, and the interrelationship of Contractor's management and control with the Owner's Quality Assurance.
- C. There may be occasions when subsequent conferences may be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures that may require corrective action by Contractor.

3.03 QUALITY CONTROL ORGANIZATION

- A. CQC System Manager:
 - 1. Designate an individual within Contractor's organization who will be responsible for overall management of CQC and have the authority to act in CQC matters for the Contractor.
 - 2. CQC System Manager may perform other duties on the Project.
 - 3. CQC System Manager shall be an experienced construction person, with a minimum of 5 years of experience in a similar position on projects with scope.
 - 4. CQC System Manager shall report to the Contractor's project sponsor or someone higher in the organization.
 - 5. CQC System Manager shall be onsite during construction, including overtime or shiftwork. Periods of absence may not exceed 2 weeks at any one time.
 - 6. Identify an alternate for CQC System Manager to serve with full authority during the System Manager's absence. The requirements for the alternate will be the same as for designated CQC System Manager.

B. CQC Staff:

1. Designate a CQC staff, available at the Site at all times during progress, with complete authority to take any action necessary to ensure compliance with the Contract. CQC staff members shall be subject to acceptance by Engineer.
2. CQC staff shall take direction from CQC System Manager in matters pertaining to QC.
3. CQC staff must be of sufficient size to ensure adequate QC coverage of Work phases, work shifts, and work crews involved in the construction. These personnel may perform other duties, but must be fully qualified by experience and technical training to perform their assigned QC responsibilities and must be allowed sufficient time to carry out these responsibilities.
4. The actual strength of the CQC staff may vary during any specific Work period to cover the needs of the Project. Add additional staff when necessary for a proper CQC organization.

C. Staff the QC Organization with technically competent personnel with freedom to make decisions without pressure or bias. Provide sufficient authority to ensure that quality requirements are consistently maintained and are independent from that portion responsible for production.

1. The Owner reserves its right to remove from the project either:
 - a. QC staff that demonstrate a lack of ability to make decisions without pressure or bias, or
 - b. Any Contractor personnel who are preventing or influencing the QC staff's freedom to make decisions without pressure or bias.
2. Any time lost or added expense to the project while staff are removed and replaced under this clause shall be non-compensable.

D. Organizational Changes: Obtain Engineer's acceptance before replacing any member of the CQC staff. Requests for changes shall include name, qualifications, duties, and responsibilities of the proposed replacement.

3.04 QUALITY CONTROL PHASING

A. CQC shall include at least three phases of control to be conducted by CQC System Manager for all definable features of Work, as follows:

1. Preparatory Phase:
 - a. Notify Owner at least 48 hours in advance of beginning any of the required action of the preparatory phase.
 - b. This phase shall include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the

- definable feature. The CQC System Manager shall instruct applicable CQC staff as to the acceptable level of workmanship required in order to meet Contract requirements.
- c. Document the results of the preparatory phase meeting by separate minutes prepared by the CQC System Manager and attached to the QC report.
 - d. Perform prior to beginning Work on each definable feature of Work:
 - 1) Review applicable Contract Specifications.
 - 2) Review applicable Contract Drawings.
 - 3) Verify that all materials and/or equipment have been tested, submitted, and approved.
 - 4) Verify that provisions have been made to provide required control inspection and testing.
 - 5) Review Witness and Hold points identified by the Engineer of Record in the Contract Documents or in the CQC plan.
 - 6) Examine the Work area to verify that all required preliminary Work has been completed and is in compliance with the Contract.
 - 7) Perform a physical examination of required materials, equipment, and sample Work to verify that they are on hand, conform to approved Shop Drawing or submitted data, and are properly stored.
 - 8) Review the appropriate activity hazard analysis to verify safety requirements are met.
 - 9) Review procedures for constructing the Work, including repetitive deficiencies.
 - 10) Document construction tolerances and workmanship standards for that phase of the Work.
 - 11) Check to verify that the plan for the Work to be performed, if so required, has been accepted by Engineer.
2. Initial Phase:
- a. Accomplish at the beginning of a definable feature of Work:
 - 1) Notify Owner at least 48 hours in advance of beginning the initial phase.
 - 2) Perform prior to beginning Work on each definable feature of Work:
 - a) Review minutes of the preparatory meeting.
 - b) Check preliminary Work to verify compliance with Contract requirements.
 - c) Verify required control inspection and testing.
 - d) Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Comparison with sample panels is appropriate.
 - e) Resolve all differences.

- f) Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.
 - 3) Separate minutes of this phase shall be prepared by the CQC System Manager and attached to the QC report. Exact location of initial phase shall be indicated for future reference and comparison with follow-up phases.
 - 4) The initial phase should be repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.
- 3. Follow-up Phase:
 - a. Perform daily checks to verify continuing compliance with Contract requirements, including control testing, until completion of the particular feature of Work.
 - b. Daily checks shall be made a matter of record in the CQC documentation and shall document specific results of inspections for all features of Work for the day or shift.
 - c. Conduct final follow-up checks and correct all deficiencies prior to the start of additional features of Work that will be affected by the deficient Work. Constructing upon or concealing nonconforming Work will not be allowed.
- 4. Additional Preparatory and Initial Phases: Additional preparatory and initial phases may be conducted on the same definable features of Work as determined by Owner if the quality of ongoing Work is unacceptable; or if there are changes in the applicable QC staff or in the onsite production supervision or work crew; or if work on a definable feature is resumed after a substantial period of inactivity, or if other problems develop.

3.05 CONTRACTOR QUALITY CONTROL PLAN

A. General:

- 1. Plan shall identify personnel, procedures, control, instructions, test, records, and forms to be used.
- 2. An interim plan for the first 30 days of operation will be considered.
- 3. Construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of Work to be started.
- 4. Work outside of the features of Work included in an accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional features of Work to be started.

5. Plan shall use written QA/QC inspection and test procedures for all operations. Include instructions for performing the required inspection or test, which contain the accept/reject criteria for each inspection or test activity (i.e., applicable drawing, specification section, industry code or standard), establish the frequency for performing the inspection or test, and provide for recording the results of inspections and tests on checklists acceptable to the Owner. Keep these procedures current and available at all locations where inspections and tests are to be performed. Ensure that both QC and QA activities are addressed in the inspection and testing procedures.
6. The CQC Plan shall incorporate all Witness and Hold points identified by the Engineer of Record in the Contract Documents. Witness and Hold points shall be identified in the construction process and the schedule where critical characteristics are to be measured and maintained and at points where it is nearly impossible to determine adequacy of either materials or workmanship once work proceeds past this point. Develop procedures for notification of the Owner for Witness and Hold points.
7. Subcontractors and Suppliers may implement their own SQC program if the program is approved by the Contractor and the Owner. Otherwise the Subcontractor or Supplier will be instructed to implement the Contractor's QC Program on all Work performed and will perform the QC inspections of their Work and activities at their facilities.
8. The plan must maintain control over procurement sources to ensure that materials, equipment and services conform to specified requirements. Procurement documents must require Subcontractors and Suppliers to implement their own SQC Program or require them to implement the CQC Program. Comply fully with manufacturers' instructions, including completing each step in sequence. If the manufacturers' instructions conflict with Contract Documents, then the Contractor shall request clarification from the Owner before proceeding.
9. Establish means and methods for controlling the identification, inspection status, handling, and storage of raw and fabricated material. Maintain these controls from the time of receipt of the material until delivery to the Owner, in order to protect the material from damage, deterioration, loss or substitution.
10. Maintain control over construction and installation processes to assure compliance with specified requirements. Perform in-process and final inspection and testing of construction in accordance with written QA/QC inspection and test procedures to ensure that requirements in the Contract Documents have been met. The Contractor shall utilize the CMIS Platform once it is implemented, including the development of QC inspection and testing forms and reports, such that the program can be implemented, reviewed, monitored real-time, including statistical

- reporting. Record the results of in-process and final inspections on inspection checklists approved by the Owner.
11. Establish and maintain a Quality Assurance Auditing and Nonconformance Recovery Plan for uniform reporting, controlling, correction, disposition and resolution of nonconformance issues (including disputed nonconforming items) that may arise on the project and as required in this Section. The Plan will establish a process for review and disposition of nonconforming material, equipment or other elements of the Work as well as corrective action reporting. The Plan will specifically address recovery measures, such as increased QA and QC testing frequency, the Contractor will undertake to achieve the desired quality Work product.
 12. The CQC and SQC Programs are subject to periodic audit by the Owner to assure compliance with the Contract Documents.

B. Content:

1. Plan shall cover the intended CQC organization for the entire Contract and shall include the following, as a minimum:
 - a. Organization: Description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff will implement the three-phase control system (see Paragraph QC Phasing) for all aspects of the Work specified.
 - b. CQC Staff: The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a QC function.
 - c. Letters of Authority: A copy of a letter to the CQC System Manager signed by an authorized official of the firm, describing the responsibilities and delegating sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop Work which is not in compliance with the Contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities and responsibilities. Copies of these letters will also be furnished to Owner.
 - d. Record Document: Procedures to track revisions to the Contract Documents made via design change notice, RFI, Work Change, Directive, Field Order or Change Order to the Contract Drawings or Specifications. Procedure shall address version control and distribution, including the removal of outdated documents from circulation.
 - e. Submittals: Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers and purchasing agents.

- f. Document Control: Procedures for managing, tracking, organizing, distributing, and retaining QC documentation
 - g. Testing: Control, verification and acceptance testing procedures for each specific test to include the test name, frequency, specification paragraph containing the test requirements, the personnel and laboratory responsible for each type of test, and an estimate of the number of tests required.
 - h. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests, including documentation.
 - i. Procedures for tracking deficiencies from identification through acceptable corrective action. These procedures will establish verification that identified deficiencies have been corrected.
 - j. Reporting procedures, including proposed reporting formats; include a copy of the CQC report form.
- C. Acceptance of Plans: Acceptance of the Contractor's basic and addendum CQC plans is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. Owner reserves the right to require Contractor to make changes in the CQC plan and operations including removal of personnel, as necessary, to obtain the quality specified.
- D. Notification of Changes: After acceptance of the CQC plan, Contractor shall notify Engineer, in writing, a minimum of 7 calendar days prior to any proposed change. Proposed changes are subject to acceptance by Engineer.

3.06 CONTRACTOR QUALITY CONTROL REPORT

- A. As a minimum, prepare a weekly CQC report for every 7 calendar days. Account for all days throughout the life of the Contract. Reports shall be signed and dated by CQC System Manager. Include copies of test reports and copies of reports prepared by QC staff.
- B. Maintain current records of quality control operations, activities, and tests performed, including the Work of subcontractors and suppliers.
- C. Records shall be on an acceptable form and shall be a complete description of inspections, the results of inspections, daily activities, tests, and other items, including but not limited to the following:
 - 1. Contractor/subcontractor and their areas of responsibility.
 - 2. Operating plant/equipment with hours worked, idle, or down for repair.
 - 3. Work performed today, giving location, description, and by whom. When a network schedule is used, identify each phase of Work performed each day by activity number.

4. Test and/or control activities performed with results and references to specifications/plan requirements. The control phase should be identified (Preparatory, Initial, and Follow-up). List deficiencies noted along with corrective action.
5. Material received with statement as to its acceptability and storage.
6. Identify submittals reviewed, with Contract reference, by whom, and action taken.
7. Offsite surveillance activities, including actions taken.
8. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
9. List instructions given/received and conflicts in Drawings and/or Specifications.
10. Contractor's verification statement.
11. Indicate a description of trades working on the Project; the number of personnel working; weather conditions encountered; and any delays encountered.
12. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in file work and workmanship comply with the Contract.

3.07 SUBMITTAL QUALITY CONTROL

- A. Submittals shall be as specified in Section 01 33 00, Submittal Procedures. The CQC organization shall be responsible for certifying that all submittals are in compliance with the Contract requirements. Owner will furnish copies of test report forms upon request by Contractor. Contractor may use other forms as approved.

3.08 TESTING QUALITY CONTROL

- A. Provide all labor, equipment, and apparatus necessary for QC inspection and testing of the civil, structural, architectural, mechanical and electrical features/equipment/systems, and all other elements of Work as required by the Contract Documents and any applicable permits and codes.
- B. Conduct testing, monitoring or inspection necessary for the progress and control of Work. Do not rely upon conformance inspection, testing or monitoring conducted by the Owner for progress and control of Work. Replace nonconforming Work.
- C. Daily Reports. The Contractor shall make a daily written and verbal report to the Owner's designated representative advising of the status of the Work, the prior day's accomplishments, activity planned for the current day and for at least two subsequent days, and any problems or delays that may be anticipated.

D. Testing Procedure:

1. Perform tests specified or required to verify that control measures are adequate to provide a product which conforms to Contract requirements. Perform the following activities and record the following data:
 - a. Verify testing procedures comply with contract requirements.
 - b. Verify facilities and testing equipment are available and comply with testing standards.
 - c. Check test instrument calibration data against certified standards.
 - d. Verify recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.
 - e. Documentation:
 - 1) Record results of all tests taken, both passing and failing, on the CQC report for the date taken.
 - 2) Include specification paragraph reference, location where tests were taken, and the sequential control number identifying the test.
 - 3) Actual test reports may be submitted later, if approved by Engineer, with a reference to the test number and date taken.
 - 4) Provide directly to Engineer an information copy of tests performed by an offsite or commercial test facility. Test results shall be signed by an engineer registered in the state where the tests are performed.
 - 5) Failure to submit timely test reports, as stated, may result in nonpayment for related Work performed and disapproval of the test facility for this Contract.

- E. Testing Laboratories: Laboratory facilities, including personnel and equipment, utilized for testing soils, concrete, asphalt and steel shall meet criteria detailed in ASTM D3740 and ASTM E329, and be accredited by the American Association of Laboratory Accreditation (AALA), National Institute of Standards and Technology (NIST), National Voluntary Laboratory Accreditation Program (NVLAP), the American Association of State Highway and Transportation Officials (AASHTO), or other approved national accreditation authority. Personnel performing concrete testing shall be certified by the American Concrete Institute (ACI).

3.09 COMPLETION INSPECTION

- A. CQC System Manager shall conduct an inspection of the Work at the completion of all Work or any milestone established by a completion time stated in the Contract.

B. Punchlist:

1. CQC System Manager shall develop a punchlist of items which do not conform to the Contract requirements.
2. Include punchlist in the CQC report, indicating the estimated date by which the deficiencies will be corrected.
3. CQC System Manager or staff shall make a second inspection to ascertain that all deficiencies have been corrected and so notify the Owner.
4. These inspections and any deficiency corrections required will be accomplished within the time stated for completion of the entire Work or any particular increment thereof if the Project is divided into increments by separate completion dates.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 45 33

SPECIAL INSPECTION, OBSERVATION, AND TESTING

PART 1 GENERAL

1.01 SUMMARY

- A. This section covers requirements for Special Inspection, Observation, and Testing required in accordance with Chapter 17 of the 2015 IBC and is in addition to and supplements requirements included in Statement of Special Inspections shown on Drawings.

1.02 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
 - 1. American Society of Civil Engineers (ASCE): 7, Minimum Design Loads for Buildings and Other Structures.
 - 2. International Code Council (ICC):
 - a. 2015 International Building Code (IBC).
 - b. Evaluation Service (ICC-ES) Reports and Legacy Reports.
 - c. Commonwealth of Virginia Statewide Building Code

1.03 DEFINITIONS

- A. Agencies and Personnel:
 - 1. Agency Having Jurisdiction (AHJ): Permitting building agency; may be a federal, state, local, or other regional department, or individual including building official, fire chief, fire marshal, chief of a fire prevention bureau, labor department, or health department, electrical inspector; or others having statutory authority. AHJ may be Owner when authorized to be self-permitting by governmental permitting agency or when no governmental agency has authority.
 - 2. Approved Agency: An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved.
 - 3. Registered Design Professional in Responsible Charge: An individual who is registered or licensed to practice their respective design profession as defined by statutory requirements of professional registration laws of state or jurisdiction in which Project is to be constructed.
 - 4. Special Inspector: Qualified person employed by Owner who will demonstrate competence to the satisfaction of AHJ for inspection of a particular type of construction or operation requiring Special Inspection.

- B. Statement of Special Inspections: Detailed written procedure contained on Drawings establishing systems and components subject to Special Inspection, Observation, and Testing during construction, type and frequency of testing, extent and duration of Special Inspection, and reports to be completed and distributed by Special Inspector.
- C. Special Inspection:
 - 1. Special Inspection: Inspection required of materials, installation, fabrication, erection, or placement of components and connections requiring special expertise to ensure compliance with approved Contract Documents and referenced standards.
 - 2. Special Inspection, Periodic: Part-time or intermittent observation of the Work requiring Special Inspection by an approved Special Inspector who is present in area where the Work has been or is being performed, and at completion of the Work.
- D. Structural Systems and Components:
 - 1. Diaphragm: Component of structural lateral load resisting system consisting of roof, floor, or other membrane or bracing system acting to transfer lateral forces to vertical resisting elements of structure.
 - 2. Drag Strut or Collector: Component of structural lateral load resisting system consisting of diaphragm or shear wall element that collects and transfers diaphragm shear forces to vertical force-resisting elements or distributes forces within diaphragm or shear wall.
 - 3. Seismic-Force-Resisting System: That part of structural lateral load resisting system that has been considered in the design to provide required resistance to seismic forces identified on Drawings.
 - 4. Shear Wall: Component of structural lateral load resisting system consisting of a wall designed to resist lateral forces parallel to plane of the wall. Unless noted otherwise on Drawings, load-bearing walls with direct in-plane connections to roof and floors shall be considered to be shear walls.
 - 5. Wind Force Resisting System: That part of the structural system that has been considered in the design to provide required resistance to wind forces identified on Drawings.
- E. Nonstructural Components:
 - 1. Architectural Component Supports: Structural members or assemblies of members which transmit loads and forces from architectural systems or components to structure, including braces, frames, struts, and attachments.

2. Electrical Component Supports: Structural members or assemblies which transmit loads and forces from electrical equipment to structure, including braces, frames, legs, pedestals, and tethers, as well as elements forged or cast as part of component for anchorage.
3. Mechanical and plumbing Component Supports: Structural members or assemblies which transmit loads and forces from mechanical and plumbing equipment to structure, including braces, frames, skirts, legs, saddles, pedestals, snubbers, and tethers, as well as elements forged or cast as part of component for anchorage.

F. Professional Observation:

1. Does not include or waive responsibility for required Special Inspection or inspections by building official.
2. City of Alexandria requirements and those indicated on Statement of Special Inspections (Plan) provided on Drawings.
3. Geotechnical Observation: Visual observation of selected subgrade bearing surfaces and installation of deep foundation elements by a registered design professional for general conformance to Contract Documents.
4. Structural Observation: Visual observation of structural system(s) by a registered design professional for general conformance to Contract Documents.
5. Statement of Special Inspections (Plan): Detailed written procedure contained on Drawings establishing systems and components subject to Special Inspection and Testing during construction, type and frequency of testing, extent and duration of Special Inspection, and reports to be completed and distributed by Special Inspector.

1.04 STATEMENT OF SPECIAL INSPECTIONS REQUIREMENTS

A. Designated Systems for Inspection:

1. Seismic-force-resisting systems designated under IBC Section 1705 and subject to Special Inspection under Section 1705: None required.
2. Wind-force-resisting systems designated under IBC Section 1705: None required.
3. Architectural, Mechanical, and Electrical Components subject to Special Inspection under IBC Section 1705.11.5, 1705.11.6, and 1705.12 for Seismic Resistance: None required.

B. Statement of Special Inspections:

1. As included in Drawings and in support of building permit application, Project-specific requirements were prepared by Registered Design Professional in Responsible Charge. The following identifies elements

- of inspection, observation, and testing program to be followed in construction of the Work:
- a. Special Inspection and testing required by IBC Section 1704 and Section 1708 and other applicable sections and referenced standards therein.
 - b. Type and frequency of Special Inspection required.
 - c. Type and frequency of testing required.
 - d. Required frequency and distribution of testing and Special Inspection reports to be distributed by Special Inspector to Engineer, Contractor, building official, and Owner.
 - e. Geotechnical Observation to be Performed: Required frequency and distribution of Geotechnical Observation reports by registered design professional to Contractor, building official, and Owner.
 - f. Structural Observations to be Performed: Not required for this Project.
- C. Special Inspection and associated testing of shop fabrication and field construction will be performed by an approved accredited independent agency or by Authority Having Jurisdiction's (AHJ) approved, qualified inspection staff. Owner's Representative in responsible charge will secure and pay for services of agency to perform Special Inspection and associated testing.
- D. Code required Special Inspection with associated testing and Professional Observation, as provided in Statement of Special Inspections on Drawings and further provided in this section, is for benefit of Owner and does not:
- 1. Relieve Contractor of responsibility for providing adequate quality control measures.
 - 2. Relieve Contractor of responsibility for damage to or loss of material before acceptance.
 - 3. Constitute or imply acceptance.
 - 4. Affect continuing rights of Owner after acceptance of completed Work.
- E. The presence or absence of code required Special Inspector does not relieve Contractor from Contract requirements.
- F. Contractor is responsible for additional costs associated with Special Inspection and Testing when Work is not ready at time identified by Contractor and Special Inspectors are onsite, but not able to provide contracted services.
- G. Contractor is responsible for associated costs for additional Special Inspection and Testing by Special Inspectors required because of rejection of materials of in place Work that cannot be made compliant to Contract Document without additional inspections and testing.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

- A. Requirements of the Statement of Special Inspections are provided by the Owner. All other testing and inspections, unless noted otherwise, are provided by Contractor.
- B. Provide access to shop or Site for Special Inspection and Testing requirements.
- C. Notify Engineer in advance of required Special Inspection no later than 48 hours prior to date of Special Inspection.
- D. Provide access for Special Inspector to construction documents.
- E. Retain special inspection records on-site to be readily available for review.
- F. Cooperate with Special Inspector and provide safe access to the Work to be inspected.
- G. Provide reasonable auxiliary services as requested by the Special Inspector. Auxiliary services required include, but not limited to:
 - 1. Providing access to the Work and furnishing incidental labor and facilities necessary to facilitate inspections and tests to assist the Special Inspector in performing test/inspections.
 - 2. Providing storage space for the Special Inspector's exclusive use, such as for storing and curing concrete test samples and delivery of samples to testing laboratories.
 - 3. Providing the Special Inspector with access to all approved submittals.
 - 4. Providing security and protection of samples and test equipment at the Project Site.
 - 5. Provide samples of materials to be tested in required quantities.
- H. Materials and systems shall be inspected during placement where Continuous Special Inspection is required.
- I. Where Periodic Special Inspection is indicated in the Statement of Special Inspections:
 - 1. Schedule inspections for either during or at completion of their placement or a combination or both.

2. Schedule periodically inspected Work (either inspected during or after its placement) so that corrections can be completed and re-inspected before Work is inaccessible.
3. Sampling a portion of the Work is not allowed. Schedules shall provide for inspection of all Work requiring periodic inspection.

END OF SECTION

SECTION 01 52 00 CONTRACTOR FACILITIES

PART 1 GENERAL

1.01 SUMMARY

- A. Work specified in this section includes but is not limited to office and parking spaces assigned in the Contractor and Engineer Administration Field Office Complex, and other temporary field offices, temporary storage units, power, water, heating, cooling, ventilation, sanitary facilities, fire protection, barriers and enclosures, and easements and rights of way.

1.02 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
 - 1. National Fire Prevention Association (NFPA): 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations.
 - 2. VOSH, Virginia Occupational Safety and Health Program.

1.03 SUBMITTALS

- A. Informational Submittals:
 - 1. Copies of the Contract Limits and Construction Access Plan that shall be posted in the construction trailer and given to each subcontractor before they commence work.
 - 2. Temporary Construction Submittals, as applicable:
 - a. Contractor's field offices, storage yard, and storage building plans, including gravel surfaced area.
 - b. Electric power supply and distribution plans.
 - c. Water supply and distribution plans.
 - d. Drainage plans.
 - e. Dewatering well locations.
 - f. Sanitary facilities.
 - g. Fencing and protective barrier locations and details.
 - h. Staging area location plan.
 - i. Construction Dewatering Plans: Including site plan of treatment, storage, and disposal facilities showing fencing, tanks, pumps, pipelines and other related items.

1.04 GENERAL

- A. Contractor shall maintain temporary field offices near the work for his own use during the period of construction at which readily accessible copies of all Contract documents, including approved transmittals, shall be kept.
- B. NOT USED
- C. The Contractor is responsible to furnish and install any other storage units or field offices that they may require for their workers, materials or equipment. The location of any added offices/storage units shall be located within the Contractor's assigned staging areas where it will neither interfere with the progress of the work nor with plant operations and shall be subject to AlexRenew's approval. Furthermore, use in the vicinity of the Dominion Energy transmission lines shall be subject to the permit restrictions specified in the Contract Documents.
- D. NOT USED
- E. Furnish, install and maintain all temporary utilities required for the Work, except as allowed herein, and remove upon completion of Work.
- F. Furnish, install and maintain all construction aids required for the Work, except as allowed herein, and remove upon completion of Work.
- G. Furnish, install and maintain fences and barriers as required for protection of the public, property and Work.
- H. Provide storage sheds as required for storage of materials and equipment.
- I. Provide site security plan per Section 01 15 20, Construction Security.
- J. Contractor shall obtain and pay all costs, fees, etc. for fit-out and maintenance of the AlexRenew assigned temporary field office complex.
- K. Contractor shall obtain and pay all costs, fees, etc. for the hauling, building, setting, maintaining, permitting, connecting and removal of the any added temporary field trailer/storage/shed unit.

1.05 MOBILIZATION

- A. Mobilization includes, but is not limited to, these principal items:
 - 1. Obtaining required permits.
 - 2. Moving Contractor's field office and equipment required for first month operations onto Site.

3. Installing temporary construction power, wiring, and lighting facilities.
4. Providing onsite Internet service and telephones.
5. Providing onsite sanitary facilities and potable water facilities as specified and as required by Laws and Regulations, and governing agencies.
6. Arranging for and erection of Contractor's work and storage yard.
7. Posting VOSH required notices and establishing safety programs and procedures.
8. Having Contractor's superintendent at Site full time.

- B. Use area designated for Contractor's temporary facilities as shown on Drawings.

1.06 CONTRACTOR-ASSIGNED FIELD OFFICE

- A. NOT USED.

1.07 TEMPORARY POWER

- A. NOT USED

- B. Contractor shall arrange for and pay all costs associated with temporary power service either from the local utility and/or portable engine-generator for any of their other trailers/storage units/staging areas.

- C. Contractor shall pay all costs for installation and removal of service and power used which is not incorporated into permanent power system.

- D. Temporary electrical work shall meet the requirements of the National Electric Code and utility's requirements.

- E. Connection to existing infrastructure:

1. Convenience outlets are located throughout existing buildings and existing processing facilities and may be utilized by the Contractor for incidental small 120-volt appliances and hand tools.
2. Additional power may be obtained from motor control centers and power distribution panel boards located within some buildings and facilities with the approval of the Owner.
3. The Contractor shall furnish and install a KWH meter acceptable to the Owner for all temporary electrical service. Where no spare circuit breakers are available or the Contractor can add none, the Contractor may be allowed to tap the bus with the Owner's approval. The Contractor shall furnish and install all equipment including disconnects, circuit breakers, overload devices, ground fault protection, transformers

- and panel boards necessary to install and utilize the source in accordance with the NEC and City of Alexandria Electrical Code.
4. All requests to utilize the Owner's electrical distribution system shall be in writing and shall include detailed plans for approval by the Owner. The Owner at no expense to the Contractor will furnish the electrical energy from the power sources described herein. However, at no time shall the total load from all sources exceed 100 kVA or 120 amp at 480V, 3-phase.
 5. The Owner does not guarantee that the power from such sources will be continuous nor does the Owner warrant the condition of the power equipment or the power characteristics.
 6. Power sources of sufficient characteristics and capacity may not be available at all work areas. The Contractor shall be responsible for the transmission of power to all work areas from approved sources.
 7. The Contractor shall furnish and install all cables, wiring, extensions cords, connections, outlets, switches, lamps, fuses, controls, accessories and incidentals necessary to utilize and distribute power as required.
 8. Cable shall be mounted on poles that do not interfere with any construction or the Owner operations. Before installing such equipment, the Contractor shall submit detailed plans for approval by the Owner.
 9. The Contractor shall provide sufficient temporary electrical lighting at all work areas where there is not sufficient light from any permanent lighting system.
 10. The Contractor shall exercise care in his operations to prevent damage to the Owner's electrical equipment. All such damage shall be repaired, or the equipment replaced, at the sole expense of the Contractor.
 11. The Contractor shall stop using a power hookup if his activities cause an overload or impact operation of online facilities.
 12. All costs for temporary construction power and lighting shall be at the sole expense of the Contractor including all power sources and requirements above those described herein.
 13. The Contractor shall remove all temporary power connections at the conclusion of the project and existing equipment shall be restored to the condition prior to construction at no additional cost to the Owner.

1.08 TEMPORARY LIGHTING

- A. Provide lighting that meets or exceeds VOSH requirements.
- B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails and lamps as required. All lighting circuits shall include a ground wire.
- C. Maintain lighting and provide routine repairs.

- D. Permanent building lighting may be utilized during construction.

1.09 TEMPORARY HEAT, COOLING AND VENTILATION

- A. Contractor shall provide temporary heat, cooling and ventilation as required to maintain adequate environmental conditions to facilitate progress of the Work, to meet specified minimum conditions for the installation of materials, and to protect materials and finishes from damage due to temperature or humidity.
- B. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- C. Provide and pay for devices and operate them as required to maintain specified conditions for construction operations.
- D. Contractor shall pay all costs of installation, maintenance, operation, removal and for fuel and power consumed.

1.10 TEMPORARY TELEPHONE AND HIGH-SPEED INTERNET SERVICE

- A. NOT USED.

1.11 TEMPORARY WATER SUPPLY

- A. Provide service required for construction operations. Extend branch piping with outlets located so that water is available by use of hoses.
- B. Contractor shall provide all drinking water required by construction personnel.
- C. All items installed in the project that are indirectly or directly in contact with potable water are to comply with National Sanitation Foundation (NSF) Standards.
- D. Contractor shall pay all costs for the installation, maintaining, and removal of service at the completion of construction.
- E. Contractor shall pay utility company directly for all charges, unless waived by AlexRenew.
- F. Work in Owner WRRF or Remote Facilities:
 - 1. The Contractor shall obtain a permit from a City of Alexandria Code permit (Monday through Friday, 8:00 a.m. to 5:00 p.m.) and coordinate with the Virginia-American Water Company (VAWC) Operations Department, telephone number 703-706-3870 between the hours of 7 a.m. and 3:30 p.m. to use potable water for construction purposes

- from public hydrants or to connect to the water system with a temporary tap.
2. If the Owner determines that fire hydrant water may be used, the Contractor will be charged the current fire hydrant use charge per working day.
 3. If the Owner determines a temporary water main tap is required, the Contractor shall excavate a pit for a tap as directed, excavate the trench and install water service piping.
 4. A temporary water tap requires the payment of the current water tap fee plus the additional fee for the water tap removal, the Owner will make the tap and will furnish and install a meter at no additional cost to the Contractor.
 5. At completion of the Contract, the Contractor shall excavate and remove Contractor water service piping and provide excavation necessary for the meter and tap removal by the Owner. After the Owner has completed the removals the Contractor shall backfill and restore the area.
 6. The Owner will keep an account for direct payment by the Contractor of water and sewer charges.
 7. The Owner will provide a meter on water services to the Contractor's Field Office and the Engineer's Facilities (field office). The Contractor will not be charged for this water usage.

1.12 TEMPORARY SANITARY FACILITIES

- A. Contractor shall provide sanitary facilities:
1. As required by laws and regulations.
 2. Not less than one facility.
 3. Not less than one facility for every 25 employees of Contractor and subcontractor at the site.
- B. Contractor shall service, clean and maintain facilities and enclosures.
- C. Contractor shall pay all costs associated with the installation, maintain and removal of facilities and enclosures.
- D. Use of Owner's existing sanitary facilities by construction personnel will not be allowed.

1.13 TEMPORARY FIRE PROTECTION

- A. Observe and enforce throughout the work all requirements of the City of Alexandria, Local, State and Insurance authorities to minimize fire hazards.
- B. Remove combustible refuse from within each building daily.

- C. Provide fire extinguishers as required by the local fire department and city ordinances.

1.14 BARRIERS

- A. Provide as required to control access to active construction areas and to protect existing facilities and adjacent properties from damage from construction operations.
- B. Provide 6-foot high commercial grade chain link fence around storage areas; equip with vehicular and pedestrian on outside gates with locks.
- C. Provide barricades and covered walkways as required by governing authorities for public rights of way and for public access to existing building.
- D. Provide barriers around trees and plants designated to remain. Protect against vehicular traffic, stored materials, dumping, chemically injurious materials, and ponding or continuous running water. Protect from staining on trunk and branches. Do not disturb existing soil at base or within drip line in any manner.

1.15 ENCLOSURES

- A. Provide temporary weather tight closures of openings in exterior surfaces to provide acceptable working conditions and protection for materials, to allow for temporary heating, and to prevent entry of unauthorized persons. Provide doors with self-closing hardware and locks.
- B. Provide temporary partitions and ceilings as required to separate work areas from AlexRenew occupied areas, to prevent penetration of dust and moisture into AlexRenew occupied areas, to prevent damage to existing areas and equipment. Construction: Framing and sheet materials with closed joints and sealed edges at intersections with existing surfaces; Flame Spread Rating of 25 in accordance with ASTM E84; paint surfaces exposed to view in AlexRenew occupied areas.

1.16 PROTECTION OF INSTALLED WORK

- A. Provide temporary protection for installed products. Control traffic in immediate area to minimize damage.
- B. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings. Protect finished floors and stairs from traffic, movement of heavy objects, and storage.

- C. Prohibit traffic and storage on waterproofed and roofed surfaces, on lawn and landscaped areas.

1.17 SECURITY

- A. Per Section 01 15 20, Construction Security.

1.18 PARKING

- A. Per Section 01 55 00, Vehicular Access and Parking.
- B. Provide temporary surface parking areas to accommodate construction personnel.
- C. When site space is not adequate, provide additional off-site parking and shuttle transportation.

1.19 WATER CONTROL

- A. Grade site to drain. Maintain excavations free of water. Provide and operate pumping equipment.
- B. Protect site from ponding or running water.

1.20 PROGRESS CLEANING

- A. Per Section 01 74 00, Cleaning.
- B. Maintain areas free of waste materials, debris and rubbish. Maintain site in a clean and orderly condition.
- C. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- D. Broom and vacuum clean interior areas prior to start of surface finishing and continue cleaning to eliminate dust.
- E. Remove waste materials, debris and rubbish from site weekly and dispose off-site.
- F. Wet down exterior surfaces prior to sweeping to prevent blowing of dust and debris. At least weekly, sweep all floors (basins, tunnels, platforms, walkways, roof surfaces), and pick up all debris and dispose.
- G. At least weekly, brush sweep entry drive, roadways, and all other streets and walkways affected by the Work and where adjacent to the Work.

1.21 ADDED FIELD OFFICES AND SHEDS

A. Additional Field Trailers for Workers, if needed:

1. All trailers shall be anchored by a tie down system that meets or exceeds building codes.
2. Fire Extinguishers, Smoke and Fire alarms shall be properly installed and maintained.
3. Contractor shall provide documentation of a benefit of occupancy inspection of all trailers to AlexRenew Department of Occupational Safety and Health.
4. Contractor shall post emergency evacuation map, primary and secondary assembly locations.
5. Provide signage of the location of all utilities into the trailer.
6. A sign shall be mounted on the trailer or building that shows:
 - a. Company Name.
 - b. Emergency Point of Contact.
 - c. 24-hour Emergency Telephone Number.

B. Storage Sheds for Tools, Materials, and Equipment: Weather tight, with heat and ventilation for Products requiring controlled conditions, with adequate space for organized storage and access, and lighting for inspection of stored materials.

1.22 TEMPORARY EASEMENT AND RIGHTS-OF-WAY

- A. The Contractor shall be responsible for providing, without expense or liability to AlexRenew, any additional land and access thereto that the Contractor may desire for temporary construction facilities, storage of materials, or other Contractor needs.
- B. Before using any private property, whether adjoining the work or not, the Contractor shall file with AlexRenew a written permission of the private property owner, and, upon vacating the premises, a written release from the property owner of each property disturbed or otherwise interfered with by reasons of construction pursued under this contract.
- C. The Statement shall be signed by the private property owner, or proper authority acting for the owner of the private property affected, stating that permission has been granted to use the property and all necessary permits have been obtained or, in the case of a release, that the restoration of the property has been satisfactorily accomplished.
- D. The statement shall include the parcel number, address, and date of signature.

- E. Written releases must be filed with AlexRenew before the Completion Date will be established.

1.23 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary materials, equipment, services, and construction prior to Substantial Completion inspection.
- B. Clean and repair damage caused by installation or use of temporary facilities. Remove underground installations to a depth of 2 feet; grade site as indicated. Restore existing facilities used during construction as specified, or to original, condition.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

- A. Maintain and operate systems to assure continuous service.
- B. Modify and extend systems as work progress requires.
- C. Keep all construction vehicles, equipment, trailers and machinery clear of the fire lanes and fire hydrants. Ensure that deliveries of equipment or supplies in the fire lanes are quickly unloaded and the vehicles moved as soon as possible.

3.02 CONTRACTOR FIELD OFFICES

- A. Contractor shall provide weekly janitorial service, removal of waste (daily), and security until the field office is reassigned to the Owner.
- B. Contractor shall provide weekly janitorial service, removal of waste (daily), and security until the field office is reassigned to the Owner, or demobilized.
- C. Regular operation and maintenance of the HVAC system must be performed as suggested by the manufacturer.
- D. Meet requirements specified in Section 01 33 29, Sustainable Construction and Reporting.

3.03 STORAGE YARDS AND BUILDINGS

- A. Coordinate storage requirements with Section 01 61 00, Common Product Requirements.

- B. Temporary Storage Yards: Construct temporary storage yards for storage of products that are not subject to damage by weather conditions within the Contractor's storage and administration area, as shown on the Drawings.
- C. Temporary Storage Buildings:
 - 1. Provide environmental control systems that meet recommendations of manufacturers of equipment and materials stored.
 - 2. Arrange or partition to provide security of contents and ready access for inspection and inventory.
 - 3. Store combustible materials (paints, solvents, fuels) in a well-ventilated and remote building meeting safety standards.

3.04 STAGING AREAS

- A. The staging area for the Contractor is shown on the Drawings.

3.05 TEMPORARY UTILITIES

- A. Power: Electric power will be available as shown. Determine type and amount available and make arrangements for obtaining temporary electric power service, metering equipment, and pay costs for electric power used during Contract period, except for portions of the Work designated in writing by Engineer as substantially complete.
- B. Lighting: Provide temporary lighting to meet applicable safety requirements to allow erection, application, or installation of materials and equipment, and observation or inspection of the Work, and all normal routine plant and operations maintenance.
 - 1. Follow manufacturer's guidelines for positioning of floodlights.
 - 2. Install and use lights only where needed to reduce light pollution. All lighting requirements established by VOSH and needed for health and safety must be followed.
 - 3. Utilize motion sensors for security lighting outside of construction zones.
- C. Heating, Cooling, and Ventilating:
 - 1. Sequence construction such that new heating, cooling, and ventilating equipment is installed and functional prior to installation of sensitive electrical, instrumentation, and other equipment.
 - 2. Provide as required to maintain adequate environmental conditions to facilitate progress of the Work, to meet specified minimum conditions for installation of materials, and to protect materials, equipment, and finishes from damage because of temperature or humidity. Costs for

temporary heat shall be borne by Contractor responsible for constructing structure or building as specified in Section 01 11 00, Summary of Work.

3. Provide adequate forced air ventilation of enclosed areas to cure installed materials, to dispense humidity, and to prevent hazardous accumulations of dust, fumes, vapors, or gases.
4. Pay costs of installation, maintenance, operation, removal, and fuel consumed.
5. Provide portable unit heaters, complete with controls, electric-, oil-, or gas-fired, and suitably vented to outside as required for protection of health and property. Use of electric-fired units is encouraged.
6. If permanent natural gas piping is used for temporary heating units, do not modify or reroute gas piping without approval of utility company. Provide separate gas metering as required by utility.

D. Water:

1. Hydrant Water:
 - a. Is available from nearby hydrants. Secure written permission for connection and use from water department and meet requirements for use. Install an acceptable metering device and pay Virginia American Water for water used at the prevailing rates of the utility provider. Notify fire department before obtaining water from fire hydrants.
 - b. Use only special hydrant-operating wrenches to open hydrants. Make certain hydrant valve is open full, since cracking valve causes damage to hydrant. Repair damaged hydrants and notify appropriate agency as quickly as possible. Hydrants shall be completely accessible to fire department at all times.
2. Contractor will provide a place of temporary connection for drinking water at Site. Provide temporary facilities and piping required to bring water to point(s) of use and remove when no longer needed. Install an acceptable metering device and pay for water used at the prevailing rates of the utility provider.
3. Provide a means to prevent water used for testing from flowing back into source pipeline.

E. Sanitary and Personnel Facilities:

1. Provide and maintain facilities for Contractor's employees, Subcontractors, and other onsite employers' employees. Service, clean, and maintain facilities and enclosures.
2. Use of Owner's existing sanitary facilities by construction personnel will not be allowed.

- F. Fire Protection: Furnish and maintain on Site adequate firefighting equipment capable of extinguishing incipient fires. Comply with applicable parts of NFPA 241.

3.06 CONSTRUCTION AIDS

- A. Contractor shall relocate construction aids as required by progress of construction, by storage or work requirements, and to accommodate legitimate requirements of AlexRenew.
- B. Contractor shall completely remove temporary materials, equipment and services at completion of the project.
- C. Contractor shall clean and repair damages caused by installation or by use of temporary facilities.
 - 1. Remove foundations and underground installations for construction aids.
 - 2. Grade the areas of the site affected by temporary installations to required elevations and slopes and clean the area.

3.07 BARRIERS

- A. Contractor shall install facilities with a neat and uniform appearance, structurally adequate for the required purposes.
- B. Contractor shall completely remove barriers, including foundations, when construction has progressed to the point that they are no longer needed or required.
- C. Contractor shall clean and repair damage caused by installation, fill and grade the areas of the site to required elevations and slopes and clean the area.

3.08 FIELD SANITARY FACILITIES

- A. The Contractor, from the commencement of the job, shall provide sufficient sanitary toilet room facilities for the use of all personnel on the job.
- B. The facilities shall be kept in sanitary condition, and at the completion of the job shall be cleaned out and removed.
- C. The sanitary facilities shall conform to AlexRenew requirements. The Contractor shall prohibit and prevent the committing of nuisances by his employees on the work site.

- D. The Contractor and Subcontractor personnel shall not use AlexRenew toilet facilities

3.09 DEMOBILIZATION FROM THE AUTHORITY ASSIGNED FIELD OFFICE

- A. NOT USED.

END OF SECTION

SECTION 01 54 50 CONSTRUCTION SAFETY

PART 1 GENERAL

1.1 SUMMARY

- A. Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the work. The specified safety provisions are the minimum requirements. Take all additional necessary precautions for the safety of, and provide the necessary protection to prevent damage, injury or loss to:
 - 1. All employees on the Work and other persons who may be affected thereby;
 - 2. All the Work and all materials or equipment to be incorporated therein, whether in storage on or off the sites; and
 - 3. Other property at the sites or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.
- B. Comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss. Erect and maintain, as required by the conditions and progress of the Work, all necessary safeguards for its safety and protection. Notify owners of adjacent utilities when prosecution of the Work may affect them. All damage, injury or loss to any property caused directly or indirectly, in whole or part, by Contractor, any Subcontractor or anyone directly or indirectly employed by any of them 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 the Owner or Design Professional Engineer or anyone employed by either of them or anyone for whose acts either of them may be liable, and not attribute, directly or indirectly, in whole or in part, to the fault or negligence of Contractor. Contractor's duties and responsibilities for the safety and protection of the Work shall continue until Substantial Completion.
- C. Comply with the current CDC, State, local and Owner COVID requirements. Where there is a conflict in these standards, the most stringent requirement shall be applied.
- D. Comply with Contractor's and Subcontractor's Insurance Requirements.
- E. All work shall conform to the requirements of the Occupational Safety and Health Act (OSHA) and the requirements under the Virginia Occupational Safety and Health (VOSH) program. Any reference to OSHA 1910 or 1926 requirements shall also be considered a reference to VOSH 1910 or 1926.

- F. No section or description in these documents shall be construed to replace, modify or supersede requirements of other codes, specifications and/or ordinances referenced throughout the document. If a conflict occurs between the referenced regulations and these documents, the more stringent shall govern.
- G. Address the AlexRenew Safety & Health Standard Operating Procedures (see Attachment 1) in your safety program as it relates to interfacing with the Plant.

1.2 SPECIFIC REQUIREMENTS

A. Contractor's Site Safety Officer:

The Contractor shall be responsible for the safety of the Contractor's employees, Owner's personnel, and all other personnel at the sites of the Work. The Contractor shall designate a competent Site Safety Officer(s) who shall be responsible for the supervision of the project safety requirements. The Site Safety Officer(s) shall be on the job at all times while work is in progress.

The Contractor Site Safety Officer(s), in addition to meeting the requirements of "Qualified Person" as defined by OSHA, must also meet the requirements specified in the Construction Safety & Health Manual for Contractors (see Attachment 1). A resume must be provided and accepted by the Owner prior to the start of work. The Backup Safety Person should be equally credentialed, depending on job complexity, size and any other pertinent factors.

The Site Safety Officer sole responsibility and duties shall be project safety, unless the total bid price is less than \$25M, in which case, the Site Safety Officer(s) may be assigned to other duties, provided these duties do not impact his ability to perform the requirements of the Site Safety Officer, unless otherwise specified.

The Site Safety Officer(s) shall be provided with an appropriate office at the Contractor's office facility at the Plant site to maintain and keep available safety records and up-to-date copies of all pertinent safety rules and regulations; and to maintain adequate supplies of safety equipment.

1. As a minimum, the Contractor shall provide a Site Safety Officer who is trained in accident prevention and first aid and certified in cardiopulmonary resuscitation (CPR).
2. The Contractor's Site Safety Officer shall:
 - a. Be completely familiar with all applicable health and safety requirements of all governing legislation and ensure compliance with same.
 - b. Be experienced in heavy construction safety programs and processes.
 - c. Schedule and conduct safety meetings and safety training programs as required by law for all personnel engaged in the Work.
 - d. Post all appropriate notices regarding safety and health regulations at locations which afford maximum exposure to all personnel at the job site.
 - e. Post the name, address, and hours of the nearest medical doctor; name and address of nearby clinics and hospitals; and the telephone numbers of the fire and police departments.

- f. Post appropriate instructions and warning signs with regard to all hazardous areas or conditions.
- g. Have proper safety and rescue equipment adequately maintained at the Plant site and readily available for any contingency.
 - 1) This equipment shall include such applicable items as: proper fire extinguishers, first aid kits, eyewash stations, safety lanyards and harnesses, stretchers, life savers (when working over water), oxygen breathing apparatus, resuscitators, gas detectors, oxygen deficiency indicators, explosion meters, and any other equipment mandated by law.
 - 2) This equipment shall be maintained at the Contractor Site Safety Officer's office at the Plant site, or at the actual Work areas, or at both locations as determined most appropriate in the judgement of the Site Safety Officer.
- h. Make inspections at least once daily to ensure that all machines, tools and equipment are in safe operating condition; and that all work methods are free of hazards.
- i. Submit copies of all safety records along with all safety inspection reports and certifications from regulating agencies and insurance companies.
- j. Notify Construction Manager (CM) of accidents immediately, followed by a detailed written report.
- k. Notify CM of any accident claim against the Contractor or any Subcontractor immediately, followed up by a detailed written Review safety aspects of the Contractor's submittals as applicable.
- l. Be responsible for coordinating and executing site Emergency Action procedures per client and applicable regulatory body requirements.

B. Site Safety and Health Plan (SSHP)

- 1. The Contractor shall provide and maintain an SSHP at all times at the project site.
- 2. The Contractor shall develop the SSHP to specifically address the scope of work to be performed by the Contractor.
- 3. The Plan shall be task-specific/activity-specific for the proposed work and be developed in compliance with requirements defined in 29 CFR 1910 and 1926 and other supporting and applicable OSHA standards as well as those standards of the Environmental Protection Agency.
- 4. The Contractor shall have the responsibility for defining protective measures in the SSHP that protects the environment, site personnel and the general public. The plan shall provide requirements for protecting all onsite participants, including the Contractor, lower-tier-subcontractors, and Owner's personnel.
- 5. The SSHP shall address requirements for the protection and orientation of vendors and other visitors who may enter the site.
- 6. The SSHP shall include requirements for protecting the general public and the environment from offsite emissions or physical hazards originating onsite.
- 7. The SSHP shall address site hazards related to environmental requirements, construction safety and occupational health.

- a. The Plan shall identify each risk, assess the hazard and specify actions and controls.
 - b. The Plan shall define organization, responsibilities, policies, and ownership criteria. Specifically the Plan shall include but not limited to general safety; environmental, health and safety training for employees and subcontractors; task-specific hazard analysis; task-specific personnel protective equipment (e.g., respirators, clothing, fall protection, etc.); traffic control; electrical safety including grounding and lockout/tagout; equipment safety, trenching and excavation requirements; chemical safety including air monitoring, action levels for PPE and specific corrective measures such as specific engineering controls; noise monitoring and control; confined space entry protocol; hazardous work permits; establishment of controlled areas; safe work practices, equipment and personnel decontamination; hoisting and rigging specifications; hazard communication; spill prevention and control; emergency response; hazardous weather requirements; incident investigation procedures; and medical surveillance and training protocol.
 8. The SSHP shall meet or exceed any additional requirements found in the RiverRenew Construction Safety & Health Manual for Contractors.
- C. All personnel employed by the Contractor or his Subcontractors, whenever entering the job site, shall be required to wear approved safety hats. The Contractor shall maintain, on site, a sufficient number of safety hats for use by visitors.
- D. No employee will be allowed to work in areas where concentrations of airborne contaminants exceed federal threshold limits. Respirators shall not be substituted for environmental control measures and shall be used only as prescribed by OSHA.
- E. All internal combustion equipment shall be operated in such a manner as to prevent health hazards to personnel from exhaust fumes.
- F. Lighting of Work Areas: Provide adequate light in all areas where work is in progress to permit proper inspection of all operations at all times.
- G. First Aid and Emergency Service:
1. General: Provide emergency first aid service.
 2. Facilities: House in the Contractor's office area at each Plant and include the following minimum facilities:
 - a. First aid supplies as recommended by the Contractor's Site Safety Officer.
 - b. Telephone with emergency telephone numbers posted in a conspicuous place. Include the numbers of police, fire, doctor, hospital, and ambulance service.
 - c. Potable Water
 3. Staff and Supplies
 - a. As recommended by the Contractor's Site Safety Officer.

- H. Confined Space Entry - Confined space entry procedures must be followed. A Contractor issued confined space entry checklist and completed permit must be submitted to the Owner within 48 hours of completion of the entry.
- I. Hazard Communications - Contractor shall be responsible for coordinating any exchange of material safety data sheets (SDS) 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. All SDS sheets shall be submitted to the Owner's Director of Health and Safety for review.

1.3 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General, Supplementary and Special Conditions and other Division 00 and 01 Specification Sections, apply to this Section.

1.4 RELATED SECTIONS: SPECIFIED ELSEWHERE MAY INCLUDE BUT IS NOT LIMITED TO:

- A. Section 01 33 00 Submittal Procedures

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 INDEMNIFICATION

- A. The Contractor shall indemnify and hold harmless the Design Professional Engineer, the Construction Manager, the RE&I, and the Owner against fines, reasonable attorneys' fees, and defense costs resulting from citations issued to the Owner, and the Construction Manager by either federal, state, or local safety enforcement agencies due to the Contractor's failure to abide by applicable safety enforcement agencies due to the Contractor's failure to abide by applicable safety and health standards.

3.2 SUBMITTALS

- A. Comply with Section 01 33 00, Submittal Procedures.
- B. The Contractor shall submit the SSHP to the Owner for review before any work is started. Work shall not occur without resolution of the Owner's comments. the Owner's review of the Contractor's SSHP shall not relieve the Contractor of the obligations under this contract or as imposed by law. The Contractor shall be solely responsible for the adequacy of its safety and health program.

3.3 INFECTIOUS AND HAZARDOUS MATERIALS

- A. Contractor is to be aware that since the project is located within a wastewater treatment facility, many forms of toxic chemicals and infectious materials (bacteria and/or virus) may be present in tanks, piping, channels, and in the atmosphere immediately surrounding such areas.
- B. The Owner cannot and will not make any provisions to clean, flush, or disinfect these areas prior to or during the work.
- C. Contractor shall take all precautions prior to beginning, or continuing work in any area where wastewater, sludge, grit, organic material, chemicals, chemical by-product, or any other sewage by-product may be present.
- D. It shall be the Contractor's responsibility to conduct monitoring for methane, hydrogen sulfide, chlorine, oxygen deficiency/enrichment and any noxious and dangerous gases prior to and during all work whenever required for reason of safety or as directed by the Owner.
- E. Whenever harmful levels of these gases are present, it will be the Contractor's responsibility to provide proper ventilation and/or special breathing apparatus, as required.
- F. Contractor shall test, remove and dispose of all infectious and hazardous material in accordance with all federal, Owner, state, and local laws and regulations as required by the Contract Documents.

3.4 HEALTH AND SAFETY STANDARDS

- A. The Contractor and any subcontractor shall not require anyone in their employment to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous to human health or safety per the Occupation Safety and Health Administration's Occupation Safety and Health Standards (29 CFR 1910), published in the Federal Register on October 18, 1972 and Safety and Health Regulations for Construction (29 CFR 1926) published in the Federal Register on December 16, 1972 and any amendments and supplements thereto which are in effect at the time bids are opened.
- B. The above referenced regulations cover minimum requirements for, but not limited to, the following:
 - 1. Safety and accident prevention
 - 2. Watchman
 - 3. Sanitary facilities
 - 4. Demolition
 - 5. Signing and barricading

6. Site Safety

- C. Failure to comply with these regulations may necessitate remedial action by the Owner to meet compliance, which shall be at the Contractor's expense.

PART 4 MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Work will not be measured separately for payment.

4.2 PAYMENT

- A. Payment will be made at the Contract lump-sum price, which price and payment include all labor, materials, tools, fees, equipment and incidentals needed to complete work specified.

ATTACHMENTS:

Attachment 1 – AlexRenew Safety and Health Standard Operating Procedures

- | | |
|----------|--|
| 01 54 50 | Attachment 1.0 – Construction Safety Manual |
| 01 54 50 | Attachment 1.1 – Plant Safety Orientation |
| 01 54 50 | Attachment 1.2 – Confined Space Program AlexRenew – Not Applicable |
| 01 54 50 | Attachment 1.3 – Control of Hazardous Energy Program |
| 01 54 50 | Attachment 1.4 – Electrical/Arc Flash Safety |
| 01 54 50 | Attachment 1.5 – Emergency Response Plan |
| 01 54 50 | Attachment 1.6 – Mosquito Control Program |
| 01 54 50 | Attachment 1.7 – Hot Work Permitting Program |
| 01 54 50 | Attachment 1.8 – Hazard Communication Program |
| 01 54 50 | Attachment 1.9 – Field Construction Guidance COVID-19 |

END OF SECTION 01 54 50

THIS PAGE INTENTIONALLY LEFT BLANK

Construction Safety & Health Manual for Contractors

Safety Department

This manual is a contract document

1.0 CONTRACTOR HEALTH, SAFETY AND ENVIRONMENT (HSE) REQUIREMENTS

It is the policy of the Alexandria Sanitation Authority (aka AlexRenew) to select and contract with Contractors with the same priority and emphasis on Health, Safety and Environment (HSE) protection as we practice for our own employees. It is a contractual requirement that Contractors comply with all applicable local, State, and Federal health, safety, and environmental laws, regulations, and ordinances. AlexRenew may supplement some local, State and Federal laws, regulations and safety standards to incorporate more stringent guidelines. These will be communicated to the Owner's Construction Management agent ("CMA") so that such procedures are subsequently incorporated into the Contractors' policies and procedures while working on the Site.

This HSE Safety & Health Manual specifies requirements that may exceed local, State, and Federal laws, including OSHA standards or the Contractors' normal HSE procedures. The CMA and Contractors are responsible for reviewing and implementing the HSE requirements set forth in this Safety & Health Manual. The CMA and Contractors are also responsible for ensuring that lower tier Contractors review and implement these HSE requirements. When activities and/or the scope of work changes, Contractors shall update their HSE procedures to ensure that the additional activities are covered by their plan.

This manual applies to all AlexRenew construction contracts. This manual prescribes the minimum safety and health requirements for all the AlexRenew construction and operation activities by contractors.

AlexRenew is committed to providing a safe, healthful and secure work environment for all persons directly involved in our construction activities. We are also committed to providing protection to the public from the hazards associated with on-site and off-site construction activities.

It is the intent of the AlexRenew management to require all contractors to foster, and promote the mission of an **Injury Free Workplace**. This calls for the elimination of unsafe acts, unsafe conditions, and the elimination of near miss events, which can be accomplished through:

Teamwork between the AlexRenew, the General Contractors and all sub-contractors.

- Personal commitment of everyone on the site to the success of this project.
- Ownership of the work product by the workers.

Pursuant to this goal, all workers on this project have the following responsibilities:

- To conduct their work in a safe manner.
- To immediately correct any unsafe act and/or condition pertaining to their work.
- To take prompt corrective action and ensure that work activities proceed in a safe manner.

All contractors and sub-tier contractors are required to implement measures to create a universal awareness, which promotes safe practices at the work site, and strives towards the achievement of **Zero Mishaps**. All contractors are required to ensure that they and their employees, Subcontractors, suppliers, vendors, and visitors, while on the job site and in the conduct of contracts, comply with the provisions of this manual. Non-compliance with safety requirements shall be treated the same as non-compliance with any contract item. Non-compliance may result in work stoppage, employee dismissal and willful or repeated non-compliance may result in Contractor dismissal.

All contractors shall comply with the latest version of the AlexRenew Safety and Health manual (including interim changes) that is in effect on the date of solicitation. Prior to making an offer, bidders must request and review the Safety and Health manual for the latest changes. No separate payment will be made for compliance with this paragraph or for compliance with other safety and health requirements of this contract. Note: Existing contracts will continue to apply the provisions of the previous edition of this manual until contract completion.

Failure to comply with safety requirements will be considered as non-compliance with the Contract and

may result in remedial action including withholding of progress payments due the Contractor and/or termination of the Contract. A Letter of Non-Compliance will be issued to the Contractor (Refer to Appendix A).

All workers employed on AlexRenew projects will conduct their work in a safe manner consistent with good construction safety practices in addition to all written requirements.

1.1 Construction Safety and Health Guidelines, Purpose and Scope

These guidelines are established to aid in the prevention of job-related accidents and health problems during the construction of the Project. These guidelines set forth elements which all Contractors must include, as a minimum, in their Project-Specific Safety Plan (PSSPs). The Project Safety Manual is not all-inclusive. Other elements may be required, and such requirements may be conveyed individually to Contractors where applicable. Some Contractors, by nature of the specific type of work being performed, must integrate additional required elements within their own safety plan.

These guidelines do not cover the full spectrum of published OSHA Construction (1926) & General Industry (1910) safety and health standards mandated by Law, and Contractors shall not assume that they are responsible only for those which are referenced in this Project Safety Manual, nor that the safety and health standards referenced herein are current as quoted. It is the responsibility of each Contractor and its employees to ensure that they are in compliance, and their safety plan is in compliance, with all safety regulations required by Law.

In the event of a conflict between the provisions of these guidelines and applicable Federal, State or local safety and health Laws, regulations/standards, Contract Documents or the Contractor's Safety Plan, the more stringent requirement shall apply.

The use of the term “Competent Person” shall herein refer to a person designated by employer to be a “competent person” as defined by OSHA Standard 29 CFR 1926.32(f) and in Section 2 below.

Safety and loss prevention must be an integral part of each job. Full participation, cooperation and support are necessary and required to ensure the safety and health of all persons and property involved in the project.

1.2 Site Access and Security

The CMA and all Contractor personnel, agents, representatives, and sub-contractors, will enter the project site thru an AlexRenew established entry gates and sign in at the Contractor's office on a daily basis. Contractor shall maintain these sign-in logs for the duration of the project and provide them to the CMA or AlexRenew when requested. Contractor visitors will be required to enter the project site thru an AlexRenew established entry gate and sign in at the Contractor's office. Visitors will be escorted at all times by an AlexRenew official, the CMA and/or a Contractor representative. If visitors tour the site, they must wear protective equipment including, but not limited to, safety shoes, hard hat, safety glasses, and high-visibility vest. The Contractor has the obligation to furnish such safety equipment for all such visitors to the Site.

This policy also applies to the visits by the general public and regulatory agency (e.g., Virginia Occupational Safety and Health Administration (VOSHA) and Department of Environmental Quality (DEQ), etc.) personnel visiting the site. Upon arrival to the site entrance, they will be asked to sign in and remain at the entry gate until CMA officials are notified and arrive to escort them around the site. The Contractor will provide the hard hat safety glasses (non-prescription), and high-visibility vest and any other safety equipment that is necessary on the Site.

Parking for all Contractor vehicles (and personal vehicles) will be parked in a designated parking area. Only construction vehicles (dump trucks, cranes, etc.) will be allowed to enter the work area. A wash bay will be available for construction vehicles to utilize prior to entering public streets.

Based on scheduled activities and Contractors on-site, a mandatory meeting will be held as required by AlexRenew and/or the CMA to discuss and coordinate security responsibilities, construction operations, working hours, number of construction personnel, and any other items of mutual interest.

2.0 DEFINITIONS

Term	Definition
Accident/Incident	An unplanned, undesirable event that disrupts work activity.
AlexRenew	Alexandria Renew Enterprises, Inc. aka Alexandria Sanitation Authority.
Competent Person	A competent person is an individual who, by way of training and/or experience, is knowledgeable of applicable standards, is capable of identifying workplace hazards relating to the specific operation, is designated by the employer, and has authority to take appropriate actions. A list of the names of all competent persons and their specific area of competency must be submitted to the Owner's representative at least 72 hours in advance of any operation that requires a "competent person".
Construction Management Agent ("CMA")	Firm hired by AlexRenew, as its agent, to provide construction oversight.
Contractor	Any party performing work, supplying materials, and/or providing services on the Site, including but not limited to: the Construction Management Company, general contractors, subcontractors, material men, suppliers, and vendors.
Contractor's Safety Representative	Individual(s) assigned by the Prime Contractor who inspects and surveys all tiers of Subcontractors and any sub-tier subcontractors for safety at the jobsite.
Contractor Site Supervisors/ Managers	The highest ranking Contract official from any construction firm working on the AlexRenew project.
Employer	Any individual, firm, or corporation, except the Owner who provides direct manual and non-manual labor or service personnel at or emanating from the Site by written Contract.
Mishap	A mishap is any unplanned, undesired event that occurs during the course of work being performed. The term "mishap" includes accidents, incidents and near misses.
Owner	AlexRenew or its designated agent
Owner's Agent	An entity contracted by the Owner and duly authorized to represent the Owner for certain roles and responsibilities per the terms of their contract.
PPE	Personal Protective Equipment such as hard hats, gloves, eye protection, and protective equipment and clothing.
Qualified Person	One who, by possession of a recognized degree, certificate, or professional standing, or extensive knowledge, training, and experience, has successfully demonstrated his/her ability to solve or resolve problems related the subject matter, the work, or the project.
Safe Plan of Action (SPA)	A task-specific planning document used to help ensure that every task receives proper HSE assessment and planning. Also referred to as a Job Safety Analysis (JSA) and/or Task Hazard Analysis.
Safety Deficiency Tracking Log	Log used to manage and verify the resolution of safety items that require attention on a project.
Site	The real property owned by AlexRenew where the Work subject to the Contract Documents is to be performed.
Site HSE	An AlexRenew employee responsible for the HSE program of AlexRenew.
Site/Project Management	The highest-ranking project management official from the CMA whose regular work location/office is at the project site.
SSO	The Contractor Site Safety Officer.
Supervisor	Field staff who are foreman level and up.
Task Safety Awareness (TSA)	A review of the SPA among the crew and supervisor to discuss and resolve any HSE issues before work is continued, such as a break in the work schedule, change in work conditions, change in crew, etc.
Work	The total of the Contractor's responsibilities as set forth in the Contract Documents.

3.0 ACCOUNTABILITY AND RESPONSIBILITIES

It is imperative that site management and job supervisor exercise positive leadership in orienting and motivating their employees toward performing their jobs effectively, efficiently, and with a high regard for safety.

3.1 Owner's Construction Management Team

The key function of the Owner's Construction Management team, as it relates to construction safety and health, is noting awareness of contractor compliance with the contract documents including applicable OSHA and Commonwealth of Virginia safety and health regulations, and the Owner specifications which pertain to safety and health.

The Owner's CMA's role in achieving construction safety and health objectives is limited to supporting and auditing the contractor's safety performance through Quality Assurance. **Contractors shall be responsible for the safety and health of persons and property in connection with their work and quality control of their Site Specific Safety Program.**

The provision or omission of safety and/or health services by the Owner and their representatives to the contractors shall not be deemed to transfer responsibility for safety to the Owner, or their acceptance or assumption of responsibility, in whole or in part, for safety on the project site or in connection with the work.

Owner's CMA has the authority to remove from the site any person, including supervisors and management of any Contractor who consistently violates safe work practices, or who fails to ensure persons working under their supervision or in a work place they control are not exposed to serious work hazards.

3.2 General Contractor

Each General Contractor that performs work on our projects shall prepare and submit, for review and comment, their own project-specific safety plan. This plan shall be tailored to the specific work to be performed on the project by their work force and their subcontractor's work force. The safety plan shall be in conformance with the Owner's contract documents, the requirements and standards of all applicable governing regulatory agencies, and comply with the Owner recommended guideline.

This project-specific Safety Plan shall be submitted for review and acceptance by the Owner prior to initiation of work at the job site. The contractors shall not be permitted to start work until all comments submitted after the review of the safety plan are adequately addressed and complies with the contract specification and recommendations.

Acceptance of such submittals in no way relieves the submitting entity from ensuring employees a safe and healthful work environment or complying with all contractual requirements and good engineering practices.

Each Contractor shall be held responsible for compliance with the Project safety requirements. This includes compliance by all its lower-tier Subcontractors. Contractors are required to take appropriate action with respect to employees who violate safety and health rules to prevent such violations from recurring.

In the event the work or any portion thereof is shut down by either an outside agency or due to an unsafe condition as determined by the Owner's CMA, the responsible Contractor shall bear the total cost incurred as a result of that shut down.

In no case shall the Contractor be relieved of responsibility for compliance with the requirements of Federal, State and Local safety and health laws and Project safety guidelines for all work to be performed under the Contract.

The General Contractor will have the overall responsibility for ensuring that all contractors and their employees incorporate safety and health standards into all construction phases of the project, and that this attitude is reflected in all agreements and contracts, and by all contractors, subcontractors, supervisors,

employees, vendors, visitors and security guards, and anyone else connected with the project.

1. In conjunction with engineering and scheduling personnel, develop and implement specific safety and health procedures and effective safe work practices through the use of an AHA or JHA.
2. Provide protection of the public on or adjacent to construction sites as recommended by the American National Standard Institute (ANSI A10.34).
3. The general or prime contractor shall provide a qualified person with:
 - a. a minimum of five years of construction experience where at least 35% of primary job duties involve safety and health,
 - b. have a Construction Health and Safety Technician (CHST) certification.

Provide a resume which must be accepted by the Owner prior to the project start.

- a. General or Prime Contractors with 1-20 workers per shift either direct hires or sub tiers will provide an onsite safety manager whose primary duty is worker safety but who may also perform other duties.
 - b. General or Prime Contractors with 21-100 or more workers per shift, or at the discretion of the Owner, either direct hires or sub tiers will provide an onsite safety manager per shift whose only duty is worker safety.
 - c. If the work force exceeds 100 workers per shift, or at the discretion of the Owner, either direct hires or sub tiers will provide an onsite safety manager per shift whose only duty is worker safety. Additional safety inspectors may be required if the Contractor fails to prevent repeat safety and health deficiencies or serious accidents/incidents amongst its employees and subcontractors; or if the Contractor is working multiple shifts.
 - d. A resume for the above safety manager must be provided for review by the Owner.
4. Worksite with Non-English speaking workers shall have a person (s), fluent in the language(s) spoken and English to translate as needed, on site at all times when work is being performed.
 5. Ensure that capable, responsible and appropriately trained supervisors and the onsite competent safety representative (that meets the Owner's requirements) make twice a day (or more frequent as needed) inspections of all excavations, forms, scaffolds, stairs, ladders, structures, machinery, and equipment; take immediate corrective measures to eliminate hazards directly under the control of the employer, or report violations of OSHA regulations and unsafe practices to the responsible employer and the Owner.
 6. Assurance that the site supervisors assume responsibility for completing a written accident/incident report for each reported mishap and that each report suggest a feasible means of avoiding future mishaps of a similar nature. This includes any reports to the Owner, VOSH, OSHA or any other regulatory agency requiring reporting in certain types of accidents.

4.0 DOCUMENTATION AND REPORTING REQUIREMENTS

- 4.1 A project-specific HSE Action Plan or, in the case of hazardous waste operations, a site-specific Health and Safety Plan (HASP), must be generated by each Contractor mobilizing on the project. This plan must include a project-specific Emergency Response Action Plan in accordance with AlexRenew, Local, State, and Federal requirements. All HSE Action Plans must include the name, location and direction to the hospital that is the most proximate to the Site.
- 4.2 If the portion of the project is regulated as a hazardous waste or emergency response operation (HAZWOPER), as defined in 29CFR 1926.65 or 29CFR 1910.120, then the Contractor must develop a HASP, utilizing someone who is qualified in the subject matter, that outlines how hazardous agents (chemical/physical/environmental) will be identified, handled, and controlled. Contractor site personnel working in this area shall be trained on the exposures, as well as the necessary precautions that are to be followed. The Contractor is required to submit documentation of this training to the CMA prior to

commencing work on the Site. In addition, any Contractor and/or Subcontractor working in adjacent non-HAZWOPER areas will be briefed on work activities and associated hazard(s) in the event of an incident or release if DRI levels exceed established “action levels.” The CMA and AlexRenew officials will be immediately informed by Contractor of any hazardous situations or materials that are discovered.

- 4.3 Contractor shall furnish to CMA the names and qualifications of the Competent Persons and Qualified Persons, who may be required for their scope of work by Federal, State, or local regulations. Examples include, but are not limited to: Competent Persons and/or Qualified Persons for steel erection, excavation, scaffold erection, confined space entry, annual crane inspections, etc.
- 4.4 Contractor is responsible for maintaining a First Aid Register for all employee injuries and illnesses reported on the project. First Aid kits will be provided by all Contractors and at least two persons on Site from each company will be current and trained in First Aid and CPR.
- 4.5 Assure contractors under their supervision have met their safety education and orientation requirements as described in this manual. Every new or reassigned employee shall be provided instruction in the general safety requirements of their job before working on the Owner job site. The Owner New Hire Safety Orientation Requirements shall also be reviewed with the employee. The contractor shall submit a signed copy of the Employee/Supervisor Certification Form for verifying review by the employee and the supervisor of the Owner’s safety standards and requirements (Refer to Appendix B - Employee/Supervisor Certification Form for Verifying Review by the Employee and the Supervisor of AlexRenew’s New Hire Safety Orientation Requirements).
- 4.6 Contractor must immediately inform CMA and AlexRenew of any inspections by VOSH, EPA, or other HSE regulatory agencies or other actions involving the Contractor’s work.
- 4.7 Keep the Owner and the Construction Manager informed of all mishaps (including near miss events) that effect or could affect employee safety and health as well as keeping the Owner informed of progress regarding completion of safety items identified for corrective action through the implementation/use of a Safety Deficiency Tracking Log.
- 4.8 Injuries, illnesses, or any incident involving a third party or a member of the general public must be promptly reported to the Contractor Site Safety Officer and the CMA.
- 4.9 Incidents involving potential exposure to hazardous materials and releases or spills of such materials must be promptly reported to Contractor Site Safety Officer, the CMA, AlexRenew, and the necessary Regulatory Agencies.
- 4.10 In the event of an accident or near miss, the Owner is to be notified immediately, the scene is to be protected and maintained until the Owner has had an opportunity to conduct their own investigation, and potential witnesses are to be retained and be available for interviews from the Owner for a reasonable amount of time.
- 4.11 Investigate mishaps to determine root cause and develop/implement corrective actions to prevent reoccurrence. Accident investigation reports are to be completed and turned into the Contractor within 24 hours of the occurrence. Copies of such reports shall be forwarded to the Owner’s Resident Engineer and the Owner’s Safety Manager.
- 4.12 Document weekly safety briefings for construction personnel.
- 4.13 Conduct all-hands safety meetings once per month, to include all sub tier contractor

employees. Document the meeting subject, date and names of attendee by contractor and subcontractor. Submit documentation of the all-hands safety meeting to the construction manager. (Monthly Report)

- 4.14 Contractor employees are required to participate in documented, daily task-specific Safe Plans of Action and regular Safety Observation Reports or equivalent. Copies of these documents shall be provided to the CMA weekly. The Contractor shall invite the CMA staff in advance so that they may observe these sessions
- 4.15 Conduct daily on-site safety inspections including a review of safety training, hazard correction and accident records. Submit documentation of all inspection and corrective action taken by the contractor to the Resident Engineer weekly; also include a summary of this information in the monthly report.
- 4.16 Review and timely abate the results of safety inspections to include recommendations made for correction of hazards and prevention of accidents, and follow-up measures taken to ensure compliance.
- 4.17 Monitor and document compliance by contractors with mandatory safety and health laws, regulations, standards and codes.
- 4.18 Contractors will conduct weekly HSE meetings, and meeting reports with attendance sign-in sheets shall be maintained by the Contractor for the duration of the project and provided to CMA upon request.
- 4.19 Maintain records of all accidents experienced by contractors and subcontractors in assigned project area of responsibility in accordance with the OSHA requirements. Copies of records shall be forwarded to the Owner's Safety Manager, Construction Oversight Manager, and the Resident Engineer within 24 hours. Submit a monthly report by the fifth day of the following month for the preceding month; for example: (the monthly report for January is due on or before February 5 etc.) to the Owner's Safety Manager, Construction Oversight Manager, and the Resident Engineer.
- 4.20 The contractor shall establish a safety and health deficiency tracking system that list and monitors the status of safety and health deficiencies in chronological order. This list shall be posted on the project safety board and in a file on site. The information shall be updated daily and provide the following:
 1. Date and time of the deficiency identified
 2. Description of deficiency
 3. Name of person responsible for correcting deficiency
 4. Projected resolution date
 5. Date actually resolved
- 4.21 The monthly report must include the following information: (See Appendix – C - Monthly Contractor Safety Report)
 1. A summary of all safety inspection reports and documentation that support all safety deficiencies has been corrected
 2. Mishap investigation reports
 3. Toolbox talks with sign-in sheets
 4. Documentation of the all-hands safety meeting with subcontractors.
 5. Copies of all employees' safety suggestions and solutions by the contractor
 6. Near Miss Reports

5.0 HSE TRAINING/COMMUNICATION REQUIREMENTS

- 5.1 Contract employees must complete HSE training required by applicable Local, State, and Federal HSE requirements. All Contractor and sub-tier contractor personnel shall have current OSHA 10 hour Construction training at a minimum in addition to any other training required by governing agencies for the scope of work to be performed. Documentation of all HSE training shall be maintained at the project site by the Contractor and provided to the CMA upon request.

Assure every new or reassigned employee shall be provided instruction in the general safety requirements of their job before working on the Owner job site. In addition to the Contractor's own site safety orientation training the Contractor shall also provide each employee, new to the site, the AlexRenew Plant Safety & Security Briefing (see Attachment 1.1 – AlexRenew's Plant Safety Orientation Program). The contractor shall submit a signed copy of the Employee/Supervisor Certification Form for verifying review by the employee and the supervisor of the Owner's safety standards and requirements.

The Owner will not furnish a security badge to a new worker, nor shall the Contractor permit unbadged worker entrance to the worksite (i.e. outside the Contractor's field office) until the Contractor submits a certification to the CMA that the worker has received the minimum training and orientation described in this paragraph.

- 5.2 Contractor supervisors and sub-tier supervisors shall have current OSHA 30 hour Construction training at a minimum in addition to any other training required by governing agencies for the scope of work to be performed.
- 5.3 Workers involved with hazardous waste operations, as defined by 29 CFR 1910.120 or equivalent applicable local, State and federal regulations, shall have met, prior to any field work activity or exposure, the training requirements of the standard to include OSHA 40-Hour HAZWOPER Training. Certification of individual worker training shall be provided to the CMA prior to commencing work.
- 5.4 Contractors must certify that all operators of mobile equipment such as forklifts, cranes, boom lifts, etc. as required by applicable local, state, and federal regulations, have been trained and/or certified on the proper operation of the equipment. Crane operators shall have a current NCCCO certification. Copies of this training and certification shall be maintained on the project site by the Contractor and provided to CMA upon request. Mobile crane operators must be qualified on each specific crane (type & rating) that they are assigned to operate through an OSHA and/or industry recognized testing and qualification procedure. Backup alarms will be functional and tested on a daily basis.
- 5.5 Contractors must establish a prompt and effective method of providing HSE communications such as HSE alerts, advisories, bulletins, regulatory updates, etc., to all Site employees.

6.0 BASIC HSE REQUIREMENTS

The following paragraphs list HSE rules and fundamental requirements for Contractor HSE. When there are multiple rules that may apply, the most stringent of AlexRenew, CMA, Local, State, and/or Federal HSE regulations that govern the work shall be followed.

- 6.1 Each Contractor shall appoint an on-site Site Safety Officer(s), who will attend regular CMA HSE meetings and be responsible for implementation of the rules listed below, as well as other HSE rules determined to be necessary for the safe execution of the project. The Contractor Site Safety Officer(s), in addition to meeting the requirements of "Qualified Person" as defined by OSHA, must also have a minimum of 3 years of experience where at least 35% of primary job duties involve safety and health in construction and have successfully completed the OSHA Outreach Training 30 hour course for supervisors. A resume must be provided and accepted by the Owner prior to the start of work. The Backup Safety Person should be equally credentialed, depending on job complexity, size and any other pertinent factors. The contractor's safety representative shall have:
1. Safety compliance responsibility. The Safety Representative shall be present at the project site and located so they have full mobility and reasonable access to all major work operations during the shift.

2. Report to a senior project (or corporate) official.
- 6.2 Hard hats (ANSI Z89.1 or equivalent) shall be worn at all times (e.g. construction, environmental operations, operations or maintenance environment), regardless of the workers' activities. This includes welders using welding hoods. Hard hats shall be worn in the forward position only.
- 6.3 Shirts with at least four-inch sleeves and full length pants shall be worn at all times. No tank tops are allowed. Loose or frayed clothing, loose or hanging long hair, ties, rings, body jewelry, etc. shall not be worn around moving machinery or other areas where they may become tangled.
- 6.4 Hearing protection shall be worn when exposures exceed 85 DBA and/or during work with heavy equipment. Sound level determination is the responsibility of the contractor and/or their lower tier sub-contractors.
- 6.5 Hard-toe footwear (ANSI Z41.1, or equivalent) shall be worn at all times by all workers when in the construction environment or in areas where there is a danger of foot injuries due to falling, rolling, or piercing objects or when an employee's feet are exposed to electrical hazards.
- 6.6 Safety glasses with rigid side shields (ANSI Z87.1, or equivalent) shall be worn at all times when in the construction environment and in any area where eye hazards exist. This includes under welding hoods and for workers with prescription eye wear. Safety goggles may be worn over non-safety prescription eyewear.
- 6.7 Face shields must be worn in addition to safety glasses when grinding, chipping, jack hammering, and power sawing or when conducting other tasks that involve such face and/or eye hazards.
- 6.8 Gloves, appropriate for the hazard present, shall be worn when hands are exposed to absorption of harmful substances, cuts, abrasions, punctures, biological hazards, chemical burns, thermal burns, or harmful temperature extremes.
- 6.9 Contractor shall comply with AlexRenew's four (4) foot fall protection requirement. The Contractor is responsible for implementing their own systems to comply with this requirement and other pertinent requirements specified in the VOSH/OSHA standards.
- 6.10 The use of "passive" systems, such as safety nets, monitoring systems, or controlled access zones, as the sole means of fall protection when working above six feet, is prohibited.
- 6.11 Each Contractor who is exposed to a fall hazard shall submit a rescue plan as required by OSHA.
- 6.12 Workers in mechanical lifts, including scissor lifts, boom trucks, suspended or supported personnel baskets, articulating lifts, and other similar devices must use fall protection equipment at all times. Only anchorage points designated by the manufacturer are permitted to be used. Such devices shall not be used as elevators to transport workers to different work locations. All workers operating such lifts shall be trained on the use of the lift and the documentation of this training shall be available upon request by CMA.
- 6.13 All portable ladders must be clearly marked with the ladder owner's name. Ladders shall be inspected by a competent person before use. All damaged ladders shall be removed immediately from the Site.
- 6.14 The safest means of worker access for overhead work (e.g., rolling scaffolds, mechanical lifts, platform ladders, etc.) shall be considered as alternatives to the use of portable ladders. If ladders are used, then the top of all straight and extension ladders shall be tied to a substantial anchor point before use; a second worker must hold the ladder until the tie-off is secure. If a worker's feet are on or above the fifth rung of a stepladder, the top of the ladder must be tied to a substantial anchor or a second worker must hold the ladder throughout the task.
- 6.15 When ascending or descending a portable ladder, three-points contact shall be maintained at all times. When potential fall exposure exceeds 20 feet, personnel on ladders must be protected with a personal fall arrest system.
- 6.16 Decking sections shall be laid tightly and immediately secured upon placement to prevent accidental movement. During initial placement, decking sections shall be placed in such a manner to ensure full support by structural members and each piece shall be individually secured. Pre-installation or shake-out of multiple sections of decking using temporary methods of attachment, such as tack welding, is not allowed. The use of controlled decking zones is not allowed.

- 6.17 Work above or adjacent to water requires a specific written safe work plan, which must be submitted to CMA for review before work begins. This includes, but is not limited to, rivers, lakes, canals, settlement ponds, and open tanks containing liquids. United States Coast Guard-approved Personal Flotation Devices (PFDs) must be worn when working above or adjacent to water. When working above water or adjacent to water without 100% fall protection, PFDs that will provide floatation to an unconscious user in a face-up position must be used. Personnel shall not work alone above water.
- 6.18 Equipment and tools shall not be altered in any way to adapt it for a job for which the manufacturer does not intend it. The manufacturer of the equipment must approve any such adaptations or alterations to equipment in writing. Only trained and authorized persons shall operate machinery or equipment.
- 6.19 All hand-held power tools must be equipped with constant pressure switches that will automatically shut off power when the pressure (worker's hand) is removed. Hand-held power tools with on/off or lock-on switches are not allowed.
- 6.20 Ground Fault Circuit Interrupters shall be used to protect all temporary electrical wiring and cord sets. The use of an assured grounding conductor program in lieu of GFCIs is not an option.
- 6.21 Contractor shall comply with AlexRenew Lock-Out/Tag Out program and procedures (see Attachment 1.3 – AlexRenew's Control of Hazardous Energy Program). Contractor will provide AlexRenew with a copy of their Lock-Out/Tag Out program and procedures through CMA. This exchange of programs is for informational purposes only. Contractor's lock-out/tag-out procedures shall meet or exceed AlexRenew's program and be followed to minimize the potential exposure of workers to hazardous energy. This exchange is for informational purposes only. Hazardous pipelines or vessels will be isolated by using a double block and bleed system or by blanking. Every effort must be made to de-energize electrical equipment to be worked on and other electrical equipment in the area that may affect the work. If the equipment cannot be isolated or de-energized, a specific written safe work plan must be submitted to CMA and AlexRenew Safety Manager for review before work proceeds. The plan shall comply with federal and state requirements and those provided in AlexRenew's Electrical/Arc Flash Safety Program (see Attachment 1.4 – AlexRenew's Electrical/Arc Flash Safety Program). Only "Qualified Electricians" may work on energized or potentially energized circuits. See 29 CFR 1910.332 for qualified electrician requirements. AlexRenew considers equipment rated at 50 volts and above as "high voltage."
- 6.22 In addition to NEC, and OSHA 1910/1926 Electrical requirements, the Contractor shall comply with the provisions of NFPA 70E, "Standard for Electrical Safety in the Workplace." Contractors shall ensure that their employees are trained in safe work practices, qualified, and provided equipment, tools, and personal protective equipment (PPE) that are specified in NFPA 70E.
- 6.23 Per 29 CFR 1910.146, confined space entry work must follow a documented hazard assessment and safe work planning process, which must be submitted to the CMA for review prior to entry.
1. Contractor who plans to enter a confined space shall submit a written plan to CMA that complies with the above referenced OSHA standard and AlexRenew's Confined Space Entry Program (see Attachment 1.2 – AlexRenew's Confined Space Program) prior to the entry taking place.
 2. As part of project planning activities, **all on-site confined spaces shall be classified as permit-required**, unless specifically waived by AlexRenew. Likewise, confined spaces discovered during work activities, and which will require entry, will also be classified as permit-required.
 3. All permit-required confined spaces will be labeled so that employees are adequately warned of the potential for hazardous atmospheres. Labeling is not required under the following circumstances:
 - a. The spaces are easily recognizable, numerous, and widely spaced (e.g., storm sewer manholes). Employees will be instructed that these constitute confined spaces during required training. However, these locations will be included on the inventory.
 - b. A complete inventory has been developed, all personnel have been trained in the use of the inventory, and the workers consult the inventory prior to performance of any work that may require entry into a confined space.
 4. Non-permit-required confined spaces can be designated by only a Certified Industrial Hygienist, Certified Safety Professional, Professional Engineer, or a competent person with appropriate confined space training and experience after review of the space(s), historical monitoring data, and other factors

(e.g., injuries that have occurred). Therefore, all confined spaces will be considered permit-required, unless the Contractor submits, in writing, an explanation of their justification to re-classify the space. AlexRenew and/or the CMA has the right to refuse the re-classification.

5. When non-permit-required confined spaces require the implementation of confined space entry procedures because of specific work operations (e.g., painting, welding), all entry points will be labeled so as to alert all employees of the existence of the hazardous conditions. These signs will be removed only when the hazard no longer exists (e.g., complete curing of the paint).
- 6.24 High-visibility reflective safety vests (ANSI/ISEA 107, Class II, or equivalent) must be worn by all personnel.
- 6.25 Motor vehicles and mobile equipment shall never be left running without an operator at the controls. Proper use of seatbelts by all occupants is mandatory. Motor vehicle operators are prohibited from using a mobile phone or two-way radio. This applies to both hands-free and non-hands-free devices. If the use of such a device by the motor vehicle operator is necessary, it is only allowed when the motor vehicle is stationary and in a safe location off the roadway. Contractor shall make all efforts to avoid any petroleum spills and leaks from any motor vehicle and equipment.
- 6.26 All outriggers on mobile cranes must be fully extended and fully deployed when the crane is used to lift or support a load. All lifts shall be conducted per the manufacturer's requirements and/or recommendations and per the applicable load chart.
- 6.27 Anti-Two Block devices that automatically disengage crane hoist/boom functions when the hook or block approaches the jib or boom tip are required on all cranes.
- 6.28 Multiple lift rigging (Christmas tree lifts) is not allowed without prior written notification to Site/Project Management and development by the Contractor of a written site-specific plan to prevent exposure to overhead loads.
- 6.29 Critical Crane Lifts - A Critical Lift Plan will be required to be submitted by the Contractor two weeks prior to the lift taking place. Examples of critical lifts include, but are not limited to:
 1. Lifts of more than 50 tons
 2. Lifts which exceed 75% of the crane's capacity
 3. Lifts which require load to be lifted, swung or placed out of the operator's view
 4. Lifts involving more than one crane
 5. Lifts involving non-routine/technically difficult rigging arrangement
 6. Lifts hoisting personnel with a crane or derrick
 7. Lifts of a non-rigid object
 8. Lifts over active work areas or public property
 9. Lifts of long-lead equipment
 10. Any lift which the crane operator believes should be critical.All "critical lifts" require written prior notification to CMA before proceeding.
- 6.30 Field supervisors for the Contractor are responsible for protecting their workers from heat and cold stress conditions by incorporating protective measures, PPE, and adequate fluid and food intake.
- 6.31 Eating and drinking will be permitted only in designated areas at AlexRenew project sites. Smoking will be permitted only in areas designated by Field Supervisors and situated in locations that are not in the immediate vicinity of activities associated with work site activities. Additionally, Field Supervision will designate each smoking area giving primary consideration to those personnel who do not smoke.
 1. Personnel actively involved in the performance of certain activities will not be permitted to smoke, eat, drink, or use smokeless tobacco, except during breaks (e.g. HAZWOPER Controlled work areas).
 2. Given the presence of raw sewage at the worksite, all site personnel will first wash hands and face after completing work activities and prior to eating, drinking, smoking or using smokeless tobacco.
- 6.32 Adequate illumination will be provided by Contractors at all times.

7.0 CERTIFICATION, INSPECTIONS, AND REGULATORY AGENCY PERMITS

- 7.1 Certain operations may require prior written notification to the Site/Project Management and CMA. Such activities may include but are not limited to hot work, confined space/vessel entry, excavations, asbestos abatement, lead abatement, etc. Contractor shall confer with CMA whether any parts of the Contractor's activities require prior written notifications.
- 7.2 Contractors are responsible for securing and complying with all city, state, and federal permits.
- 7.3 A third-party certified Qualified Person shall make a thorough annual inspection of all cranes and powered hoisting equipment. Cranes assembled on site shall receive an annual inspection prior to being put into service. Documentation of all crane inspections shall be maintained on site by the Contractor and provided to Site/Project Management upon request.
- 7.4 All scaffolding must be inspected and tagged by a Competent Person prior to initial use, before each work shift, and after any event that could affect its structural integrity. Suspended scaffolds must receive documented daily pre-use inspections. Untagged scaffolds must not be used.
- 7.5 Mobile equipment must receive daily pre-use inspections, which will be documented by Contractor and given to CMA upon request. Examples include forklifts, backhoes, personnel lifts/manlifts, etc.

8.0 SITE OPERATIONS

Contractors shall include planning for environmental compliance in the preparation of their HASP or HSE Action Plan. Issues to be considered include but are not limited to release reporting, air permits, water permits, asbestos/lead permits or notifications, hazardous waste generation and related disposal procedures, spill mitigation, clean up methods, etc.

Contractor shall have a written Hazard Communication Program and comply with the requirements of 29 CFR 1910.1200. A copy of the program shall be forwarded to Site/Project Management and a copy shall be in the possession of the Contractor onsite. The Contractor shall comply with the added requirements of Attachment 1.7 - AlexRenew's Hazard Communication Program.

Any potentially hazardous material or chemical brought onto the site shall be accompanied by a Material Safety Data Sheet (MSDS). Copies of MSDSs shall be forwarded to the Site/Project Management before the product is brought onto the site.

Small quantities (less than 10 gallons) of hazardous liquids, such as gasoline, diesel fuels, and solvents, brought onto the site shall be stored in a properly labeled safety container with a flame arrestor and self-closing lid. Larger quantities will require the construction of a berm to contain a release.

Site/Project Management shall be notified before any chemical or material is used that could create foul smelling, noxious, or toxic vapors or gasses.

All accidents involving exposure to potentially hazardous materials and hazardous material releases (as defined by EPA-RCRA) must be immediately reported to Site/Project Management. It is important to report all releases or exposures even if the incident is considered minor or adverse health effects or symptoms are not apparent at the time.

8.1 Emergency Action Planning and Emergency Response

The Owner has developed for each of its facilities an emergency management plan (see Attachment 1.6 – AlexRenew's Emergency Response Program) to cover designated actions that must be taken to ensure employee safety during emergency conditions. Any questions about contractor compliance with this plan or questions about this section should contact the Manager, the Owner's Safety Manager at (o) 703-549-3381 ext. 2216 or (m) 703-408-6090.

The site-specific emergency action plan will be discussed with the selected contractor after the Owner contract has been awarded. The contractor will be expected to have a site-specific emergency action plan within 10 days of the pre-construction meeting. All emergency action plans must be reviewed and approved by the Owner Office of

Emergency Management.

The contractor is responsible for ensuring the following:

1. Identify a contract specific Emergency Operations Coordinator (EOC). The EOC should be onsite and would be the primary person who serves as the main the Owner contact person for the contractor before, during, and after an emergency. This is not necessarily a FTE and could be assigned duties to another contractor on the job site.
2. That all anticipated hazards and risks are identified and ranked in level of impact to the contractor operations being conducted. Examples are: fire; toxic chemical releases; hurricanes; tornadoes; blizzards; floods, etc. These hazards should provide the basis for the incident specific response portion of the emergency Management plan (see item number 9).
3. The contractor should list in detail the procedures to be taken by those employees who have been selected to remain behind to care for essential operations until their evacuation becomes absolutely necessary. Essential contract employees must be identified by name and a list provided in the emergency management plan.
4. Training of all employees, at least annually on the procedures to be followed in the event of an emergency, including how to properly notify other affected employees. The EOC and other identified critical personnel shall complete ICS 300 and 400 level training (within 1 year of contract award). Certifications shall be forwarded to the Manager, the Owner Office of Emergency Management.
5. Hold emergency drills at least once a year to ensure that employees know what to do in an emergency (the drill should be based on emergencies identified in item number 2) and to test the effectiveness of the emergency management plan and procedures. It is the responsibility of the contractor to keep records of such drills. In addition to any Contractor lead evacuation training, the Contractor shall participate in semi-annual Plant Evacuation Drills lead by the Owner.
6. Shall designate an evacuation warden at the rate of at least 1 warden per 20 workers. Wardens shall be trained in the execution of the evacuation plan, locations of emergency assembly points, notification and communication, and procedures for evacuations. Names of evacuation wardens and certification of training shall be forwarded to the Manager, the Owner Office of Emergency Management.
7. In the event of an emergency such as earthquake or fire, all contractors are expected to evacuate the Owner facilities to the pre-designated emergency assembly points for a head count, where the designated evacuation warden from each contractor will take attendance and provide the Owner incident commander with the information regarding attendance and the last known location for any individuals that are not present. The contractor may assign some employees the task of shutting off the gas or electricity, if needed. At no time will any employee be expected to jeopardize his or her own safety to do this.
8. Contract employees will be notified of emergencies through one of the following:
 - Fire alarm
 - Radio
 - Emergency horn
 - Direct voice communication

It is the responsibility of the contractor to provide details for their means of notification and communication (if the contract is executed on WRRF the contractor may connect to the plant emergency alert system). The contractor emergency communication plan shall be provided in the emergency action plan.

9. Develop a contract and site specific emergency management plan that shall contain, at minimum information on the following:
 - Emergency contact numbers
 - Potential emergencies
 - Site diagram, including; building locations and layouts, evacuation routes, location of emergency equipment, emergency alarms
 - Training requirements for emergency response personnel

- First aid plan
 - Emergency communications
 - Procedures for rescue and evacuation
 - Document review and management information
10. Contractors are encouraged to coordinate their plans with other contractors as well as the Owner facilities where, contracts may overlap or be in close proximity to each other.
11. Contractors who are involved in emergency situations must complete an incident summary within 10 business days of the emergency, detailing what occurred, why it occurred, actions taken to abate the situation, and recommendations for future corrective measures. All reports shall be forwarded to the Manager, the Owner Office of Emergency Management.

8.2 Clearing and Grubbing

Chain Saws

Chain saws should be used with caution in order to prevent personal injury, as the cutting mechanism is unguarded. Kickback is the single biggest cause of the chain saw injuries. A kickback is the sudden and potentially violent rearward and/or upward movement of the chain saw.

Prior to making the cut, all other workers must be removed and made aware of the fall area.

The operator must be completely familiar with the controls and proper use of the equipment.

- Minimum PPE required includes hardhat, hard-toe safety boots, safety glasses, hearing protection, leather gloves, and debris shield.
- Chainsaw operations require the use of chainsaw chaps (leather leggings are not suitable)
- Employees working aloft in trees will use proper climbing, fall protection, and descending equipment. Fall protection procedures shall be implemented.
- A high visibility reflectorized safety vest will be worn when working around vehicular traffic.

Covering of Holes

Contractors are also responsible for insuring that holes at are two (2) inches or greater in floors, roofs, and other walking/working surfaces are covered. The following is a list of requirements for covering holes:

- Covers for holes shall be capable of supporting, without failure, at least twice the weight of employees, equipment, and materials that may be imposed on the cover at any one time.
- All covers shall be secured when installed to prevent accidental displacement by wind, equipment, or employees.
- Covers shall be marked with the word "Hole" or "Cover" to provide additional warning of the hazard.
- Caution or Danger tape around or over holes four (4) feet or more are not to be used at AlexRenew as protective devices. Tape does not provide any fall protection.

Fire Prevention

- Fuel should be stored in approved metal safety cans only and labeled as to contents.
- The container should have a metal spout and funnel provided, to allow for electrical bonding during fuel transfer.
- Equipment will be turned off while being refueled.
- Smoking is prohibited during refueling.
- After completing fueling, carefully wipe off any gasoline spilled before starting the engine
- Keep a fire extinguisher available at all times in the work area.

- Keep the equipment clean of gasoline, oil, and sawdust.

Wood Chipping Hazards

Wood chipping equipment should be used with extreme caution in order to prevent personal injury, as the chipping mechanism is open to receive tree branches and other wooden material. The cutting blades begin to rotate when the engine starts and slows down gradually after the engine is shut off.

In addition, the following work safety practices should be observed:

- Care should be taken to avoid foreign objects such as metal, glass or rocks that could damage equipment and become projectiles. Personnel will not wear loose clothing, gauntlet gloves, or hand/wrist jewelry when operating a chipper.
- No part of an employee's body will be placed on the chipper table, nor the discharge chute raised while the rotor is turning.
- A chipper will be fed from the side of the centerline, and the employee will immediately turn away when the brush is taken into the rotor chamber.
- Bystanders should be kept at least 25 feet away when in operation.
- Never try to clear blockages by hand and always engage the chipping mechanism gradually using the safety handle.
- Brush chippers will be provided with a locking device on the ignition system that prevents startup when the key is removed.
- Access panels must be closed and secured before chippers are used.
- The infeed hopper or table will be of a design to prevent an employee from reaching the rotor blades or knives during normal operation.
- Trailer-type chippers will be chocked.
- The feed-openings will be protected with flap-type guards to prevent kickback of chips.

8.3 Landfill Operations

- All ground personnel must wear a high-visibility, reflective safety vest at all times. Safety vests must be visible from all angles.
- All ground personnel will yield to heavy equipment and maintain approximately 100 feet of clearance at all times while maintaining constant eye contact with the operator.
- The site supervisor must notify Site/Project management prior to allowing any worker to enter a high-traffic area. The site supervisor shall instruct Site/Project management to alert all operators when personnel will be entering traffic areas to perform assigned work. When feasible, perform work during periods of low traffic. All work performed in high traffic areas shall be performed within physical barriers, such as cones, warning tape, concrete jersey barriers, etc. Physical barriers will be set up in such a manner to be visible to all operators.
- Operators and site supervisors shall ensure all reverse warning devices are in working order prior to the operation of equipment. If any person notices an inoperable reverse warning device, that person shall immediately notify the operator and the site supervisor. Any vehicle with an inoperable reverse warning device shall be tagged and placed out of service until equipped with a working device.

8.4 Drilling

- Use common sense while maintaining a "safety-first" attitude at all times.
- Know the location of underground and overhead utilities
- Use required PPE, do not wear loose-fitting clothing or jewelry. Keep hair tied back and tucked into hardhat.

- Do not touch or go near moving parts.
- Be aware of the location of “Emergency Shut Off” switches.
- Be aware of potential contaminants. Always wear required PPE and follow appropriate decontamination procedures.
- In the event of an accident, allow properly equipped and protected personnel to respond. Immediately leave the area.
- Do not smoke or use spark-producing equipment around drilling operations.
- No food will be consumed or stored in the work area.
- Do not work around a drill rig during a thunderstorm or rain.
- Maintain orderly housekeeping on and around the drill rig. Store tools, materials, and supplies to allow safe handling by drill crewmembers. Proper storage on racks or sills will prevent spreading, rolling, or sliding. Avoid storage or transportation of tools, materials, or supplies within or on the drill rig derrick.
- Maintain working surfaces free of obstructions or potentially hazardous substances.
- Store gasoline only in containers specifically designed or approved for such use.
- Fire-fighting equipment should not be tampered with and should not be removed for other than the intended fire-fighting purposes or for servicing.
- The departing driller should inform the oncoming driller of any special hazards or ongoing work that may affect the safety of the crew.
- Rigging material equipment for material handling should be checked prior to use on each shift and as often as necessary to ensure it is safe. Defective rigging should be removed from service.
- Work areas and walkways should not be obstructed. The area around the derrick ladder should be kept clear to avoid unimpeded access to the ladder. The rotary table of the rig floor shall be kept free of obstructions and free of undue accumulation of oil, water, ice, or circulating fluids.
- Passengers shall only be allowed in vehicles designed for passenger use. Do not ride on the outside of drill rigs, trailers, or other equipment.

Utility Clearance

Contractors will determine the location of all underground/overhead utilities before drilling operations take place. Project management shall contact Miss Utility to obtain written clearance. For areas that are not covered by Miss Utility or local utility companies (i.e., client specific utilities), clearance must be obtained from the AlexRenew. In addition to obtaining utility clearances, the appropriate party will make a utility survey of each drilling point. The utility survey shall include, but is not limited to; both magnetometer and ground-penetrating radar survey. Documentation that nearby utilities have been marked on the ground and that the drill site has been cleared shall be kept in the project trailer/support vehicle and communicated to the drilling Contractor. All utilities shall be identified on a job hazard analysis and communicated to all drilling and drill support personnel.

Prior to the start of site work each day, the drilling Contractor will inspect all drilling equipment. The inspections will be documented in the field records, and the records will be maintained at the site. The drilling equipment inspection must be repeated on a daily basis. Defective equipment shall be repaired prior to use.

The following are minimum specifications for performing maintenance on drilling equipment:

- Safety glasses shall be worn, at a minimum, when performing maintenance on a drill rig or on the drilling tools.

- Follow all manufacturers' recommendations for maintenance on drilling equipment.
- The drill rig engine shall be shut down before making repairs or adjustments to a drill rig or lubricating fittings (except repairs or adjustments that can only be made with the engine running). The operator shall remove keys and tag out the ignition. All systems (i.e., drill rotor, engine, pressurized lines, etc.) shall be at a "zero energy state" before performing maintenance.
- The leveling jacks shall be lowered, the wheels chocked, and the hand/parking brakes set before working under a drill rig.

Moving Drill Equipment

- Lower drilling mast before moving rig.
- Secure all loads to rig prior to off-road mobilization.
- Inspect the route of travel prior to moving the drill rig off-road. Be aware of holes, rocks, trees, erosion, and uneven surfaces.
- Remove all passengers from the cab before moving drill rig onto rough or sloped terrain
- Engage multiple drive power trains (when available) on rig vehicle when mobilizing off-road.
- Travel directly up or down grade on slopes when feasible. Avoid off-camber traverse approaches to drill sites.
- Approach changes in grade squarely to avoid shifting loads or unexpected unweighting.
- Use a spotter (person at grade) to provide guidance when vertical and lateral clearance is questionable.
- Use parking brake and chock wheels when grades are steep.

Raising the Derrick (Mast)

- Locate overhead utilities visually prior to raising the mast
- Treat overhead electrical lines as if they were energized and maintain at least a 40-foot clearance.
- Contractors will contact appropriate utilities agency to manipulate and deactivate overhead service in areas that interfere with drilling operations. Do not attempt to handle utilities.
- Stabilize and level each work site prior to drill rig setup. Do not drill on slopes near power lines, including drainage ditches, trenches, excavations, and other holes.
- The derrick must not be raised until the rig has been blocked, leveled (leveling jacks down), and chocked.
- Secure and lock mast according to manufacturer's recommendations prior to drilling.
- If required to perform work on the mast at heights above six feet, a full body safety harness and lanyard shall be work accordingly.
- Note wind speed and direction to prevent overhead utility lines from contacting rig derrick. Allow at least a 40-foot clearance between rig mast and utility lines, unless authorized by the CMA Site HSE Representative to operate at a shorter clearance distance.

Drilling

- Follow the manufacturer's operational or field manual's safety guidelines/specifications.
- Only authorized and trained drill rig operators shall operate a drill rig. Drill rigs shall be setup and operated according to manufacturer's specifications.
- Set up and delineate appropriate work zones. This may include an exclusion zone, contamination-reduction zone, and a support zone. When feasible, work zones shall be cleared of obstructions and leveled to provide a safe working area.

- Establish a communication system between driller, helpers, and other field support personnel for responsibilities during drilling operations.
- All personnel shall be instructed to “stand clear” prior to and during startup. Personnel shall stay as far away as possible from operating equipment, especially if a rig is located on unstable terrain (drilling operations shall not proceed on unstable ground).
- Begin auger borings slowly with the drive engine operating at low speed.
- Keep hands and feet clear of rotating augers and direct push equipment.
- Prevent placing hands or feet under auger sections during hoisting over hard surfaces.
- Avoid the removal of spoil cuttings with hands or feet.
- Assure drill rig is in neutral and the augers are not rotating before cleaning augers.
- Wear hearing protection as required.

Fall protection must be maintained around the hole at all times. At no time shall a worker go inside the rails, especially when the equipment is present. Each hole shall be sufficiently protected when work is not taking place.

8.5 Excavation and Trenching

The following factors are to be evaluated by a competent person and discussed before commencing excavation operations:

- Soil Structure: Excavations in wet soil, sandy soil, or areas that have been backfilled are relatively unstable and must be supported or sloped if employees are to enter the excavation.
- Weather Conditions: Changing weather conditions greatly affect the safety of working in and around excavations. Excess water from rain or snow loosens the soil, increasing the chance of the soil caving in. Excavation should be diked, pumped, or covered, to prevent an excessive amount of water from accumulating.
- Superimposed Loads: Superimposed loads in the vicinity of excavation walls increase the probability of a cave-in. Heavy equipment and materials should be kept back as far as possible. Heavy equipment should be placed on wooden mats or planking to spread the weight more evenly. Considerations must also be taken when buildings, curbs, trees, utility poles, and other structures are around the excavation. Excavated soil must be stored away from the edge of the excavation.

The following safe operating guidelines will apply to excavations exceeding 4 feet in depth.

- Prior to opening an excavation, all efforts shall be made to locate and mark all underground utilities. Miss Utility shall be contacted prior to any digging.
- Trees, boulders, and other surface encumbrances that create a hazard will be removed or made safe before excavation is begun.
- Excavated materials will be stored and retained at least 3 feet from the edge of the excavation. Walkways and sidewalks shall be kept clear of excavated materials.
- Special precautions shall be taken in sloping or shoring the sides of excavations adjacent to a previously backfilled excavation.
- If the excavation may affect the stability/integrity of an adjacent structure, it must be assessed by a qualified person prior to the work taking place.
- Diversion ditches, dikes, or other suitable means will be used to prevent water from entering an excavation

and for drainage of the excavation.

- When mobile equipment is used or allowed adjacent to excavations, stop logs or barricades will be installed. The grade will always be away from the excavation.
- Dust conditions during excavation will be kept to a minimum. Wetting agents shall be used upon the direction of the CMA.
- Employees subjected to vehicle traffic in excavating operations shall don reflective clothing. Excavations shall be inspected by a competent person prior to employees entering the space.
- When employees are required to work in an excavation 4 feet or deeper, one or more ladders shall be provided for access/egress. Within the trench, the maximum horizontal travel distance to a ladder shall be no more than 25 feet. The ladder shall extend a minimum of 3 feet above the excavation and be secured. This ladder shall not be removed until all employees have exited the excavation. All ladders will meet the requirements of 29 CFR 1926 Subpart X.

Soil or Rock Type	Horizontal to Vertical Ratio (Slope)	Degrees
Stable Rock	Vertical	90
Type A	¾: 1	53
Type B	1:1	45
Type C	1 ½: 1	34

- Excavations equal to or deeper than 5 feet which are entered by employees shall be sloped, shored, or supported by some

other protective system prior to entering the space.

- Guardrail or fences shall be placed at all excavations which are close to sidewalks, drives, or other thoroughfares. Adequate protection shall also exist at remote excavations where workers are not present.

Protective Systems

OSHA requires that a competent person inspects all excavations prior to employees entering them. If the competent person determines that a hazard or cave-in exists below 5 feet in depth, that competent person shall determine the necessary precautions to take. Once an excavation reaches 5 feet or more which will be entered by employees it shall be protected by at least one of the following options;

- Sloping or benching in accordance with the following diagram:

Maximum Allowable Slopes

Notes:

No soil classification is required if a 1 ½:1 slope (34-degree slope) is used. If a 1 ½:1 slope is not used, a soil classification must be made by a competent person. The excavation must then comply with the above minimum slope requirements.

- The second method of support is shoring, sheeting, tightly placed timber shores, bracing, trench jacks, piles, or other materials installed in a manner strong enough to resist the pressures surrounding the excavations.
- The third method is to use a trench box, which is a prefabricated movable trench shield made of steel plates, welded to a steel frame.
- The forth option is to follow a Registered Professional Engineer's design.

Hazardous Atmospheres

When Contractors perform excavation operations in areas where a hazardous atmosphere could reasonably exist (e.g., landfill, hazardous storage areas, underground/aboveground storage tanks, etc.) personnel will, at a minimum, apply these guidelines:

- Perform atmospheric testing in the anticipated breathing zone of the work area to determine oxygen content, combustible gas, and toxic gases and vapors, at a minimum, if applicable
- Employees will not perform work in areas with less than 19.5% oxygen without the appropriate respiratory protection or adequate ventilation.
- Employees will not perform work in an area with greater than a 10% lower explosive limit (LEL) level.
- Toxic gases will be evaluated on a per-site basis using direct-reading instrumentation (DRI).

Competent Person

The SSO or designated alternate will serve as the site's "competent person" for excavation operations. The designated competent person must meet the following qualifications:

- Has sufficient experience to identify existing and predictable hazards in the excavation surroundings, or working conditions which are unsanitary, hazardous or dangerous to employees, and has the authority to take corrective actions.
- Is a registered Professional Engineer (P.E.) in civil engineering, or
- Has completed a competent person training course in excavation safety which includes at a minimum, the following elements:
 - Soils classification and identification
 - Appropriate sloping/shoring methods
 - Shoring system types and construction
 - Operational safety practices
 - Inspection of excavations

The designated competent person will be responsible for:

- Performing a daily inspection of the excavation (to be documented on an Excavation Daily Inspection Checklist form)
- Overseeing excavation operations to ensure that they conform to the requirements of 29 CFR Subpart P.

8.6 Overhead Electrical Lines

Operation of heavy equipment and cranes in areas with overhead power lines represents a significant hazard to all personnel on the job site. Accidental contact with an energized lines or arcing between a high power line and grounded equipment can cause electrocution of equipment operators or nearby ground personnel, and damage to power transmission and operating equipment. While maintaining a safe distance from all energized lines is the preferred means for control of this hazard, site conditions may not always accommodate this. If work will (or may) occur within 50 feet of any energized lines, the procedures outlined below will be observed.

- Overhead power lines will be identified on each job site before the work commences. For each identified line, the Project Manager must determine whether it is energized (and the operating voltage for energized lines), and whether work operations will require that activities with heavy equipment (excavators, loaders,

cranes, etc.) will occur within 50 feet of the line. Unless verified, it will be assumed that all lines will be energized.

Hazard Prevention

Safe working distance is the minimum distance which must be maintained between any energized electrical line and any part of the operating equipment to maintain adequate safety margins, and is based on the line voltage of the power line. The following safe working distance criteria will be applied for all Operations:

Notes:

Source – American National Standards Institute, Publication B30.5

Where any work task will not allow the minimum safe working distance to be maintained at all times, an alternate means of protection must be identified and approved by the CMA. In order of preference, acceptable procedures are:

- De-energize the power line(s)
- Relocate the lines
- Install insulated sleeves on power lines
- Assign line spotters to assist the equipment operator (this method should only be used in conjunction with one of the methods above to increase safety. It is not allowed to be used in lieu of other means.)

Elimination of electrical power provides the most acceptable means of ensuring safety of personnel. While temporary site power lines are under the control of the site manager (and can be de-energized locally), electrical distribution and transmission lines can be de-energized only by the owner of the line, (generally the local electrical utility). Therefore, de-energizing of a line requires the advance coordination with the line owner – generally at least one week advance notice should be provided.

Insulating sleeves can be placed over power lines to provide a contact and arcing barrier if work must occur closer to the power lines than the accepted safe work distance. Although not as desirable as line de-energizing, the use of these sleeves can provide an acceptable alternative where electrical lines are required to remain in service.

As with de-transmission lines, sleeves can be owner. This requires line owner. To representatives of access to the job site.

Line Voltage	Minimum Safe Working Distance
0-50	10 feet
>50 – 200	15 feet
>200 – 350	20 feet
>350 – 500	25 feet
>500 – 750	35 feet
>750 – 1000	45 feet

energizing of distribution and placement of insulating performed only be the line advance coordination with the install the sleeves, the line owner will require

A line spotter is a person located at ground level who is assigned to observe equipment operations with the specific duty of assisting the equipment operator to ensure that no part of the equipment gets too close to an energized, unprotected electrical line. This method alone cannot be used if the required distances cannot be maintained.

Persons assigned to act as line spotters must meet the following requirements:

- While acting as a spotter, no other duties may be performed (e.g., the line spotter cannot also act as the load spotter during a lifting operation)
- The spotter will have a radio or other direct means of communicating with the equipment operator at all times.
- The spotter will be positioned at a right angle to the equipment operator's line of sight to maximize the sight angles between the personnel.

Under no circumstances will any portion of a piece of equipment pass closer than the required minimum distance to an energized, un-insulated electrical line.

The following additional safety measures can be implemented as needed when working around energized power lines:

- Provide equipment with proximity warning devices – these provide an audible alarm if any part of the equipment gets too close to a line.
- Install ground safety stops – these prevent vehicles from accidentally entering hazardous areas.
- Equip cranes with a boom-cage guard – this prevents the boom from becoming energized if an electrical line is contacted.
- Utilize insulated links and polypropylene tag lines – these prevent transmission of electricity to loads or tag line handlers if an electrical line is contacted.

NOTE: These additional safeguards are intended as supplemental protection. Use of these measures is not permissible as a substitute for maintaining the safe working distance or implementation of the safety procedures.

8.7 Welding, Cutting, and Other Hot Work

- Comply with AlexRenew Hot Work procedures (see Attachment 1.5 – AlexRenew's Hot Work Permitting Program)
- AlexRenew must be notified of any cutting or welding activities within any structure including Access Galleries (Tunnels) on the plant prior to the work being started. This notification is to allow AlexRenew to contact their Fire Alarm monitoring company and the City Fire Department to have them disregard fire alarms triggered by the heat or smoke of the welding operations.
- Equipment will be used only for operations for which it is approved, and as recommended by the manufacturer.
- Workers assigned to operate or maintain oxygen/fuel-gas supply equipment and resistance welding equipment will be thoroughly instructed in the safe use of such equipment by a qualified person.
- Where practicable all combustibles will be relocated at least 35 feet from the work site.
- Engineering controls will be implemented to control hot work hazards to the extent feasible.
- Before cutting or welding is performed, the area will be inspected by the supervisor responsible for authorizing hot work. When appropriate, a written Hot Work Permit will also be completed to designate specific approvals needed and precautions to be taken.
- A Fire Watch Form and Fire Watch person will be provided during and at least 30 minutes past the completion of the welding project if required by the Hot Work Permit.
- Special care must be taken whenever Hot Work is to be performed in or within 100 feet of any Class I Div. I area. This includes but is not limited to Hot Work in:

- Building A
- Building C
- Building K
- Building L
- Building M
- Building 20
- Building 55

Storage and Handling of Compressed Gas Cylinders

- Compressed gas cylinders will be legibly marked with either the chemical or trade name of the gas. Such markings will be stenciled, stamped, or labeled and will not be easily removable.
- The marking will be located on the shoulder of the cylinder.
- Compressed gas cylinders will be equipped with approved connections.
- Acetylene cylinders will be stored and used valve end up.
- Cylinders will not be stored near highly combustible/flammable materials, especially oil or grease.
- Cylinders will be stored in an upright and secure position with caps installed and separated from fuel-gas cylinders or combustible materials (especially oil or grease), by a minimum distance of 20 feet, or by a noncombustible barrier of at least 5 feet high and having a fire resistance rating of at least one half hour.
- Cylinders will not be dropped, struck by objects, or permitted to strike each other violently.
- Cylinder valves will be closed and gauges removed before moving cylinders.
- Cylinder valves will be closed and gauges removed at the end of the shift or when work is finished.
- Valves of empty cylinders will be closed.
- Cylinders will be kept far enough away from the actual welding/cutting operation so that sparks, hot slag, or flames will not reach them.
- Cylinder valves will always be opened slowly.
- An acetylene cylinder valve will not be opened more than one and one-half turns of the valve stem and preferable no more than three-fourths of a turn.
- Where a special wrench is required to operate a cylinder valve, it will be left in position on the stem of the valve when the cylinder is in use. In the case of manifolded or coupled cylinders, at least one such wrench will be available for immediate use.
- Regulators will be removed, valve caps in place, and valves closed when cylinders are transported by vehicles. All vehicles used to transport cylinders will have a proper support rack installed.
- A suitable cylinder truck, chain, or other steadying device will be used to prevent cylinders from being knocked over while in use or storage.
- Cylinders will not be placed where they may become part of an electrical circuit.
- Tapping of an electrode against a cylinder to strike an arc will be prohibited.

Eye and Face Protection

Eye and face protection will comply with the following:

- 29 CFR 1926.102

- Welding helmets and hand shields will be used during all arc welding/cutting operations, excluding submerged arc welding. Cutting/welding goggles will also be worn during arc welding/cutting operations. The goggles or glasses may be either clear or colored glass, depending on the type of exposure in welding operations. Helpers or attendants will wear proper eye protection.
- Safety goggles or other approved eye/face protection are for use during gas welding operations in light work, torch brazing, or inspection.
- All operators and attendance on resistance welding or brazing equipment will use face shields or goggles, depending on the particular job.

Protective Clothing

Hot work will require the following protective clothing:

- Except when engaged in light work, all welders will wear flameproof gauntlet gloves.
- Flameproof aprons made of leather, or other suitable material, may also be desirable for protection against radiated heat and sparks.
- Woolen clothing will be worn in preference to cotton because it is not so readily ignited. Nylon clothing is not permitted for welding/cutting operations. All outer clothing, such as jumpers or overalls, will be reasonable free from oil or grease.

Fire Watch

- When required, a fire watch will be maintained for at least 30 minutes after completion of welding/cutting operations so that possible smoldering fire can be detected and extinguished. This includes breaks and lunches. Firewatchers will have fire-extinguishing equipment readily available and be trained in its use.
- Firewatchers will be familiar with facilities and procedures in the event of a fire. They will watch for fires in all exposed areas and attempt to extinguish them only when obviously within the capacity of the equipment available. The City Fire Department will be immediately notified of all fires.

8.8 Heavy Equipment

Field operators that involve heavy equipment represent a significant hazard to ground workers as well as heavy equipment operators. Heavy equipment may cause serious injury or death as a result of a rollover, contact with ground personnel, and pinch points. All personnel working at or visiting a site where heavy equipment operations occur shall read and abide by the requirements of this procedure.

Communications

Communications between site supervisors/managers, heavy equipment operators, and other site personnel is a key method of preventing serious injury or death during heavy equipment operations. The following outline the communication requirements during heavy equipment operations:

- Contractor Site supervisors/managers shall ensure that all operators are notified/informed of when, where, and how many ground personnel will be working on the site.
- Contractor Site supervisors/managers shall inform ground personnel before changes are made in the locations of designated areas.
- If required to work near heavy equipment, ground personnel shall use industry standard hand signals to communicate with operators.
- Always maintain eye contact with operators to the greatest extent possible (always face equipment). Never approach equipment from a blind spot or angle.
- All heavy equipment shall be equipped with reverse warning devices (i.e., backup alarms) that can be significantly heard over equipment and other background noise. Reverse signaling lights shall be in working order.

- When feasible, two-way radios shall be used to verify the location of nearby ground personnel.
- When an operator cannot adequately survey the working or traveling zone, a guide shall use a standard set of hand signals to provide directions. Flags or other high visibility devices may be used to highlight these signals.

Clearance

Ground clearance around heavy equipment may significantly reduce hazards posed during heavy equipment operations. The following outline the clearance requirements during heavy equipment operations:

- Ground personnel shall always yield to heavy equipment.
- Ground personnel shall maintain approximately 100 feet of clearance from all active heavy equipment, unless an approved, job-specific hazard analysis that identifies any special precautions is completed and communicated to the appropriate operators and ground personnel. Contractor Site supervisors/managers shall designate areas of heavy equipment operation and ensure that all ground personnel are aware of designated areas. Designated areas shall include boundaries and travel routes for heavy equipment. Travel routes shall be set up to reduce crossing of heavy equipment paths and to keep heavy equipment away from ground personnel.
- When feasible, site supervisors/managers shall set up physical barriers (e.g., caution tape, orange cones, and concrete jersey barriers) around designated areas and ensure that unauthorized ground personnel do not enter such areas.
- Operators shall stop work whenever unauthorized personnel or equipment enter the designated area and only resume when the area has been cleared.
- Operators shall only move equipment when aware of the location of all workers and when the travel path is clear.
- Ground personnel shall never stand between two pieces of heavy equipment or other objects (i.e., steel support beams, trees, buildings, etc.)
- Ground personnel shall never stand directly below heavy equipment located on higher ground.
- If working near heavy equipment, ground personnel shall stay out of the travel and swing areas (excavators, all-terrain forklifts, hoists, etc.) of all heavy equipment.
- Ground personnel shall never work near heavy equipment during times of inadequate lighting.
- Personnel shall keep all extremities, hair, tools, and loose clothing away from pinch points and other moving parts on heavy equipment.

Personal Protective Equipment

At a minimum, all ground personnel and operators outside of heavy equipment shall wear the following:

- High visibility, reflective safety vest that is visible from all angles and made of fluorescent material and orange, white, or yellow reflective material (ensure that vest is not faded or covered with outer garments, dirt, etc.)
- ANSI-approved hard hat
- ANSI-approved safety glasses with side shields
- ANSI-approved hard toe safety boots
- Hearing protection as needed
- Appropriate work uniform (i.e., full length jeans/trousers and a sleeved shirt; no tank, crew tops or loose clothing permitted).

Utilities

When contacted by heavy equipment, aboveground and underground utilities may cause severe injuries or death as a result of electrocution, explosion, etc. The following outline the requirements while performing heavy equipment operations that may lead to contact with aboveground or underground utilities:

- Always be aware of surrounding utilities
- Ensure all equipment (i.e., dump trailers, loaders, excavators, etc.) is lowered prior to moving underneath of aboveground utilities.
- Ensure utilities are cleared and identified prior to beginning any earthwork moving operation. Contact the local utility service providers for clearance prior to performing work.

Training, Inspection, and Maintenance

- Only designated, qualified personnel shall operate heavy equipment.
- Operators shall have all appropriate local, state, or federal licenses or training to operate a designated piece of heavy equipment.
- Operators shall be evaluated through documented experience (resume) and a practical evaluation of skills (field tests). Operators shall be knowledgeable and competent in the operation of a designated piece of heavy equipment.
- All heavy equipment shall be inspected and, if necessary, repaired prior to use. Operators shall not operate heavy equipment that has not been cleared for use. All machinery and mechanized equipment will be certified to be in safe operating condition by a competent individual seven days prior to on-site operation, and is valid for one year.

Operation

- All heavy equipment shall be operated in a safe manner that will not endanger persons or property.
- All heavy equipment shall be operated at safe speeds.
- Always move heavy equipment up and down the face of a slope. Never move equipment across the face of a slope.
- Slow down and stay as far away as possible while operating near steep slopes, shoulders, ditches, cuts, or excavations.
- When feasible, operators shall travel with the “load trailing,” if the load obstructs the forward view of the operator.
- Slow down and sound horn when approaching a blind curve or intersection. Flagmen equipped with 2-way radio communications may be required to adequately control traffic.
- Operators shall remain in cab while heavy equipment is being loaded.
- Always keep heavy equipment in gear while in operation. Do not place in neutral.
- All heavy equipment shall be shut down prior to and during fueling. Do not smoke or use electrical devices while fueling. Fuel shall not be carried in or on heavy equipment, except in permanent fuel tanks or approved safety cans.
- Turn off heavy equipment, place gear in neutral, and set parking brake prior to leaving vehicle unattended. Also, place buckets and blades on the ground and place hydraulic gear in neutral. Heavy equipment parked on slopes shall have the wheels chocked.
- Never jump on to or off a piece of heavy equipment.
- Never exit heavy equipment while it is in motion.

- Passengers shall only ride in heavy equipment designed for occupancy of passengers.
- Never ride on the outside of a piece of heavy equipment (e.g., tailgates, buckets, steps, etc.).
- Site vehicles must be parked in a safe place away from heavy equipment.
- Operators shall never push/pull “stuck” or “broken-down” equipment unless a spotter determines that the area is cleared of all personnel around and underneath the equipment.
- Operators shall wear seatbelts at all times while operating heavy equipment.
- If designated for work in contaminated areas/zones, equipment shall be kept in the exclusion zone until work or the shift has been completed. Equipment will be decontaminated within designated decontamination areas.
- Equipment left unattended at night adjacent to traveled roadways shall have appropriate lights or reflectors, or barricades equipped with appropriate lights or reflectors, to identify the location of that equipment, and shall not be closer than 6 feet (or the regulatory requirement for the work location) to the active roadway.
- Pneumatic-tired earthmoving haulage equipment, with a maximum speed exceeding 15 miles per hour, shall be equipped with fenders on all wheels.
- Lift trucks shall have the rated capacity clearly posted on the vehicle, and the ratings are not exceeded.
- Steering or spinner knobs shall not be attached to steering wheels. High lift rider industrial trucks shall be equipped with overhead guards. When ascending or descending grades in excess of 5%, loaded trucks shall be driven with the load upgrade.
- All belts, gears, shafts, pulleys, sprockets, spindles, drums, flywheels, chains, or other reciprocating, rotating or moving parts of equipment shall be guarded when exposed to contact by persons or when they otherwise create a hazard.
- All hot surfaces of equipment, including exhaust pipes or other lines, shall be guarded or insulated to prevent injury and fire.
- All equipment having a charging skip shall be provided with guards on both sides and open end of the skip area to prevent persons from walking under the skip while it is elevated.
- Platforms, footwalks, steps, handholds, guardrails, and toeboards shall be designed, constructed, and installed on machinery and equipment to provide safe footing and access ways.
- Substantial overhead protection shall be provided for the operators of fork lifts and similar equipment.

8.9 Traffic/Pedestrian Safety

The following requirements can be implemented for simple work operations occurring on or near roadways. The Contractor will utilize flagmen during activities that require work in local streets and/or schools/pedestrian crossings.

- Work activities by Contractors will not restrict emergency vehicle access
- Follow the Virginia Work Area Protection Manual on Standards of Traffic Control when necessary
- Use of Signs and Cones to Direct Traffic: Traffic signs and cones are used to direct traffic away from and around personnel. Cones and signs are effective only if they give oncoming drivers enough time to react and make it clear how traffic should react.
- Signs and Traffic Control Devices: Signs are required in addition to cones in almost all traffic control situations.
- “Road Work Ahead” or “Men Working” are the basic warning signs. They are orange, a minimum of 48"x 48" square, and equipped with a self-supporting base. In general, advanced signs should be placed well ahead of the cone taper to warn traffic of the upcoming controls. If required by law, they can be placed on the roadside in advance of the cone taper.

- Directional Arrow signs should be placed ahead of the cone taper to clearly indicate which direction traffic should flow.
- Warning Flags are often put in cones at the leading edge of a taper to make the taper more prominent. They have no legal status and are not to be used on AlexRenew projects. Use a “Road Work Ahead” sign instead.
- Additional protection will be provided by City of Richmond Police in high-traffic areas to include residential areas and pedestrian crossings.

8.10 Flammable and Combustible Materials

- Storage containers in storage racks are to be stored a minimum of 50 feet from the nearest structure. All containers are to be electrically grounded. Drip trays are to be provided under container spigots.
- When transferring a flammable/combustible liquid an electrical bond (metal-to-metal) is to be established between the two transfer containers prior to transfer. Storage containers are to be equipped with an approved safety faucet and flexible metal hose. A pressure-vacuum relief vent is required for containers of flammable liquids. Metal-to-metal contact may also be established by using a grounding strap.
- Spill containment is required for all solvent dispensing areas. The secondary containment dike will be designed for 110 percent of the maximum stored solvent volume, with the capacity for 24-hour holding time.
- The maximum amount of flammable solvent (used for cleaning purposes) at any workstation is limited to one quart. Variance from this requirement requires the prior approval of the City of Alexandria Fire Marshal.
- Maximum use must be made of fireproof metal cabinets to store flammable liquids inside any structure.
- Rags, kimwipes, etc., that are contaminated with flammable liquids are to be placed in a safety container equipped with a fusible link lid.
- All containers of flammable liquids must be properly identified as to contents.
- All manually handled flammable liquids shall be handled in approved safety containers. The exception is pint-sized squirt bottles.
- Where flammable solvents must be used in wash containers, such as for paint sprayer cleaning, the container must be provided with a self-closing or fusible lid.
- Flammable liquid in portable containers in excess of the amount required for one day of use must be stored in approved flammable liquid storage cabinets.
- Flammable storage cabinets will be kept closed, and will be latched each time after use.
- “NO SMOKING” signs are to be posted in areas where flammable liquids are stored, dispensed, or used.
- An adequate supply of fire extinguishers will be located to support each area where flammable or combustible liquids are handled or stored.

Additional information and requirements for handling and storage of specific flammable liquids are detailed in Material Safety Data Sheets (MSDS), which must be obtained and maintained on site for each solvent in use.

8.11 Compressed Gases

Compressed air or other compressed gases in operating pressures exceeding 10 pounds per square inch gauge (psig) are not to be used to blow dirt, chips, or dust from clothing while it is being worn. Compressed air for other types of cleaning (other than clothing/personnel) is limited to 30 psig.

The use of blown compressed air is to be controlled, and proper personal protection equipment or safeguards utilized, to protect against the possibility of eye injury to the operator or other persons.

Compressed air or gases are not to be used to empty containers of liquids in cases where the operating pressure

can exceed the safe working pressure of the container.

Compressed gases are not to be used to elevate or otherwise transfer any hazardous substance from one container to another unless the containers are designed to withstand the operating gas pressure with a safety factor of at least four.

Compressed Gases (Cylinders)

- Cylinders are not to be used unless they bear Department of Transportation (DOT) markings showing that they have been tested as required by DOT regulations.
- Cylinders must never be dropped, struck, or permitted to strike each other violently. Cylinders may be moved by tilting and rolling them on their bottom edges.
- Valve protection caps must always be kept on cylinders when they are being moved or stored, and until ready for use.
- Cylinder valves are to be kept closed except when gas is being used or when connected to a permanent manifold. Valves of empty cylinders must be closed.
- Cylinders must never be used as rollers or supports, or for any purpose other than carrying gas.
- Cylinders of compressed gas shall be stored in areas where they are protected from external heat sources such as flame impingement, intense radiant heat, electrical arc, or high-temperature steam lines.
- Cylinders are to be stored in an assigned area, with full and empty cylinders stored separately. Stored fuel gases and oxygen cylinders are to be separated by at least 20 feet, or by a fire wall of at least 5 feet high that has a fire-resistance rating of at least ½ hour.
- Oxygen, nitrogen, helium, or Freon cylinders may be stored or transported either in an upright or horizontal position. Acetylene cylinders must always be kept in an upright position. All horizontally placed cylinders are to be secured by chocks or ties to prevent rolling.
- Cylinders are to be secured to a fixed object by chain or equivalent fastening device whenever they are placed in an upright position. The protective cap is not to be removed or the cylinder valve opened until the cylinder is secured.
- Repair of leaks must never be attempted on a pressurized system. System pressure should be reduced to atmospheric pressure as rapidly as possible, and the supervisor notified immediately.
- Compressed gas cylinders must be legible marked for the purpose of identifying the gas content with either the chemical or trade name of the gas. Such marking is to be by means of stenciling, stamping, or labeling, and must not be readily removable. Whenever practical, the marking is to be located on the shoulder of the cylinder. Positive identification of the gas in any cylinder is required before connecting cylinders for use.
- Compressed gas cylinders in portable service are to be conveyed by suitable trucks, to which they are securely fastened. All gas cylinders in service must be securely held in substantial racks or secured to other rigid structures so that they will not fall or be knocked over.
- Gas cylinders moved by hoist must be handled in suitable cradles or skip boxes. Any slings used for this purpose must be specifically designed for that cylinder handling.
- Cylinders must not be placed where they might form part of an electrical circuit.
- Transfer of acetylene from one cylinder to another or mixing of gases in a cylinder is prohibited.
- Oxygen cylinders are never to be stored near:
 - highly combustible materials, especially oil and grease;
 - reserve stocks of acetylene or other fuel gas cylinders; or
 - any other substance likely to cause or accelerate fire.

- Compressed oxygen is never to be used: as
 - breathing air;
 - to purge pipelines, tanks, or any confined area;
 - to supply a head-pressure tank;
 - in pneumatic tools;
 - in oil preheating burners;
 - to start internal combustion engines;
 - for ventilation;
 - for cleaning clothing; or
 - in any other way as a substitute for compressed air.

8.12 Underground Work

A mandated pre-job meeting will be held prior to the start of the underground work. Participants include all interested parties such as state representatives if needed, CMA, Contractors, and fire and law enforcement representatives.

The pre-job meeting subject items will include all of the following facets of the work:

- Personnel requirements
- Ventilation
- Excavation
- Ground support
- Diesel engine operation
- Emergency plans
- Codes of safe practices
- Rescue crew and first aid procedures
- Protective equipment requirements
- Underground communication systems
- Fire prevention and control
- Explosives safety (if used)
- Dust control
- Transportation and haulage
- Electrical equipment
- Lighting requirements
- Laser safety
- Occupational exposure sampling.

General Safety

- The Contractor Site Supervisor will ensure that every reasonable effort is taken for the safety and health of employees, whether or not specified in this procedure.

- Fence, cover, over or otherwise safeguard to control unauthorized entry underground.
- At least one designated employee must be on outside duty when anyone is working underground.
- A check-in/check-out procedure will be provided at the surface that will ensure those aboveground can accurately determine and identify those underground.
- Unnecessary accumulations of water, muck, timber rails, and similar materials will be avoided underground.
- Gunite, shotcrete, and pump-crete lines will be secured to prevent uncoupling of sections under pressure.
- Air hose ($\frac{3}{4}$ inch or larger) requires a safety device (whip check) to prevent the hose or line from whipping if disconnected under pressure.
- Inform oncoming shift of any hazardous occurrences or conditions.
- Any buried air, fuel, or utility line requires a “buried line” caution sign. Overhead utility lines should be marked also to prevent accidental contact.

All employees involved with underground work will be instructed in hazard recognition and measures to take to eliminate the hazards including:

- Air monitoring and ventilation
- Illumination
- Communications
- Flood control
- Personal protective equipment
- Emergency procedures, including evacuation plans
- Check-in/Check-out procedures
- Explosives
- Fire prevention and protection
- Mechanical equipment

8.13 Poisonous Plants, Insects and Animals Indigenous to Virginia

Plants

- *Giant Hogweed* can be identified by its height, the size of the leaves and its flower clusters. It grows to be approximately 15 feet tall with leaves spanning 2-5 feet. It has a thick green stem with purple areas and hairy flower stalks. A combination of contact with the sap from this plant and exposure to the sun can cause painful burning blisters within 24 to 48 hours. It can also cause purple and black painful scars.
- *Blue-Green Algae* technically known as cyanobacteria, are naturally occurring and found in lakes and streams. The algae become very abundant in warm undisturbed waters. Exposure to the algae in small quantities over a long period of time or large quantities of a short period for time can cause liver damage and/or damage to the nervous systems.
- *Poison Ivy or Poison Oak* grows in a vine or a shrub formation. The tissues of these plants contain poisonous oil which is irritating to the skin. The leaf formation is two leaves on the side and one down in the middle. The edge of the leaf has varying amounts of notches. In the spring the poison ivy is a red color. Later in the spring they become a shiny green. In autumn the leaves turn yellow, red, and orange. Small greenish flowers grow in bunches close to the leaf joins, later in the season berries form that are whitish and waxy looking. Wash the area several times with soap water if exposure is confirmed. If blisters, redness, and/or itchiness develop, treat with calamine lotion, Epsom salts, or bicarbonate of soda.

Poisonous Insects and Animals

- *Fleas, mites, and chiggers* are not poisonous but can cause skin irritation. Symptoms of a bite may include small, raised lesions, pain or itching, inflammation of the skin, allergic-type reactions in people that are hypersensitive. Clean the affected area with soap and water. Call a physician if the pain or itching persistent or there are signs of infection, and/or if you have a fever.
- *Tick bites* can have similar skin irritations as the fleas, mites and chigger bite but can also carry Lyme Disease. The following are symptoms of Lyme Disease: a rash at the site of the bite, have flu like symptoms, fever, headache, nausea, jaw pain, sensitivity to light, red eyes, muscle aches and/or a stiff neck. See your doctor immediately.
- *Black and Yellow Argiope female spider* spins its web in a circle. The male will spin a smaller web with a zigzag pattern. The female grows to be inch and a half long. The male grows to be $\frac{3}{4}$ inch long. The spider has a small front body section with silver hairs on it. The abdomen (large back section) is egg shaped with black and yellow coloring. The spider lives in fields and gardens in shrubs, tall plants and flowers.
- *Black Widow Spiders* are a venomous spider. It injects a small amount of poison when it bites. Reports indicate the human mortality rate is less 1%. The female Black Widow is shiny black, usually with a reddish hourglass shape on the underside of her spherical abdomen. Her body is about .5 inches long, 1.5 inches when the legs are spread. Adult males are harmless to humans, about half the female's size, with smaller bodies, and longer legs and usually have yellow and red bands and spots over the back as do the immature stages. Their webs are erratic in appearance, and the silk is stronger than almost all other spiders.
- *Brown Widow Spider* is not as dangerous as some other widow spiders because the Brown Widow Spider is less likely to bite someone and injects less poison.
- *Fire Ants* can inflict painful stings. The ant mounds are found in warm, sunny locations such as landscape beds, lawns, around trees and shrubs, along sidewalk cracks and against buildings. If disturbed, these ants are generally aggressive and can inflict painful stings.
- *Timber Rattlesnakes* are venomous snakes. They measure from 3-3.5 feet or more in length. Two color patterns are commonly found: a yellow phase, which has black or dark brown cross bands on a lighter background color of yellow, brown or gray, and a black phase, which has dark cross bands on a dark background. Scales are ridged, giving this rattlesnake a rough-skinned appearance. The timber rattler has a broadly triangular head with many small scales on the crown of the head bordered by a few large scales.
- *Northern Copperheads* are venomous snakes. Northern Copperheads are medium-sized snakes. Adults typically range in length from 26 to 42 inches. The distinctive feature is the copper or bronze-colored top and sides of the head. This species also uses camouflage, in the form of tan, brown and rust-colored bands that allow the copperhead to disappear easily into dried up, fallen leaves, sticks and limbs.
- *Eastern Cottonmouths* are venomous snakes. Cottonmouths or water moccasins are common residents of southeastern swamps; however, they can be found in almost any wetland within their range. This species is highly variable in coloration, but is usually plain brown or olive with darker blotches or bands. These snakes average 3 to 3 1/2 feet long and are very stout-bodied. Cottonmouths have a reputation for being vicious and aggressive. When confronted cottonmouths will often stand their ground and not retreat.

8.14 Bloodborne Pathogens

Contractors shall include safety measures which address Bloodborne pathogens that may be present at wastewater collection and treatment facilities.

8.15 Mosquito Control Program Compliance

Contractors shall include safety measures which comply with the Owner's Mosquito Control Program (see Attachment 1.8 – Owner's Mosquito Control Program).

8.16 Protection of the Public

Contractors shall take all necessary precautions to prevent injury to the public or damage to property of others. The “Public” is defined as all persons not employed by a Contractor or not under contract with Developer. The Contractor Safety Director shall review installation of temporary barriers and/or fencing designated to protect the Public. Precautions shall include but not be limited to the following:

1. When necessary to maintain public use of work areas, the Contractor shall protect the Public in accordance with the applicable regulations.
2. Appropriate warnings, signs and instructional safety signs shall be conspicuously posted where necessary. In addition, a signal person shall control the moving of motorized equipment in areas where the public might be endangered. All signage warnings and traffic control shall comply with applicable regulations and Law, including but not limited to, requirements imposed by the Maryland State Highway Administration and Prince George’s County Fire/EMS Department. Required signs and symbols shall be visible at all times when work is being performed and shall be removed or covered promptly when the hazards no longer exist.

9.0 RESPIRATORY PROTECTION

Contractors, who plan to use respirators as a part of their work operations, are required to forward to the CMA copy of their written Respiratory Protection Program.

Refer to 29 CFR 1910.134 for requirements of this OSHA standard.

10.0 HSE SURVEYS

The CMA and the AlexRenew Safety Manager may conduct periodic HSE surveys of the site. There will be an interval of self-inspections conducted every two weeks with documentation of results sent to the Site/Project management. Any HSE discrepancy observed shall be reported to the appropriate Contractor representative for immediate correction.

These HSE surveys do not relieve Contractors of their responsibility to self-inspect their work on a regular basis and document audit results with appropriate corrective action(s) with copies and communication sent to CMA and to conduct their work in a safe and environmentally compliant manner.

11.0 PLANNING AND OBSERVATION PROCEDURES

In order to achieve the AlexRenew’s goal of Zero Incidents, the following shall be implemented by the Contractor. The SPA, the TSA, and the SOR process require each worker to receive on-the-job training from their direct Supervisor. Contractor employees shall also be trained and educated on their individual responsibilities contained in these tools by the Contractor after mobilization.

11.1 Safe Plan of Action

The Safe Plan of Action (SPA) is developed by the crew assigned to perform the work with guidance from their Supervisor. The Supervisor identifies the work area and task to be performed and then leads the crew in developing a Safe Plan of Action.

Creating the SPA requires the Supervisor to solicit crew participation in identifying hazards and hazard control measures such as PPE, training requirement, permits, procedures, etc.

Members of the team are required to review and sign the SPA document on a daily basis to indicate their participation, their understanding of the plan, and their agreement to follow the plan.

Examples of activities that require an SPA or JHA include but are not limited to:

- Potential for collapse (work in trenching, tunneling, may include demolition, etc.)
- Potential release of stored energy (electrical, pressure, explosive, static, etc.)

- Crane supported work platform use
- Critical crane lifts (two cranes used to lift one load and/or lift limits exceeding 75%)
- Non-routine crane operation as determined by regulatory agencies, Owner, and Contractor
- Potential exposure to uncontrolled hazardous materials or wastes
- Abrasive/Sandblasting, Hydro blasting, etc.
- Potential injury from burns, both chemical and thermal
- Respirator use
- Potential oxygen-deficient environments
- Entry into confined space
- Potential of entanglement in, on, or between objects
- Work on public streets and highways
- Lockout/Tagout
- Operations involving fall exposures
- Operations involving fall exposures
- Structural Steel Erection
- Use of new or Hazardous Materials, procedures, equipment
- Powder actuated tool use
- Suspended scaffolds
- Scaffold erection/dismantling
- Work on live electrical systems
- Prevention of utility strike (Overhead and Underground)

11.2 Task Safety Awareness

The Task Safety Awareness (TSA) meeting is a daily HSE briefing associated with the task(s) that are scheduled for the crew during the work shift.

These meetings generally take from two to ten minutes and address the HSE measures specific to the tasks.

TSA meetings shall be conducted at least daily and whenever a task presents a change of hazards from the previous tasks.

11.3 Safety Observation Reports

The Safety Observation Report (SOR), is a proactive process designed to identify and document HSE-related acts and conditions in the work environment. All Contractor's supervisors are required to participate in the SOR process by generating written SORs and turning them in to the CMA Site/Project Management at least weekly.

The SOR allows any site worker to record observed proper or improper HSE practices and identifies the cause of any deficiencies so that corrective action can be taken.

12.0 ACCIDENT/INCIDENT INVESTIGATION

A formal accident investigation must be conducted when an accident occurs, including non-injury incidents, most first-aid type accidents, and environmental releases or spills.

- 12.1 In the event of a workplace accident, injury, or illness, the most important immediate actions are to provide medical assistance to those who may need it and to ensure the safety of others that may be affected or acting as emergency responders.
- 12.2 Securing the accident scene is essential to ensure an effective accident investigation. No materials or equipment shall be moved made until a review of the accident is completed, except when securing

equipment or materials that could result in further injury.

- 12.3 Obtain witnesses' names, permanent addresses, and signed statements of their complete factual observations.
- 12.4 All accident investigations must be documented using the Accident Investigation Report. All required reports should be completed and copies provided within 24 hours to the CMA Site/Project Manager.

13.0 DRUGS, ALCOHOL, AND CONTRABAND

AlexRenew strictly prohibits the use, sale, attempted sale, manufacture, possession, distribution, cultivation, transfer, or dispensing of any illicit substance. This includes the use or possession of prescription medications without a valid prescription.

CMA and all Contractors shall implement a Drug, Alcohol, and Contraband Policy, including post incident testing, which meets the requirements of the CMA's policy. Key elements of the CMA's policy, except where prohibited by law, are:

- **Pre-access/Pre-assignment testing** current to within six months prior to initial assignment to work on the AlexRenew project.
- **Post-incident testing** of any worker involved in a project-related workplace incident that results, or could have resulted, in injury to any person requiring medical treatment beyond first aid, any type of medical attention given by a third-party medical services provider (hospital, clinic, doctor, etc.), a motor vehicle incident, or property damage. Post-incident testing must be conducted as soon as possible after the incident occurs.
- **Reasonable suspicion testing upon reasonable suspicion** by CMA or Contractor management that a worker is under the influence of a prohibited substance. In such cases, worker(s) shall be immediately removed from the project and surrender their project credentials. Personnel so removed may only be allowed to return with a negative test result and written permission of the CMA.
- **Periodic random or unannounced testing** for workers randomly selected or chosen by job classification or worksite. The percentage of the workforce, or the number of workers, selected for testing shall be specified on a project specific basis and stated in the project's Hazard Assessment Safety Action Plan.
- Possession or use of alcohol in a CMA-, AlexRenew-, or Contractor-provided vehicle is prohibited.
- Any worker whose drug or alcohol test is positive will be removed from the project and required to surrender their project credentials.
- Refusal to submit to drug or alcohol testing, or attempts to tamper with, adulterate, dilute, or otherwise tamper with a test sample will be treated the same as a positive test result.
- Contractor shall adopt collection, chain-of-custody, and other related procedures consistent with sound industry practice.
- The AlexRenew drug and alcohol testing requirements may be more stringent than the CMA minimums. If so, AlexRenew's requirements shall be enforced. If the CMA suspects that a worker is in possession of illegal drugs, alcohol, or contraband, the CMA may request that the individual voluntarily submit to a search of his or her person, personal effects, vehicles, lockers, and baggage. The CMA may also conduct random searches of individuals entering or leaving the work site. All searches will be performed by local law enforcement.
- Any suspected contraband will be confiscated and may be turned over to law enforcement, as appropriate. If an individual is asked to submit to a search and refuses, that individual will be considered insubordinate, will surrender their project credentials, will be escorted off the job, and will not be allowed to return.
- CMA shall have the right to review the Contractor's Drug, Alcohol, and Contraband Policy and to audit the

Contractor's implementation of their program at the jobsite.

- Contractors shall comply with all applicable federal, state, and local alcohol and drug-related laws and regulations.

14.0 MEDICAL AND EXPOSURE MONITORING

Contractors involved with operations, such as those involving hazardous waste, asbestos or lead abatement, certain carcinogenic compounds, etc., shall describe their medical and exposure monitoring procedures and their proposed compliance methods in their HSE Action Plan or HASP.

Employees involved in these operations shall have met, prior to any fieldwork activity or exposure, the medical requirements of applicable regulations or standards, including, but not limited to, a baseline medical exam and periodic update exams, as required.

Employee medical requirements and limitations shall be considered prior to the use of certain types of PPE, such as respirators.

15.0 IMMINENT DANGER SITUATIONS

Upon discovery of any situation that may, in the opinion of the AlexRenew or CMA, reasonably be expected to cause serious physical harm, illness, death, or significant environmental damage, the Contractor Site/Project Management or HSE representative shall suspend the related work immediately. Work may resume only after the HSE concern(s) have been corrected, to the satisfaction of AlexRenew and CMA.

Examples of "imminent danger" situations may include, but are not limited to the following:

- Visual observations of contamination, waste, etc. in a non-HAZWOPER work area
- Falls from elevations
- Excavations not properly sloped or shored
- Electrocution hazards
- Work activities posing injury hazards to the general public
- Operation of vehicles, machinery or heavy equipment in an unsafe manner
- Improper Lock Out/Tag Out procedures

In addition to the immediate suspension of work, the procedure for correction of imminent danger situations follows the "HSE Adherence Policy" set forth below. If site personnel are required to evacuate the area, personnel will exit through designated emergency routes and gather in a designated area for a head count, etc.

16.0 HSE ADHERENCE POLICY

Contractors are required to comply with the applicable HSE requirements and regulations. The procedures below

outline a three-step, progressively administered system to correct compliance problems. However, if in the opinion of the AlexRenew non-compliance issues are considered to be severe, Contractors' contracts may be terminated at any time. **Note that the Contractor's Site-Specific Health and Safety Plan shall include similar procedure between the Contractor and its employees and subcontractors.**

16.1 Action Level One

If a Contractor fails to comply with an applicable HSE standard, Site/Project Management will issue a written "Letter of Non-Compliance" to the Contractor's site representative (See Appendix C - Letter of Non-Compliance). Site/Project Management will also forward a "Warning Letter for HSE Non-Compliance" and a copy of the Letter of Non-Compliance to the Contractor's President or Operations Manager.

16.2 Action Level Two

If item(s) of HSE non-compliance are not corrected by Action Level One, or if the Contractor repeatedly fails to comply with the applicable HSE regulations, the AlexRenew Safety Manager will issue a "Written Notice of Temporary Job Suspension" to the Contractor. The Contractor's work may not resume until the AlexRenew Safety Manager, Site Project Management and the Contractor's Division Manager or equivalent have met and the Contractor has proposed corrective actions that are acceptable to the AlexRenew Safety Manager and CMA.

Actions that may be considered include, but are not limited to:

- Removal of certain Contractor personnel from the project,
- Alteration of the Contractor's job procedures, or
- Implementation of corrective action by AlexRenew with back charges to the Contractor.

The Contractor shall not resume work until the CMA accepts the proposed corrective actions. CMA will document and keep on file the meeting results in the form of meeting minutes.

15.3 Action Level Three

If Action Levels One and Two do not result in the Contractor's HSE performance being brought into compliance, contract termination may result. AlexRenew may terminate the contract after verifying with the AlexRenew Safety Manager that the HSE adherence procedure has not been followed and after giving the Contractor applicable notice. Contractors that have a contract terminated in accordance with this procedure are ineligible to participate in future AlexRenew projects until they have implemented and demonstrated corrective actions to improve their deficiencies. Only written approval from the AlexRenew's Engineer - Director can reinstate a Contractor's eligibility.

Construction Safety & Health Manual for Contractors

Appendices A-C

TABLE OF CONTENTS

APPENDIX A - LETTER OF NON-COMPLIANCE

**APPENDIX B - EMPLOYEE/SUPERVISOR CERTIFICATION FORM FOR VERIFYING
REVIEW BY THE EMPLOYEE AND THE SUPERVISOR OF
ALEXRENEW'S NEW HIRE SAFETY ORIENTATION REQUIREMENTS**

APPENDIX C - MONTHLY CONTRACTOR SAFETY REPORT

**APPENDIX D – (IF INCLUDED) OVERVIEW AND GUIDANCE FOR SPECIFIC ASPECTS
OF CONTRACTOR SAFETY PROGRAMS**

APPENDIX A

LETTER OF NON-COMPLIANCE

TO: _____ DATE: _____

PROJECT: _____ JOB NAME/NO: _____

It has been determined that your company is responsible to correct the following unsafe condition:

IF A RESPONSE IS NOT RECEIVED BY _____, THE OWNER AND/OR THE GENERAL CONTRACTOR WILL TAKE ACTION TO CORRECT THIS MATTER AND THE COST FOR SAME WILL BE DEDUCTED FROM YOUR COMPANY'S CONTRACT AMOUNT.

Signed: _____ Date: _____

Title: _____

CONTRACTOR/SUBCONTRACTOR RESPONSE:

I will correct the above noted condition by: _____.

Comments:

Signed: _____ Date: _____

Name, Title, Company

DISTRIBUTION: Owner/Resident Engineer

Contractor Superintendent

Contractor Safety

Other/File Other/File

APPENDIX B

Contractor: _____

AlexRenew Contract # _____

Contract Name: _____

EMPLOYEE/SUPERVISOR CERTIFICATION FORM FOR VERIFYING REVIEW BY THE EMPLOYEE AND THE SUPERVISOR OF ALEXRENEW'S NEW HIRE SAFETY ORIENTATION REQUIREMENTS

This is to certify that I have received a copy of the AlexRenew Enterprises, Inc. (AlexRenew) New Hire Safety Orientation Requirements. I have read these instructions, understand them, and will comply with them while on AlexRenew project.

I understand that failure to abide by these rules may result in disciplinary action by my employer and possible denial of access to the sites.

I also understand that I am to report any injury and near miss incident to my supervisor or superintendent immediately and report all safety hazards.

I have received instruction on and/or reviewed the site specific emergency evacuation plan.

I further understand that I have the following rights.

- I am not required to work in any area I feel is not safe.
- I am entitled to information on any hazardous material or chemical I am exposed to while working.
- I am entitled to see a copy of the AlexRenew New Hire Safety Orientation Requirements as well as my employer's safety manual.
- I will not be discriminated against for reporting safety concerns.

Employee Print Name_____
Date_____
Employee Sign Name_____
Date_____
Supervisor Print Name_____
Date_____
Supervisor Sign Name_____
Date

Copy: Employee
Contractor
Resident Engineer

APPENDIX C

MONTHLY CONTRACTOR SAFETY REPORT			Month of:		
Contract Name:			Year:		
Contract Number:					
Contacts	Name	Contact Number			
Report Prepared By:					
Contractor Corporate Health & Safety Manager:					
Contractor Site Health & Safety Manager:					
Contractor Project Manager:					
Owner Health & Safety Manager:					
Resident Engineer:					
MONTHLY PERFORMANCE					
LAGGING INDICATORS	Monthly Total	Contract to Date	LEADING INDICATORS	Monthly Total	Contract to Date
Safety Observation Report (SOR)			Orientations		
First Aids			Toolbox Talks		
Lost Work Day Cases			Safety Huddles (Daily pre-job meetings)		
Lost Work Days			Inspections / Observations		
Restricted / Modified Work Days			Job Hazard Analysis(s) / JHAs prepared		
Other Recordable Cases			Safety Meetings		
Reportable Envir. Incidents / Spills			Pre-excavation Checklists completed		
Utility Strikes – Un-marked			Number of Excavations for the Month		
Utility Strikes - Marked			LO/TO Permits Completed		
Utility Strikes – Miss marked					
Utility Strikes Total			Good Catch (Near Miss) Corrections		
Property Damage			Corrective Actions completed		
Disciplinary Actions			Deficiencies Corrected		
Total Hours Worked for month					
Prime Contractor					
Total Hours Worked for month					
All Subcontractors					
Contract Total Hours Worked for month					
REGULATORY ACTIONS OR INSPECTIONS					
Did your company experience any regulatory actions or inspections this month?			Yes No		
If yes, provide regulatory agency and description of action taken			(OSHA, EPA, DDOT, etc.)		

General

1. The Monthly Contractor Safety Report must include the Monthly Contractor Performance Report cover page
 - a) The Monthly Safety Report is due the **5th of each month** for the prior month's activities.
 - b) Please fill in all blanks as applicable.
 - c) The Safety Report will track Lagging and Leading Indicator Information.
 - d) Lagging Indicators will provide facts on past events or measurements after an incident occurred.
 - e) Leading Indicators are safety measurements that are focused on future safety performance.

According to the National Safety Council – *“Proactive, preventative, and predictive measures that monitor and provide current information about the effective performance, activities, and processes of an EHS management system that can drive the identification and elimination or control of risks in the workplace that can cause incidents and injuries.”*

2. The monthly report must include the following information:
 - a) A summary of all safety inspection reports and documentation that support all safety deficiencies has been corrected
 - b) Accident/incidents investigation reports including utility strike reports
 - c) Toolbox talks with sign-in sheets
 - d) Documentation of the all-hands safety meeting with subcontractors.
 - e) Copies of all employees' safety suggestions and solutions by the contractor
 - f) Good Catch/Near Miss Reports
 - g) Number of excavations for the month
 - h) Number of Pre-excavation Checklists completed of the month
3. The report will track Contract to Date information.
 - a) Start your tracking from your first month of activity on site until completion of the contract.
 - b) Update Contract to Date columns each month on the cover sheet.
 - c) Provide hours worked, Recordable Cases and Lost Time Cases to include in the Contract to Date columns on your first report and then update for each month subsequently.
4. Continued Emphasis on Utility Strike Prevention
 - a) Accurate reporting of whether a utility strike was marked, un-marked or Miss marked by the utility making company is required.
 - b) Pre-excavation checklists are required for every new excavation with an emphasis of identifying the utilities in the area prior to digging.
 - i. A review of the Miss Utility Ticket must also be completed prior to excavating.
 - ii. Provide count of total Pre-excavation Checklists completed for the month on the Monthly Report Cover Sheet.
 - c) AlexRenew wants to capture statistical information regarding the number of excavations that are dug by our contractors monthly.
 - i. Provide number of excavations per month in the Leading Indicators column.
 - ii. An Excavation is counted as a new open hole/trench which requires a Pre-excavation checklist prior to digging.
 - iii. Continuation of the same excavation on a different day is not counted as another excavation. It should only be counted once.

- iv. An excavation that is cover and closed at night and re-opened the next day to complete work is only counted once.
- v. New hole/trench on the same street is counted as another excavation.

Each injury/illness should be recorded only once and categorized using the hierarchy on this page. For example, a Lost-Time Injury that involves Medical Treatment and subsequent Restricted Work shall be categorized as a Lost-Time Injury.

Report Completion Instructions

Prime Contractor to AlexRenew on ROCIP Contracts is required to complete this form on a monthly basis and include with Monthly Report. Reports are due on 5th day of each month.

1. The monthly report must include the following information:
 - a) A summary of all safety inspection reports and documentation that support all safety deficiencies has been corrected
2. Accident/incidents investigation reports including utility strike reports
3. Toolbox talks with sign-in sheets
4. Documentation of the all-hands safety meeting with subcontractors.
5. Copies of all employees' safety suggestions and solutions by the contractor
6. Good Catch/Near Miss Reports
7. Pre-excavation Checklists

Reports are to be submitted to the following as applicable: AlexRenew Resident Engineer, AlexRenew Safety Consultant.

Injury Statistic Definitions

Good Catch - program aims to Capture, Document and investigate near-miss incidents. This will in turn lead to the development of programs that will reduce the risk associated with certain activity. A

Near Miss - is an unplanned event, circumstance, condition or behavioral action that did not result in injury, illness, damage, or productivity loss – but had the potential to do so. All Near Misses are required to be investigated to determine root cause and focused corrective action that will lead to continuous improvement - working safely without incident.

First Aid Injury – An Occupational Injury/Illness that requires first aid treatment only and does not result in loss of time from work or Restricted Work. First Aid Injuries include:

1. Use of non-prescription medications at a non-prescription strength, including antiseptics;
2. Administration of tetanus or diphtheria shot(s) or booster(s). Other immunizations such as Hepatitis B vaccine or rabies vaccine related to an injury are considered medical treatment;
3. Cleaning, flushing or soaking wounds on skin surface;
4. Use of wound coverings such as bandages including liquid bandages, gauze pads, steristrips or butterfly bandages, etc. Wound closing devices such as staples, sutures and skin glue are considered medical treatment;
5. Use of any hot/cold therapy (e.g., compresses, soaking, whirlpools, non-prescription skin creams / lotions for local relief, etc.);
6. Use of any totally non-rigid, non-immobilization means of support (e.g., elastic bandages,

wraps);

7. Use of temporary immobilization devices while transporting an accident victim;
8. Drilling of a nail to relieve pressure or to drain fluid from a blister;
9. Use of eye patches;
10. Removal of foreign bodies not embedded in the eye if only irrigation or removal with a cotton swab is required;
11. Removal of splinters or foreign material from areas other than eyes by irrigation, tweezers, cotton swabs or other simple means;
12. Use of finger guards;
13. Use of massages; and,
14. Drinking of fluids for relief of heat stress.

Medical Treatment – A classification of Occupational Injury/Illness for Medical Treatment beyond First Aid Injury where there has been no Lost Days. The following are not considered Medical Treatment Injuries:

1. Visit(s) to a health care provider limited to observation or counseling or prescribed Restricted Work;
2. Diagnostic procedures (e.g., X-rays, blood tests), including the use of prescription medications solely for diagnostic purposes (e.g., eye drops to dilate pupils).

Lost-Time Injury – An injury/illness resulting in Lost Days beyond the date of injury as a direct result of an Occupational Injury/Illness incident.

Other Recordable Injury/Illness

Restricted Work – When an employee, due to a work-related injury/illness, is medically determined to be unable to perform one or more routine functions or unable to work the normal time period of their pre-injury/illness work day, they are working in a “restricted” capacity. Routine functions are the work activities that employee regularly performs at least once a week.

Significant Occupational Injury/Illness – Any injury/illness, that is not recorded as a Fatality, Lost-Time Injury, Medical Treatment Injury or Restricted Work case, but has been medically diagnosed and determined to be work-related and the cause is a verified trauma or workplace exposure that has extended to be within the current reporting period. Injury examples include: punctured eardrums and fractured or cracked bones. Illness examples might be hearing loss, or respiratory disease.

Loss of Consciousness – Is a work-related, altered state of consciousness that can vary from disorientation to time, place or person, to coma. For reporting purposes, the Loss of Consciousness must be witnessed or medically substantiated as related to a work activity or exposure.

Recordable Injury – Any Occupational Injury/Illness that results in an employee experiencing:

1. Fatality;
2. Lost-Time Injury;
3. Medical Treatment Injury; or
4. Other Recordable injury/illness (not captured above), which has:
 - a. Restricted Work; or
 - b. Significant Occupational Injury./Illness; or

i. Loss of Consciousness.

Lost Days – The number of calendar days that the employee is unable to work beyond the day of injury/illness and recommended by a physician or other health care professional. Lost time ends as of the date that the employee is deemed fit to work either full or Restricted Work or to a maximum of 180 calendar days for any individual case.

Restricted Days – The number of calendar days to a maximum of 180 days during which the employee is subject to Restricted Work, based on the recommendation of a physician or licensed health care professional, for an individual case. .

$$\text{Recordable Injury Rate} = \frac{\text{Number of Recordable Injuries} \times 200,000}{\text{Total Contract Hours Worked}}$$

APPENDIX D

Overview and Guidance for Specific Aspects of Contractor Safety Programs

Formal Safety Plan

All contractors will be required to submit with their proposal a formal safety plan indicating how they will ensure compliance with AlexRenew's Construction Safety and Health Manual and general safety compliance. The safety plan shall contain the following:

1. Assignment of a competent person with safety responsibility and oversight of the program.
2. Safety and Health Policy Statement signed by a company officer.
3. Assignment of safety responsibility (inspection, corrective action, stopping work, etc.)
4. Safety rules and/or policies and procedures for the contract employees.
5. Policy to ensure supervisory and worker safety compliance.
6. Policies and procedures for contractor safety training.
7. Hazard identification plan (inspections, audits, etc.)
8. Fire protection plan.
9. PPE program covering availability and proper use.
10. Medical Plan including - first aid and/or CPR.
11. Emergency response plan.
12. Accident investigation and reporting procedures.
13. Return to work program.
14. Drug and alcohol program.
15. Specific programs related to the work to be performed at AlexRenew (ex: Confined space entry, Demolition, Asbestos or Lead abatement, Night operations lighting plan, LOTO, Site Specific Fall Protection and Prevention Plan, Emergency Response /Communications Plan, Emergency Rescue Plans, Traffic Control, Respiratory Protection, Steel Erection Plan, Critical Lift Plan, Excavation/trenching, etc.).
16. The contractor shall obtain written permission from AlexRenew to use any AlexRenew equipment to include overhead and gantry cranes. The contractor shall submit training documentation that will qualify personal to operate such equipment.

Requirements mentioned above may vary per Contractual Specifications.

Note: Plans submitted to AlexRenew which require revisions, will need to be documented in the AlexRenew Review Comment Form and any revisions will be highlighted in yellow in the resubmittal in the same sequence as originally submitted.

Contractor's Project Specific Safety Plan

Minimum Requirements Provided

The Contractor is responsible to review the specific requirements of the contract, incorporate any additional specific or unique safety requirements in the written plan, and ensure that all applicable safety regulations are addressed. The Contractor's Safety Plan shall be in the same sequence and include, at a minimum, the items listed below. (Note: If an item is not applicable due to the nature of the work to be performed, the Contractor shall state this exception and provide a justification).

1.0 General Description

Contractor name: _____
Contract number: _____
Project name: _____
Project location: _____

Scope of Work (Brief project description, description of work to be performed) :

Expected number of employees to be working on project site: _____

List of phases of work that will require a Job Hazard Analysis (JHA) or Activity Hazard Analysis (AHA):

- _____
- _____
- _____

Project Team

a. Project Manager

b. Name: _____

1) Phone: _____

2) Email: _____

c. Safety Representative: name of competent person with safety responsibility and oversight of the site specific safety plan, phone, and email. (Resume must be attached)

1) Name: _____

2) Phone: _____

3) Email: _____

d. Point of Contact in the Event of an Emergency:

1) Name: _____

2) Phone: _____

3) Name: _____

4) Phone: _____

Sub-Tier Contractors

Please list all sub-tier contractors you anticipate hiring:

Name	Date	Scope of Work

2.0 Safety & Health Policy.

The Contractor will state that they are committed to provide a safe and healthy working environment that is free from recognized hazards for all employees. This policy is to be signed by the President/CEO of the Company; reinforced by upper management, and implemented by all project managers/foremen.

3.0 Safety Accountability & Responsibility (inspection, corrective action, stopping work, etc).

The Contractor shall include a statement of their responsibility for the effective implementation of their site specific safety plan. This section will include the following items:

- Identification and accountability of personnel responsible for safety, at both corporate and project level.
- The names of Competent and/or Qualified Person(s). Proof of competency to meet specific AlexRenew and OSHA Competent/Qualified Person(s) requirements must be attached.
- Requirement that no work shall be performed unless plan is approved by AlexRenew DOSH and a designated Safety/competent person is present on the job site as stated in AlexRenew Construction Manual.

4.0 Safety Rules.

Include the list of safety rules that Contractor's employees, subcontractors, and suppliers must follow.

5.0 Compliance.

Contractor's plan shall comply with all Safety Regulations applying to their work and the specific safety requirements identified in the AlexRenew Construction Safety & Health Manual. The plan shall include an acknowledgement that the Contractor is totally responsible for compliance with all applicable State, Federal and Local safety regulations as well as any and all manufacturer's safety requirements. Additionally, the plan will require a place of employment that is free of unsanitary or hazardous conditions that would harm an employee's health or safety. The Plan shall include a policy to ensure supervisory and worker safety compliance.

6.0 Policies and Procedures for Contractor Safety and Training.

The Contractor must outline the company policies for initial safety indoctrination of all employees, and plans for continued safety education, including weekly safety meetings. All training shall accommodate the various language groups. The Contractor's Plan shall include the following at a minimum:

- a. List subjects to be discussed with newly hired employees in safety orientation.
- b. List topics to be discussed for weekly and monthly safety meetings. State the accountability system you will use to ensure compliance.
- c. List the mandatory training and certifications which are site specific to this project (ex: powder actuated tools, confined space entry, crane operator, vehicle operator, etc.)
- d. Identify the requirements Contractor shall have for emergency response plan training. This is to include, at a minimum, the following:
 1. Procedures and tests for emergency response (fire drills, etc.)
 2. Spill Plans
 3. Fire Protection plan
 4. Posting of emergency contact numbers site wide
 5. Training for those providing first aid/cpr in the event of a medical emergency

7.0 Safety and Occupational Health (SOH) Inspections/Audits.

This section shall include details on the following:

- a. Who conducts daily safety inspections (e.g., project manager, safety professional, QC, supervisors, employees, etc.), proof of the inspector's training/qualifications, when inspections will be conducted, how the inspections will be recorded for items to include; excavations, equipment, job sites, etc. and acceptable frequencies.
- b. Plans for hazard identification: state the tracking system to be used, the follow-up procedures and the corrective action measures to be taken.

8.0 Site Specific Fire Prevention Plan.

Refer to Part 2/Section V of the AlexRenew Construction Safety and Health Manual for the specifics that need to be included in the Plan.

9.0 Personal Protective Equipment.

Contractor's plan shall comply with the minimum personal protective equipment requirements outlined in the AlexRenew Construction Safety & Health Manual. The Plan shall outline the P.P.E. required on the project.

10.0 Medical Plan including first aid-CPR.

State how Contractor will provide medical service in compliance with the AlexRenew Construction Safety & Health Manual.

11.0 Emergency Response Plan.

Refer to Part 2/Section U of the AlexRenew Construction Safety and Health Manual for the specifics the must be addressed in the Plan. At a minimum the Plan shall cover:

- a. Procedures and tests
- b. Spill plans (refer to Part 2/Section W)
- c. Inclement weather plan (refer to Part 2/Section X)
- d. Posting of emergency telephone numbers

12.0 Safety Notification & Reporting.

The Plan shall identify who will provide the following, how, and when:

- a. Exposure data (man-hours worked)/Complete and updated OSHA 300 Log
- b. Accident Investigations, reports and logs
- c. Immediate notification of any mishap

13.0 Return to Work Program.

Contractor shall have a "Return to Work" policy that meet the requirements set forth in the AlexRenew ROCIP Construction Safety Manual.

14.0 Substance Abuse Policy.

Contractor to include Policy Statement of their Substance

15.0 Specific Safety & Health Provisions.

Depending on the type of construction, additional items must be incorporated into the Contractor's Safety Plan. The following Site Specific Safety Plans (Programs/Procedures) shall be incorporated into the overall Contractor's Safety Plan in the same sequence as shown below. (note: If an item is not applicable due to the nature of the work to be performed, the Contractor shall state this exception and provide a justification).

- a. Site Sanitation Plan. Contractor to include the procedures for housekeeping and cleanup. Refer to Part 2/Section I of the AlexRenew Construction Safety and Health Manual for the specifics requirements.
- b. Access and Haul Road Plan. No contractor shall move any equipment or vehicle upon an access or haul road unless the roadway is constructed and maintained to safely accommodate the movement of the equipment or vehicle involved.
- c. Respiratory Program. How and when respiratory protection will be provided and monitored. If respirator use is required a copy of the Contractor's respiratory protection program must be included. Refer to Part 2/Section V of the AlexRenew Construction Safety and Health Manual for the specifics requirements.
- d. Health Hazard Control Program. Where required by specific regulations, contractors shall have at a minimum the following health hazard exposures addressed:
 - 1) Lead Abatement Plan.
 - 2) Asbestos Abatement Plan.
 - 3) Radiation Safety Program.
 - 4) Abrasive Blasting Plan.
 - 5) Heat/Cold Stress Monitoring Plan.
 - 6) Crystalline Silica Monitoring Plan
- e. Hazard Communication Program. Policy for following the hazard communication standard, including the location of SDSs on the job site. Refer to Part 2/Section T of the AlexRenew Construction Safety and Health Manual for the specifics requirements.
- f. Process Safety Management Plan.
- g. Abrasive Blasting Plan
- h. Night Operations Lighting Plan. Refer to Part 2/Section H.7 of the AlexRenew Construction Safety and Health Manual for the specifics requirements.
- i. Fire Prevention Plan. Refer to Part 2/Section S of the AlexRenew Construction Safety and Health Manual for the specifics requirements.
- j. Wild Land Fire Management Plan

- k. Hazardous Energy Control Program. Procedures for lockout/tagout and the control of hazardous energy during work operations. A JHA or AHA is required for any work requiring LOTO. Refer to Part 2/Section F of the AlexRenew Construction Safety and Health Manual for the specifics requirements.
- l. Critical Lift Plan/Procedures. Refer to Part 2/Sections N & O of the AlexRenew Construction Safety and Health Manual for the specifics requirements.
- m. Contingency Plan for Severe Weather. Refer to Part 2/Section I of the AlexRenew Construction Safety and Health Manual for the specifics requirements.
- n. Float Plan. Float plans shall be prepared by the operator of a launch or motorboat when engaged in surveying, patrolling, or inspection activities that are remote and are expected to take longer than 4 hours or when the operator is traveling alone. The plan shall be filed with the boat operator's supervisor and shall contain the following, as a minimum:
 - 1) Vessel information;
 - 2) Personnel on-board;
 - 3) Activity to be performed;
 - 4) Expected time of departure, route, and time of return;
 - 5) Means of communication.
- o. Fall Protection and Prevention Plan. Refer to Part 2/Section E of the AlexRenew Construction Safety and Health Manual for the specifics requirements. A Fall Protection Plan is required when any worker is exposed to a fall 6 feet or greater regardless of the trade. Each Contractor who has a worker exposed to a fall six feet or greater must develop a Site-Specific Fall Protection and Prevention Plan as part of their Site Specific Safety Plan. The Fall Protection Plan shall detail in writing when fall protection is required and exactly how this protection is to be provided.
- p. Demolition Plan. Refer to Part 2/Section Y of the AlexRenew Construction Safety and Health Manual for the specifics requirements.
- q. Excavation/Trenching Plan. For any excavation or trench five feet deep or greater, an Excavation/Trenching Plan is required to be submitted to the AlexRenew Construction Safety Manager for review. At a minimum, the plan shall include: Identification and credentials of Competent Person; Diagram or sketch of the area where the work is to be done with adjacent and nearby structures shown; Projected depth of the excavation; means of protection; Management of excavated soil/asphalts/concrete; and Management of Traffic Control. Refer to Part 2/Section L of the AlexRenew Construction Safety and Health Manual for the specifics requirements.
- r. Emergency Rescue Plan (tunneling). Refer to Refer to 29.CFR.1926.800(g)for the specific requirements.
- s. Underground Construction Fire Prevention/Protection Plan. Refer to 29.CFR.1926.800(m)for the specific requirements.
- t. Compressed Air Plan. Refer to 29.CFR.1926.803for the specific requirements.
- u. Formwork and Shoring/Erection and Removal Plan. A work safety plan will be completed prior to all major pours identifying proposed equipment set-up areas, employee safe access and egress, lighting truck staging area, wash out areas, and pertinent pre-planning for safety issues. A Formwork Plan is required which must include procedures for submitting formwork drawings for review. This item should also be included on the Contractor's progress schedule to prevent submittal delay which could hold up project. Refer to Part 2/Section M of the AlexRenew Construction Safety and Health Manual for the specifics requirements.
- v. Pre Cast Concrete Plan. Refer to Part 2/Section M of the AlexRenew Construction Safety and Health Manual for the specifics requirements.

- w. Lift Slab Plan. Refer to Part 2/Section M of the AlexRenew Construction Safety and Health Manual for the specifics requirements.
- x. Steel Erection Plan. Refer to Part 2/Section Q of the AlexRenew Construction Safety and Health Manual for the specifics requirements.
- y. Site Safety and Health Plan for HTRW work.
- z. Blasting Safety Plan. Refer to 29.CFR.1926.900 for the specific requirements.
- aa. Diving Plan. Refer to 29.CFR.1926.605(e)for the specific requirements.
- bb. Confined Space Program. Procedures for confined space entry and work operations in and around confined spaces, as well as, emergency retrieval measures. Refer to Part 2/Section U of the AlexRenew Construction Safety and Health Manual for the specifics requirements.

16.0 Use of AlexRenew Equipment

Plan must include a statement that Contractor is prohibited from using any AlexRenew equipment to perform their work including portable ladders, manlifts, anchors or clevises, and overhead and gantry cranes.

THIS PAGE INTENTIONALLY BLANK

AlexRenew Plant Safety & Security Briefing



OVERVIEW

- Security
 - Access
 - Badge Issuance
 - Stop and Identify

Security



- HR-19: Security Badge & Gate Opening Devices
 - Vendors/Contractors imbedded for six months or more
 - Keep the badge visible
 - Keep the badge in good condition, or request a replacement
 - Do not loan the badge or gate opener to other people
 - Do not use your badge or gate opener to allow others access

Stop & Identify



- Comply with requests for identification
 - Provide your AlexRenew issued ID
 - Indicated your requirement or need to be in the area
 - Check-in with the L-Building Control Room (2211) prior to plant entry

Security Questions?



Vehicles



OVERVIEW



- Safety Notification
 - EC Evacuations
 - Plant Evacuation



EC Evacuation



- In the event of an emergency, visual and audible alarms will activate
- A programmed recording instructs occupants to calmly evacuate the building
- Do not use the elevator, follow the exit signs toward one of the two stairwells located along the north hallway
- AlexRenew Staff will sweep the building to clear all occupants, and will provide assistance as required to safely evacuate personnel
- Remain outside the building at a safe distance and location until the “all clear” is sounded, and the building has been determined “safe” for return



Emergency Assembly Point Locations

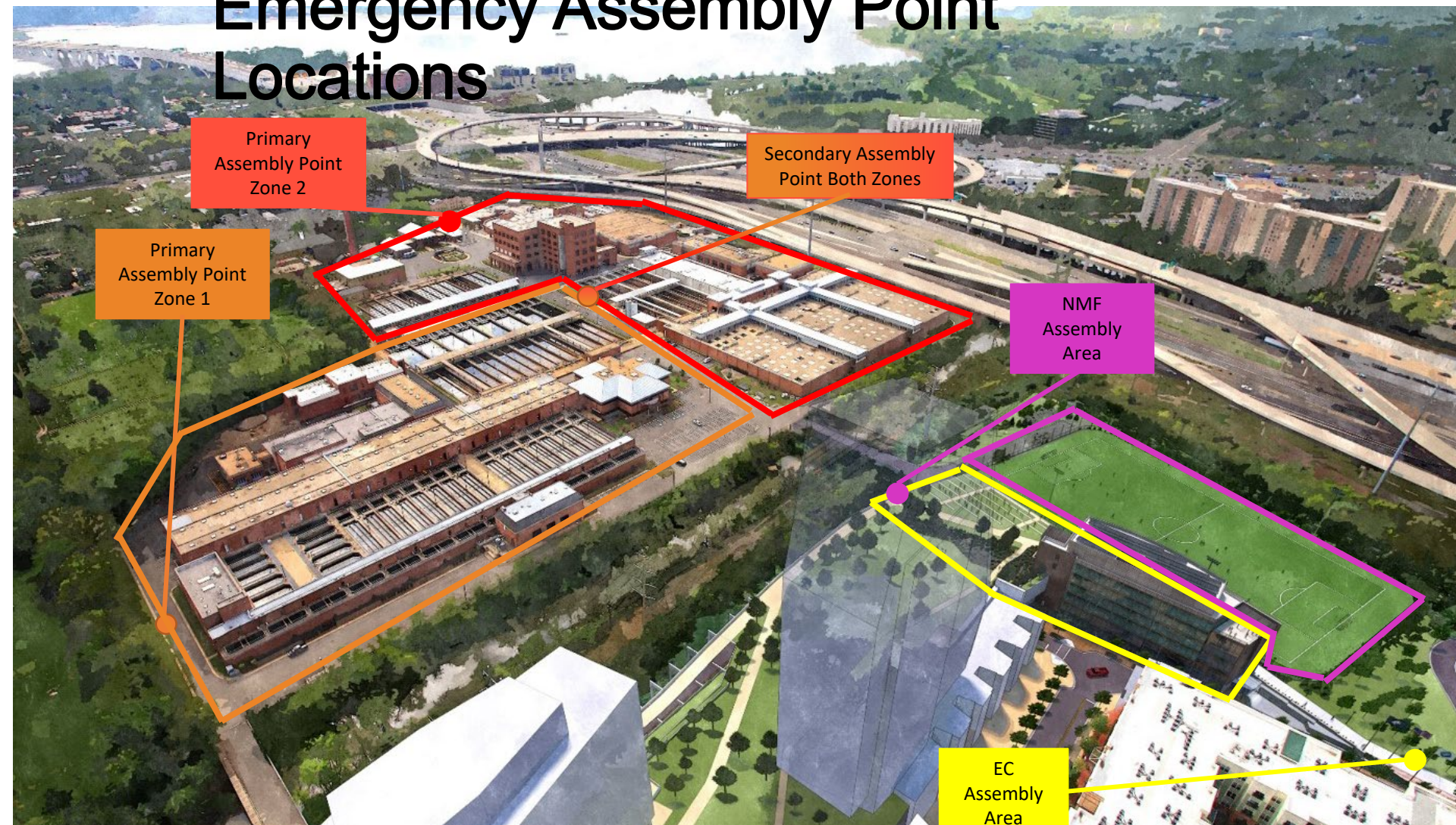
Primary
Assembly Point
Zone 2

Secondary Assembly
Point Both Zones

Primary
Assembly Point
Zone 1

NMF
Assembly
Area

EC
Assembly
Area



Emergency Assembly Point – EC Building



Benches West of EC Building



Emergency Assembly Point - NMF



West Gate Guard Booth



Emergency Assembly Point – Plant Zone 1



North of Building G



Emergency Assembly Point – Plant Zone 2



Payne Street Gate



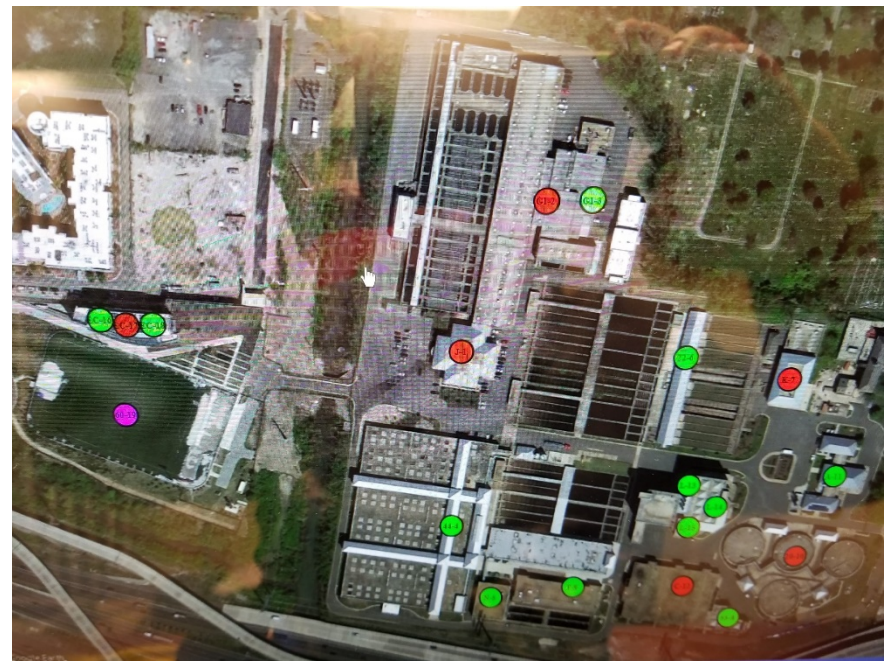
Emergency Assembly Point – Secondary Assembly Point



Grass behind truck scale



Plant – Emergency Notification System



- An integrated system that links local voice broadcasts with a rapid call dialer to notify personnel of emergency events
 - Fire
 - Bomb Threat
 - Tornado
 - Earthquake
 - Active Shooter
 - Etc.

OVERVIEW



- Safety Notifications
 - EC Shelter
 - Plant Shelter



Emergency Shelter Locations

Building L
Basement

Building G
Basement

EC Fish
Room



Shelter In Place Locations



EC Building Fish Room



Main Plant – Shelter

- In addition to evacuation notifications, you may here notifications to shelter
- When the ENS provides an announcement to take shelter, move to one of these two designated shelter areas:
 - “L” Building Basement (below operations center)
 - “J” Building Basement
- If unable to safely proceed to the “L” or “J” buildings proceed to the nearest building with access to the plant tunnels

Shelter In Place Locations



NEW Shelter Point
Building G Basement



Shelter In Place Locations

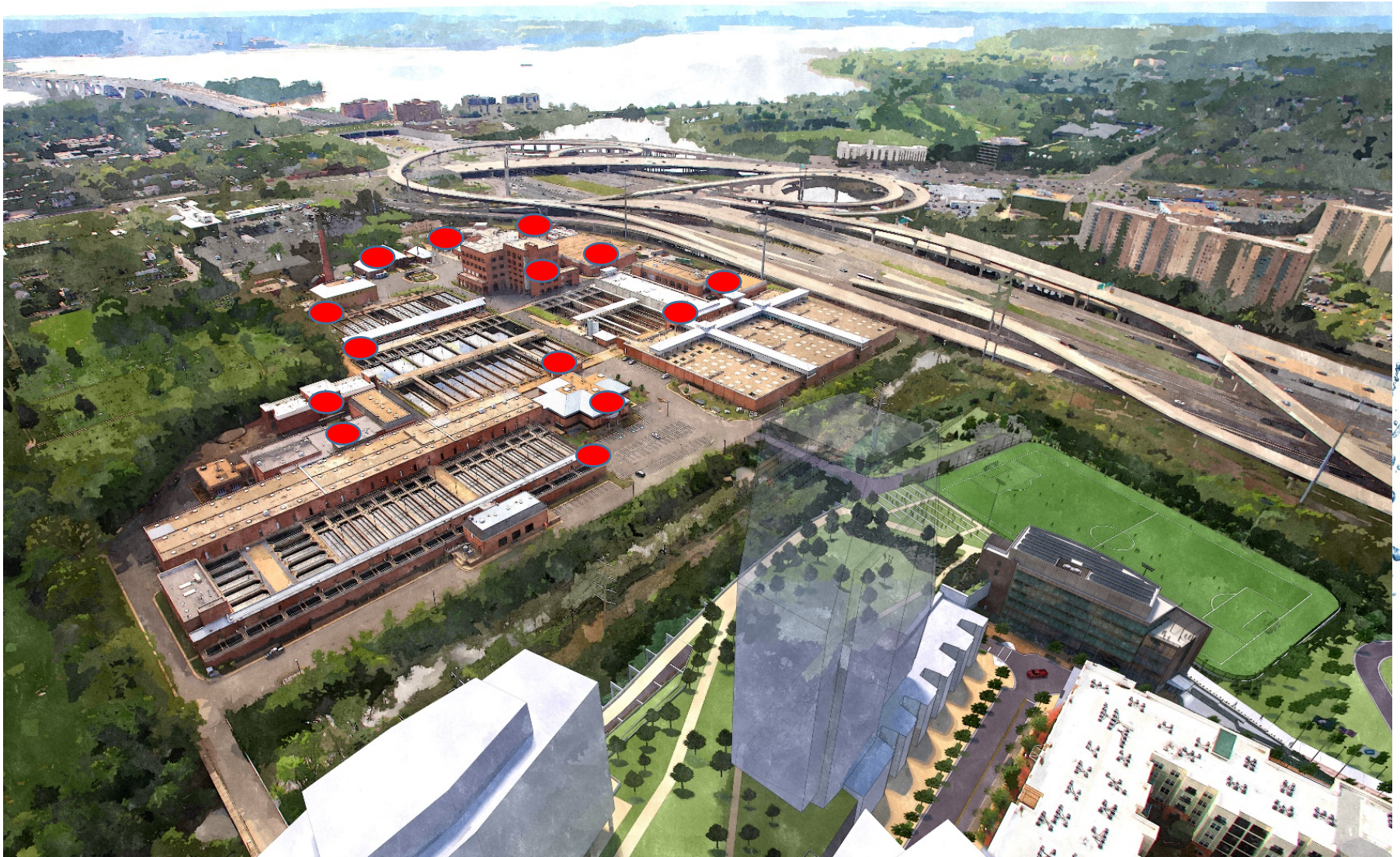
Building L Basement



EC Shelter



Shelter Access



Evacuation & Shelter Question?



Plant Safety



- Four Key Areas of Knowledge
 - PPE
 - Electrical Safety
 - HAZCOM
 - Confined Space



Hard Hat Policy

- *AlexRenew requires that all staff and visitors wear hardhats whenever they are within the boundaries of the AlexRenew plant campus, with the exception of the following locations: administrative offices, control rooms, lunchrooms, locker rooms, classrooms, while in vehicles, or going to or from vehicles while arriving on the plant campus or departing the plant campus.*
- *The plant campus is defined as the operation side of the wastewater treatment plant, bound by the area within the chain link fence, as well as the NMF area and all off-site pump stations.*
- *AlexRenew also requires that all staff and visitors wear hard hats when working in any other process area or whenever an overhead hazard exists.*





PPE Requirements

- Main Plant
 - Safety Shoes
 - Hard Hat
 - Safety Glasses (based on need)
- Construction Area
 - Safety Shoes
 - Hard Hat
 - Safety Vest
 - Safety Glasses (based on need)



ELECTRICAL SAFETY PROGRAM

- Three Categories of Personnel

- Qualified

- Special training and knowledge
 - Authorized to work on electrical systems (Journeyman Electrical Qualified - Licensed)
 - Can perform Lock-Out Tag-Out (LOTO) requirements

- Authorized

- Special training and knowledge
 - Can perform Lock-Out Tag-Out requirements

- Affected

- May work near or around equipment subject to LOTO
 - Able to recognize LOTO devices



LOTO DEVICES



Hazardous Communication (HAZCOM)

- **Four Parts:**
- **Hazard classification:** Provides specific criteria for classification of health and physical hazards
- **Labels:** Chemical manufacturers and importers are required to provide a label that includes a harmonized signal word, pictogram, and hazard statement
- **Safety Data Sheets:** Now have a specified 16-section format
- **Information and training:** Employers are required to train workers on the new labels elements and safety data sheets format



Hazardous Communication (HAZCOM)

	FIRE (Flammability)	HEALTH	REACTIVITY (Instability)
Rating	Description of Numeric Rating		
4	Flash Point < 73°F Boiling Point < 100°F	Deadly	May detonate
3	Flash Point < 73°F and Boiling Point ≥ 100°F, or Flash Point 73°F to 100°F	Extreme danger	Shock and heat may detonate
2	Boiling Point > 100°F and ≤ 100°F	Hazardous	Violent chemical change
1	Flash Point > 200°F	Slightly hazardous	Unstable if heated
0	Will not burn	Normal material	Stable



Hazardous Communication (HAZCOM)



Big Picture





CONFINED SPACE AWARENESS

- A **confined space** has limited or restricted means for entry or exit and is not designed for continuous occupancy
 - Do not enter areas marked “CONFINED SPACE, AUTHORIZED PERSONNEL ONLY”
 - Only “Authorize Personnel” may enter permit required confined spaces

Plant Safety Questions?



THIS PAGE INTENTIONALLY BLANK



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020		BH 10/2020	10/2020

OHSMS-2.4 Confined Space Program

Person responsible: Safety Coordinator

Document location: OHSMS SharePoint

Original issue date: 10/2020

Version Number: 0000

Revisions

Rev. No.	Date	Description	Author
0000	10/2020	Original Document	Alex Rigby

Recurring action items

Activity	Responsibility	Frequency
1. Review and revise the procedure as necessary.	Safety Coordinator	Annually

Procedure Index

- 1.0 Purpose**
- 2.0 Scope**
- 3.0 Definitions**
- 4.0 Responsibility**
- 5.0 General Safety Requirements**
- 6.0 Identification of Confined Spaces**
- 7.0 Job Safety Analysis (JSA)**
- 8.0 Confined Space Entry Permit System**
- 9.0 Confined Space Entry Procedures**
- 10.0 Emergency and Rescue Plans**
- 11.0 Contractors/Third Party Personnel**
- 12.0 Training**
- 13.0 Program Documentation and Review**

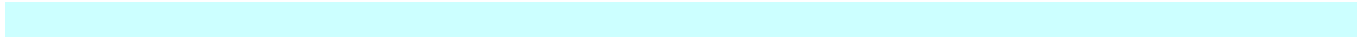


Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020		BH 10/2020	10/2020

OHSMS-2.4 Confined Space Program

14.0 Disciplinary Action

15.0 References/Related Documents





Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020		BH 10/2020	10/2020

OHSMS-2.4 Confined Space Program

1.0 PURPOSE

- 1.1** This program establishes the minimum requirements for the protection of personnel prior to entry into a confined space to conduct maintenance or servicing on AlexRenew property. This program includes procedures to ensure:
- 1.1.1** That all confined spaces present on AlexRenew property have been evaluated and that all hazards that may be present within each space have been identified prior to entry.
 - 1.1.2** That all known and/or anticipated hazards that are present or have the potential to become present in the confined space have been accounted for and that the appropriate control measures have been implemented to mitigate those hazards prior to entry into the space.
 - 1.1.3** That the physical space, the hazards which may be present or accumulate within the space, and the employees conducting activities in the space are monitored for the full duration of the confined space entry.
 - 1.1.4** That the personnel entering the space, monitoring the space, and authorizing entry into the space have the appropriate training, education, and experience to conduct the work safely.
 - 1.1.5** That a plan for the emergency removal of employees in the space without entry of additional personnel has been devised and implemented for each confined space entry.
 - 1.1.6** That unauthorized personnel are never allowed to enter a confined space.
 - 1.1.7** That a trained confined space rescue team is available to respond to any incident within the confined space where the retrieval mechanism fails.
 - 1.1.8** That pertinent safety information regarding confined spaces and the hazards that may be present within is communicated to contractors who may be working in or around those spaces in a timely manner.
 - 1.1.9** That communication flows freely and effectively between AlexRenew and any contractors that may be involved in, or have an impact upon work to be conducted within a confined space.



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020		BH 10/2020	10/2020

OHSMS-2.4 Confined Space Program

- 1.2 To establish and communicate planned procedures and safety requirements for the protection of employees and applicable contractor/vendors from hazards associated with confined spaces.

2.0 SCOPE

- 2.1 This Program applies to all AlexRenew employees, contractors, vendors, and visitors performing work in or near confined and permit-required confined spaces. This procedure has been developed in compliance with the Occupational Safety and Health Administration (OSHA) regulations at 29 CFR 1910.146 (General Industry and 29 CFR 1926 Subpart AA (Construction)).

3.0 DEFINITIONS

- 3.1 Acceptable Entry Conditions means the conditions within the space are safe for employee entry. To be considered acceptable, the following must be achieved:
- 3.1.1 No hazardous atmosphere (as defined in paragraph 3.7) is present;
 - 3.1.2 All physical hazards have been eliminated through the use of engineering or administrative controls, where feasible;
 - 3.1.3 Appropriate methods for non-entry rescue have been implemented; and
 - 3.1.4 The space must be isolated and all hazardous energy sources have been controlled in accordance with OHSMS Section 2.3 Control of Hazardous Energy. This may include (but is not limited to):
 - 3.1.4.1 Disconnecting and locking out all energy sources
 - 3.1.4.2 Blocking or disconnecting all mechanical linkages
 - 3.1.4.3 Blanking or blinding any pipes or lines through which a substance might enter the space and threaten to engulf the entrant.
- 3.2 Attendant means an individual stationed outside one or more permit spaces who monitors the authorized entrants and who performs all attendant's duties as defined in Section 4.0.
- 3.3 Authorized Entrant means an employee who is authorized to enter a permit space.

Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020		BH 10/2020	10/2020

OHSMS-2.4 Confined Space Program

3.4 A Confined Space means a space that:

- 3.4.1** Is large enough and so configured that an employee can bodily enter and perform assigned work;
- 3.4.2** Has limited or restricted means for entry or exit; and
- 3.4.3** Is not designed for continuous human occupancy.

3.5 Confined Space Entry Supervisor means the Safety Coordinator, the Wastewater Superintendent, the Maintenance Supervisor, or their designee. If another employee is designated to act as the Confined Space Entry Supervisor, that employee must have a thorough knowledge and understanding of confined spaces, the risks that may be encountered during confined space entry, the proper methods for controlling those risks, and emergency response procedures through extensive training, education, or experience.

3.6 Entry means the action by which any part of a person passes through an opening into a permit-required confined space. Entry includes work activities in the space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space, whether or not such action is intentional or any work activities are actually performed in the space.

3.7 Hazardous Atmosphere means an atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue (that is, escape unaided from a permit space), injury, or acute illness from one or more of the following causes:

- 3.7.1** Flammable gas, vapor, or mist in excess of 10% of its lower flammable limit (LFL) or lower explosive limit (LEL);
- 3.7.2** Airborne combustible dust at a concentration that meets or exceeds its LFL or LEL;
 - 3.7.2.1** Note: This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet or less.
- 3.7.3** Atmospheric oxygen concentration below 19.5% or above 23.5%;
- 3.7.4** Atmospheric concentration of any substance for which a dose or a permissible exposure limit (PEL) is published and which could result in employee exposure in excess of its dose or permissible exposure limit; or



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020		BH 10/2020	10/2020

OHSMS-2.4 Confined Space Program

3.7.4.1 Note: for substances for which direct read monitors are not available, the exposure risk shall be determined based upon:

3.7.4.1.1 The ability of the chemical of concern to become airborne;

3.7.4.1.2 The concentration of the chemical of concern within the substrate in the confined space;

3.7.4.1.3 The potential for the activities being conducted in the space to cause the chemical to become airborne; and

3.7.4.1.4 The hazard presented by exposure to the chemical of concern.

3.7.5 Any other atmospheric condition that is immediately dangerous to life or health.

3.8 Limited or Restricted means for entry or exit means a condition that has a potential to impede an employee's movement into or out of a confined space. Such conditions include, but are not limited to, trip hazards, poor illumination, slippery floors, inclining surfaces, and ladders.

3.9 Lower Explosive Limit (LEL) or Lower Flammable Limit (LFL) means the minimum concentration of a substance in air needed for an ignition source to cause a flame or explosion.

3.10 Permit Required Confined Space means a confined space that has one or more of the following characteristics:

3.10.1 Contains or has the potential to contain a hazardous atmosphere

3.10.2 Contains a material that has the potential for engulfing an entrant;

3.10.3 Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross section; or

3.10.4 Contains any other recognized serious safety or health hazard.

3.11 Prohibited Condition means any condition in a permit space that is not allowed by the permit during the period when entry is authorized.



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020		BH 10/2020	10/2020

OHSMS-2.4 Confined Space Program

4.0 RESPONSIBILITY

- 4.1 The Chief Executive Officer provides executive leadership in the development, promulgation, and implementation of the AlexRenew Confined Space Safety Program.
- 4.2 The Safety Coordinator is responsible for the overall implementation, maintenance, oversight, and communication of this program. The Safety Coordinator will conduct, at a minimum, an annual audit of this program or whenever deficiencies in this program are identified. Additional responsibilities shall include:
 - 4.2.1 Overseeing the training and evaluation of all employees;
 - 4.2.2 Maintaining training records for employees trained as part of this program;
 - 4.2.3 Endorsing completed confined space entry permits or designating a competent person to do so;
 - 4.2.4 Assisting in the assessment of confined spaces whenever there are changes made to existing spaces or new spaces are installed to determine the hazards that may be present; and
 - 4.2.5 Reviewing all completed and cancelled confined space entry permits at least annually.
- 4.3 All Employees are responsible for:
 - 4.3.1 Following company guidelines for proper use of all field monitoring equipment, testing protocols, and recordkeeping on site;
 - 4.3.2 Properly storing, cleaning, and maintaining all PPE; and
 - 4.3.3 Never entering a confined space, even briefly, without a permit.
- 4.4 Confined Space Safety Attendants shall be stationed outside the entry point to the confined space at all times while entry operations are in progress. The attendant is responsible for:
 - 4.4.1 Being familiar with and understanding the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020		BH 10/2020	10/2020

OHSMS-2.4 Confined Space Program

- 4.4.2 Being aware of possible behavioral effects of hazard exposure in authorized entrants;
- 4.4.3 Continuously maintaining an accurate count of authorized entrants in the permit space and ensuring that the means used to identify authorized entrants accurately identifies who is in the permit space;
- 4.4.4 Remaining outside the permit space during entry operations until relieved by another attendant;
- 4.4.5 Communicating with authorized entrants as necessary to assess entrant status and to alert entrants of the need to evacuate the space;
- 4.4.6 Assessing activities and conditions inside and outside the space to determine if it is safe for entrants to remain in the space;
- 4.4.7 Ordering authorized entrants to evacuate the space immediately under any of the following conditions:
 - 4.4.7.1 If there is a prohibited condition;
 - 4.4.7.2 If the behavioral effects of hazard exposure are apparent in an authorized entrant;
 - 4.4.7.3 If there is a situation outside the space that could endanger the authorized entrants; or
 - 4.4.7.4 If the attendant cannot safely and effectively perform all the duties required.
- 4.4.8 Summoning rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space hazards;
- 4.4.9 Warning any unauthorized personnel to stay away from the permit space;
- 4.4.10 Advising any unauthorized personnel to exit immediately if they have entered the permit space;
- 4.4.11 Informing the authorized entrants and entry supervisor if unauthorized persons have entered the permit space;

Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020		BH 10/2020	10/2020

OHSMS-2.4 Confined Space Program

4.4.12 Performing non-entry rescue if possible;

4.4.13 Performing no duties that might interfere with their primary duty to assess and protect the authorized entrants; and

4.4.14 Never entering the confined space while acting as the attendant, even during an emergency.

4.5 Authorized Entrants are responsible for:

4.5.1 Being familiar with and understanding the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of exposure;

4.5.2 Properly using all equipment;

4.5.3 Communicating with the attendant as necessary to enable the attendant to assess entrant status and to enable the attendant to alert entrants of the need to evacuate the space as necessary;

4.5.4 Alert the attendant whenever:

4.5.4.1 There is any warning sign or symptom of exposure to a dangerous situation;
or

4.5.4.2 The entrant detects a prohibited condition.

4.5.5 Exit from the permit space as quickly as possible whenever:

4.5.5.1 An order to evacuate is given by the attendant or the entry supervisor;

4.5.5.2 There is any sign or symptom of exposure to a dangerous situation;

4.5.5.3 The entrant detects a prohibited condition; or

4.5.5.4 An evacuation alarm is activated.

4.6 Confined Space Entry Supervisors are responsible for:

4.6.1 Being familiar with and understanding the hazards that may be faced during



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020		BH 10/2020	10/2020

OHSMS-2.4 Confined Space Program

entry, including information on the mode, signs or symptoms, and consequences of the exposure;

- 4.6.2 Verifying that all tests specified by the permit have been conducted and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin;
- 4.6.3 Terminating entry and cancelling the permit;
- 4.6.4 Verifying that rescue services are available and that the means for summoning them are operable, and that AlexRenew will be notified as soon as the services become unavailable;
- 4.6.5 Removing unauthorized individuals who enter or who attempt to enter the permit space during entry operations; and
- 4.6.6 Determining that entry operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained.

5.0 IDENTIFICATION OF CONFINED SPACES

- 5.1 A comprehensive survey of the confined spaces present on AlexRenew property has been conducted and the potential hazards presented by each space have been evaluated. A record of each confined space evaluation has been included as a part of this program as Appendix A.
 - 5.1.1 All confined spaces on AlexRenew property have been designated as permit-required confined spaces.
- 5.2 A danger sign shall be posted at every entrance to each confined space to warn employees of the existence and danger posed by the confined space. The sign shall be at least 5" tall by 7" wide and shall be labeled with the words "DANGER – PERMIT REQUIRED CONFINED SPACE – DO NOT ENTER" or similar language. An example of an appropriate sign has been included as Figure 1, below.

Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020		BH 10/2020	10/2020

OHSMS-2.4 Confined Space Program

5.2.1 Figure 1 – Permit Required Confined Space Danger Sign



5.2.2 Note: For spaces with no designated point of entry (i.e. settling tanks), at least one sign shall be posted on each side of the barrier to entry to the space (hand rails, etc.)

5.3 Entrances to all confined spaces shall be secured such that no person can remove the cover and enter the space without the use of tools or equipment. A list of potential methods for securing confined space entries has been included below. This list is not meant to be all-inclusive.

5.3.1 Weight – a cover of significant weight that cannot be removed or moved without the use of mechanical lifting devices.

5.3.2 Lock & Key – an entrance may be locked and the access key maintained by the Safety Coordinator or Wastewater Superintendent.

5.3.3 Fasteners (i.e. bolts) – an entrance may be secured by several fasteners such as bolts or screws that cannot be removed without the use of tools.

5.4 Excavations 4 feet in depth or deeper shall be considered a confined space and entry into such space shall be subject to all of the requirements contained within this program.

6.0 GENERAL SAFETY REQUIREMENTS

6.1 Entry into any confined space (as defined in Section 3.0, Paragraph 3.3) located on property owned or leased by AlexRenew shall require the completion of a job safety analysis (JSA) and a confined space entry permit, which have been included as a part of this program as Appendices B and C, respectively.

6.2 Entry into any confined space shall require that an attendant be present outside the entrance



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020		BH 10/2020	10/2020

OHSMS-2.4 Confined Space Program

to the space. No duties or tasks shall be given to the attendant that may interfere with their responsibilities as defined in Section 4.0.

- 6.2.1** Confined Space Attendants shall always be equipped with a radio that allows direct communication with the control room operator in the event of an emergency.

6.3 Atmospheric Testing

- 6.3.1** A confined space shall never be entered without testing and monitoring the atmosphere conditions.
- 6.3.2** Prior to entering any confined space, the atmosphere at the bottom and at four foot intervals thereafter (if greater than four feet in depth) shall be tested for oxygen deficiency, combustible gases, hydrogen sulfide, and carbon monoxide, in that order.
- 6.3.3** A calibration check will be conducted on all testing equipment prior to use, before each shift, or per the manufactures recommendations.
- 6.3.4** AlexRenew personnel shall not be allowed to enter any confined space with a hazardous atmosphere including areas in which employee exposure to a chemical may be in excess of the chemical's Permissible Exposure Limit (PEL) as established by OSHA, regardless of whether or not that exposure may pose an immediate risk to the employee's life or health.
- 6.3.5** Entry into any space with conditions which are immediately dangerous to life or health (IDLH) is hereby prohibited except to qualified rescue personnel with the appropriate equipment in emergencies.

6.4 Ventilation

- 6.4.1** When a hazardous atmosphere is detected during pre-entry atmospheric testing, continuous forced-air ventilation must be provided to introduce clean air into the space and remove the hazardous atmosphere.
- 6.4.2** The air supply for any forced air ventilation must be from a clean source and must not introduce new hazards into the space.
- 6.4.3** When utilizing continuous forced-air ventilation is utilized to remove a



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020		BH 10/2020	10/2020

OHSMS-2.4 Confined Space Program

hazardous atmosphere, the purging volume and times for confined spaces must be calculated and included in the confined space entry plan.

7.0 JOB SAFETY ANALYSIS (JSA)

- 7.1 Prior to entry into any confined space, a new Job Safety Analysis (JSA) must be completed for the tasks to be undertaken during confined space entry.
- 7.2 The Job Safety Analysis, included as a part of this program as Appendix B, must identify:
 - 7.2.1 The steps of each task to be completed during confined space entry;
 - 7.2.2 The hazards associated with the tasks to be completed;
 - 7.2.3 The potential outcomes for employee exposure to the identified hazards;
 - 7.2.4 The risk associated with each of the identified hazards;
 - 7.2.5 Hazard mitigation measures for any identified hazards assigned a risk of “Medium” or higher;
 - 7.2.6 The residual risk after hazard mitigation measures have been implemented; and
 - 7.2.7 Rescue procedures specific to the confined space being entered and tasks being conducted.
- 7.3 The Confined Space Entry Supervisor, Attendant, and all Entrants shall meet prior to entry to review the completed JSA.

8.0 CONFINED SPACE ENTRY PERMIT SYSTEM

- 8.1 A confined space entry permit, included as Appendix C, must be completed prior to entry into any confined space on AlexRenew property.
- 8.2 The confined space entry permit must be endorsed by the Entry Supervisor prior to entry.
- 8.3 The completed permit must be maintained by the attendant at the entrance to the confined space and made available to all entrants and their representatives.
- 8.4 The Entry Supervisor shall cancel the permit upon the completion of entry operations.



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020		BH 10/2020	10/2020

OHSMS-2.4 Confined Space Program

- 8.5** The Entry Supervisor shall cancel the entry permit if a prohibited condition arises within or near the permit space during entry operations.

9.0 CONFINED SPACE ENTRY PROCEDURES

- 9.1** When entering a confined space, the following procedure must be followed:

- 9.1.1** Complete the Job Safety Analysis (JSA) for the tasks to be completed prior to entry
- 9.1.2** Notify the control room of the impending confined space entry, the location of the entry, the number of entrants, and the anticipated duration of the entry.
- 9.1.3** Notify the Alexandria Fire Department that confined space entry will be taking place and the anticipated duration of the entry by calling (703) 746-5206.
- 9.1.4** Eliminate all hazards that can be eliminated without entering the space (e.g. draining material from the space, locking out mechanical equipment, blocking and blanking pipes leading into the space).
- 9.1.5** Eliminate any condition making it unsafe to remove an entrance cover before the cover is removed.
- 9.1.6** Promptly guard the opening by a railing, temporary cover, or other temporary barrier that will prevent an accidental fall through or entrance into the opening and that will protect each employee working in the space from foreign objects entering the space.
- 9.1.7** Test the internal atmosphere with a pre-calibrated direct-reading instrument (four-gas monitor) for oxygen content, flammable gasses and vapors, and potential toxic air contaminants.
 - 9.1.7.1** Employees entering the space (or their representative) must be given an opportunity to observe this pre-entry testing.
 - 9.1.7.2** There may be no hazardous atmosphere within the confined space whenever any employee is inside the space.
 - 9.1.7.3** The atmosphere of each confined space must be monitored for:



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020		BH 10/2020	10/2020

OHSMS-2.4 Confined Space Program

9.1.7.3.1 Oxygen content;

9.1.7.3.2 Presence of flammable vapors or gasses;

9.1.7.3.3 Presence of Carbon Monoxide (CO);

9.1.7.3.4 Presence of Hydrogen Sulfide (H₂S); and

9.1.7.3.5 Presence of any other substance for which employee exposure can reasonably be anticipated to exceed the chemical's PEL.

9.1.8 Ventilate the space utilizing continuous forced air ventilation to eliminate any hazardous atmosphere, if detected.

9.1.8.1 No employee shall enter the confined space until the hazard has been eliminated. Ventilation shall continue for the full duration of the entry.

9.1.9 Make a plan for non-entry rescue of entrants and set up necessary rescue equipment.

9.1.10 Complete the Confined Space Entry Permit

9.1.11 The completed permit shall be endorsed by the Confined Space Entry Supervisor prior to any entry. The Entry Supervisor shall ensure that prior to entry, acceptable entry conditions exist as defined in paragraph 3.1.

9.1.12 Each entrant shall be equipped with a continuous, direct reading monitor to ensure that the atmosphere in the employee's working area remains acceptable.

9.1.13 Each entrant shall be equipped with equipment necessary for non-entry rescue in the event of an emergency.

9.1.14 Once all of the procedures in paragraphs 8.1.1 through 8.1.7 have been completed, entry into the confined space may proceed.

9.2 If a hazardous atmosphere is detected during entry:

9.2.1 Each employee shall leave the space immediately;

9.2.2 The space shall be evaluated to determine how the hazardous atmosphere



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020		BH 10/2020	10/2020

OHSMS-2.4 Confined Space Program

developed; and

- 9.2.3** Measures shall be implemented to protect employees from the hazardous atmosphere before any subsequent entry takes place.

9.3 Upon conclusion of work in a confined space, the following procedures must be taken:

- 9.3.1** Survey the space to ensure all personnel, materials, tools, and equipment have been safely removed from the space and are accounted for.
- 9.3.2** Remove continuous forced air ventilation, if in use.
- 9.3.3** Re-install and secure the cover for the confined space.
- 9.3.4** Remove any temporary barriers or protections that were installed around the opening.
- 9.3.5** Remove any lockout tagout devices, pipe blanks, or other energy control devices if equipment is ready to be put back into service.
- 9.3.6** Notify the control room that the entry has concluded and the current operational status of the equipment (i.e. whether or not the equipment may be returned to service)
- 9.3.7** Notify the Alexandria Fire Department that confined space entry operations have concluded by calling (703) 746-5206.
- 9.3.8** Notify the Entry Supervisor that entry operations are complete. Deliver the completed confined space entry permit to the Entry Supervisor for cancellation and retention.

10.0 EMERGENCY AND RESCUE PLANS

10.1 Self-Rescue

- 10.1.1** If possible during an emergency, any entrants shall self-rescue – that is, exit the confined space under their own power.
- 10.1.2** An entrant shall immediately self-rescue if:



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020		BH 10/2020	10/2020

OHSMS-2.4 Confined Space Program

10.1.2.1 Notified of the need to evacuate by the attendant

10.1.2.2 An alarm sounds on a four gas monitor worn by any of the entrants

10.1.2.3 The fire alarm or employee notification system is activated for the area

10.1.2.4 The entrant experiences any signs or symptoms related to chemical exposure, heat stress, etc.

10.1.2.5 The entrant experiences any injury or near miss while conducting work in the confined space

10.1.3 If needed, the attendant will provide or summon aid as necessary

10.2 Non-Entry Rescue

10.2.1 Prior to entry into a confined space, procedures and equipment shall be deployed to provide for the rescue of unconscious entrants without the entry of additional personnel into the confined space unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant.

10.2.2 Appropriate retrieval equipment must include:

10.2.2.1 A full body harness, with a retrieval line attached at the center of the entrant's back near shoulder level, above the entrant's head, or at another point to present a profile small enough for the successful removal of the entrant.

10.2.2.2 The other end of the retrieval line must be attached to a mechanical device or fixed point outside the permit space in such a manner that rescue can begin as soon as the attendant becomes aware that rescue is necessary.

10.2.2.2.1 A mechanical device must be available to rescue an entrant from vertical type permit spaces more than 5 feet deep.

10.2.3 During an emergency, no AlexRenew or contractor personnel shall be allowed to enter a confined space for any reason.

10.3 Entry Rescue



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020		BH 10/2020	10/2020

OHSMS-2.4 Confined Space Program

10.3.1 In the event of an emergency situation wherein both self-rescue and non-entry rescue have failed, the attendant will notify the control room of the need to summon rescue services via one of the following methods:

10.3.1.1 Radio communication

10.3.1.2 Dialing 2211 from a landline phone

10.3.1.3 Dialing 703-549-3381 x 2211 from a cellular phone

10.3.2 The attendant will relay the following information to the control room operator:

10.3.2.1 Nature of the emergency

10.3.2.2 Status of the entrant(s)

10.3.2.3 Results of the most recent air monitoring

10.3.2.4 If exposure to a chemical substance caused the injury or emergency, the name of the chemical in question.

10.3.3 The control room operator will immediately summon emergency services by dialing 9-911 from a landline phone.

10.3.3.1 The control room operator will notify emergency services of the need for a confined space rescue team and the location of the confined space including the address (1500 Eisenhower Avenue), Building Number, and specific location (i.e. basement, etc.). The control room operator will also provide the emergency response team the information provided by the attendant.

10.3.3.2 The control room operator will notify the security guard at the north gate and relay the location to the security guard so the security guard can direct the emergency response team to the proper location

10.3.3.3 The control room operator will dispatch personnel to key intersections on the plant to direct the emergency rescue team along the shortest route to the emergency.

10.3.3.4 The control room operator will dispatch one employee to the entrance to the building to walk the emergency rescue team to the entry location to the



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020		BH 10/2020	10/2020

OHSMS-2.4 Confined Space Program

confined space.

10.3.3.4.1 The employee shall be equipped with the Safety Data Sheet (SDS) for any chemicals in use in the confined space.

10.3.3.5 The control room operator will issue a medical emergency alert using the Employee Notification System. All personnel shall be instructed to clear the roads to facilitate the expedited arrival of emergency personnel to the emergency location.

10.3.3.6 The control room operator will contact the Safety Coordinator and Wastewater Utility Superintendent and notify them of the emergency.

10.4 The Alexandria Fire Department has been identified as the confined space entry rescue team. To facilitate the expeditious retrieval of personnel in confined spaces during an emergency, AlexRenew will:

10.4.1 Familiarize the Alexandria Fire Department with the overall job site, the locations of each confined space, and the potential hazards that may be found within each space.

10.4.2 Provide opportunities for the Alexandria Fire Department to conduct a confined-space rescue drill on AlexRenew property at least annually.

10.4.3 Notify the Alexandria Fire Department prior to entry into any confined space.

10.4.4 The Alexandria Fire Department will be asked to notify AlexRenew if the rescue team becomes unavailable during any time of a confined space entry.

10.4.4.1 If a notification is made that the Fire Department is no longer available to perform a rescue then all confined space work will cease and will not resume until the Fire Department is available.

11.0 CONTRACTORS/THIRD PARTY PERSONNEL

11.1 If work is to be conducted within a confined space by contractor personnel, the contractor's supervisor and AlexRenew point of contact or Safety Coordinator shall meet to the location of all confined spaces in the working area, hazards or potential hazards present in each space, and any special precautions necessary or pertinent information regarding the confined space to be entered.



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020		BH 10/2020	10/2020

OHSMS-2.4 Confined Space Program

- 11.1.1** If the contractor retains another company to complete the work within the confined space, they shall be responsible for communicating all of the pertinent information shared by AlexRenew to their subcontractors.
- 11.2** A written job safety analysis and confined space entry permit is required for all work conducted in any confined space by contractor personnel.
- 11.2.1** Contractors shall utilize their internal job safety analysis and confined space entry permits.
- 11.2.2** A copy of the completed forms shall be provided to AlexRenew within 24 hours of the completion of work in the confined space.
- 11.3** If employees of multiple companies will be working in or around a confined space while entry is in progress, each company whose employees will be entering the confined space or whose activities may create hazards for those persons in a confined space must meet to coordinate activities prior to entry to ensure that the simultaneous operations will not create hazards that have not been previously anticipated.
- 11.4** Following conclusion of work inside a confined space, the contractor shall meet with their AlexRenew point of contact to discuss the entry operations as well as any hazards confronted or created in the confined space,

12.0 TRAINING

12.1 Confined Space Awareness Training

- 12.1.1** AlexRenew employees that may conduct work around, but never in, a confined space, shall receive classroom training in the recognition and identification of confined spaces as well as the hazards associated with confined space entry including the hazard presented by untrained personnel attempting a confined space rescue.
- 12.1.2** At the completion of the classroom training session, participants shall be given a written test to assess their comprehension of the material presented. A minimum passing grade for the exam shall be 80%.
- 12.1.3** Employees who receive a passing grade shall be issued a paper certificate of training. The certification shall contain the employee's name and dates of training. The Safety Coordinator or HR Manager shall maintain an electronic



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020		BH 10/2020	10/2020

OHSMS-2.4 Confined Space Program

copy of the training certificate on file for the full term of employment plus 5 years.

12.2 Confined Space Entry Training

- 12.2.1** All Authorized Entrants and Attendants shall receive confined space entry training prior to being assigned tasks that require them to work in confined spaces or as a confined space attendant.
- 12.2.2** Confined Space Entry Training shall consist of both a classroom portion and a “hands-on” portion. The classroom portion must be completed successfully prior to an employee being given the “hands-on” portion of the training.

12.2.2.1 The classroom portion of the training shall include:

- 12.2.2.1.1** The location and nature of all of the confined spaces located on property owned or leased by AlexRenew
- 12.2.2.1.2** The hazards associated with confined space entry
- 12.2.2.1.3** The signs and symptoms of exposure to hazardous atmospheres that may be created by each chemical in use on AlexRenew property as well as for Hydrogen Sulfide, Carbon Monoxide, and Oxygen deficient/enriched atmospheres.
- 12.2.2.1.4** Acceptable and prohibited entry conditions
- 12.2.2.1.5** The AlexRenew Job Safety Analysis (JSA), and how to complete it
- 12.2.2.1.6** The AlexRenew confined space entry permit and its requirements
- 12.2.2.1.7** Methods used to isolate, control, or in other ways protect entrants from the hazards associated with confined space entry
- 12.2.2.1.8** AlexRenew’s confined space entry procedures
- 12.2.2.1.9** The danger presented by attempting an entry rescue by unauthorized personnel
- 12.2.2.1.10** The appropriate use and maintenance of equipment used for



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020		BH 10/2020	10/2020

OHSMS-2.4 Confined Space Program

atmospheric monitoring

12.2.2.1.11 The roles and responsibilities of each person involved with a confined space entry

12.2.2.1.12 The different types of rescue, and the emergency response procedures during a confined space entry

12.2.2.1.13 A written test to assess the entrant's comprehension of the material presented. A minimum passing grade for the exam shall be 80%.

12.2.2.2 The "hands-on" portion of the training shall include:

12.2.2.2.1 The opportunity for the entrant to pre-calibrate/bump test the air monitor

12.2.2.2.2 The opportunity for an entrants to conduct air monitoring for a confined space on AlexRenew property

12.2.2.2.3 A group session creating a JSA for a theoretical task in a designated confined space

12.2.2.2.4 The opportunity to set up, and understand the operating procedures for equipment used for non-entry rescue

12.2.2.2.5 The opportunity to set up and operate equipment for providing the continuous forced-air ventilation

12.2.2.2.6 The opportunity to don the PPE that may be utilized during a confined space entry

12.2.2.3 Employees passing both portions of the confined space entry training shall be issued a paper certificate of training. The certification shall contain the employee's name and dates of training. The Safety Coordinator or HR Manager shall maintain an electronic copy of the training certificate on file for their full term of employment plus 5 years.

12.3 Following successful completion of the training, authorized employees shall be assigned by a Supervisor to work with a mentor until the employee has proven competency. The length of this mentoring period shall not be less than 20 separate confined space entries but



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020		BH 10/2020	10/2020

OHSMS-2.4 Confined Space Program

may be as long as deemed necessary by the supervisor.

12.4 In addition to the aforementioned training, all confined space entrants and attendants must have received training in First Aid, Cardiopulmonary Resuscitation (CRP), use of an Automated External Defibrillator (AED), and Bloodborne Pathogens (BBP).

12.5 Retraining

12.5.1 Refresher training shall be provided for employees whenever there is a change in their job assignments, a change in the configuration or use of a confined space that presents a new hazard, when there is a change in the confined space program, or at a minimum, every two years.

12.5.2 Additional refresher training shall also be conducted whenever there is reason to believe that there are deviations from or inadequacies in the employee's knowledge or use of the procedures contained within this program.

12.5.3 The refresher training shall reestablish employee proficiency and introduce new or revised control methods and procedures, as necessary based on changes to site conditions. Following the adequate completion of the retraining, the employee shall be assigned a competent mentor by their supervisor to assess the employee's knowledge of appropriate confined space entry procedures. The duration of this additional mentorship shall be as long as deemed appropriate by the employee's supervisor and/or the Safety Coordinator.

12.5.4 The employee may request additional training/instruction at any time if they feel they do not have adequate knowledge or experience to complete their assigned tasks safely.

13.0 PROGRAM DOCUMENTATION AND REVIEW

13.1 Each cancelled confined space entry permit and associated JSA shall be maintained electronically by the Safety Coordinator for a period of at least 1 year. The cancelled permits shall be reviewed within 12 months of their cancellation. If any deficiencies or opportunities for improvement are identified during this review, the confined space program shall be revised to address the identified items.

13.2 This program shall be reviewed and revised to correct any deficiencies found:

13.2.1 Any time an unauthorized entry into a confined space occurs;



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020		BH 10/2020	10/2020

OHSMS-2.4 Confined Space Program

- 13.2.2 Any time a hazard is detected in a confined space that was not covered by the permit;
- 13.2.3 Any time a condition prohibited by the permit is detected within a confined space;
- 13.2.4 Any time an injury or near miss occurs during confined space entry;
- 13.2.5 Any time the use or configuration of a confined space is changed or altered;
- 13.2.6 Upon receiving any employee complaints regarding the efficacy of this program; or
- 13.2.7 At least annually

14.0 DISCIPLINARY ACTION

- 14.1 Violation of any of the procedures implemented as a part of this program shall be deemed to be a serious health and safety infraction and shall result in immediate disciplinary action up to and including termination of employment in accordance with AlexRenew's Discipline Policy (HR-02).
- 14.2 If the employee violates one of these rules but was found to have made a good faith effort to abide by AlexRenew's procedures, the employee shall be removed from the task until retraining can be provided and provided verbal counseling as defined in AlexRenew's Discipline Policy. The employee's supervisor shall make a record of the event and forward that record to the HR manager. One retraining shall be allowed within a two-year period. Subsequent infractions within that time period shall be considered to be a willful violation and shall elicit further disciplinary actions as outlined below.
- 14.3 Should an employee be found to have knowingly and/or willingly violated any element of this program, they shall be issued a Final Written Warning in congruence with AlexRenew's Discipline Policy, and a Performance Improvement Plan shall be developed and implemented by the employee's supervisor. Should a second such event occur within a two year time period, the employee shall be immediately discharged from duty.

15.0 REFERENCES / RELATED DOCUMENTS

- 15.1 Appendix A – Confined Space Assessment Forms



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020		BH 10/2020	10/2020

OHSMS-2.4 Confined Space Program

- 15.2 Appendix B – Job Safety Analysis (JSA) Form
- 15.3 Appendix C – Confined Space Entry Permit
- 15.4 HR-02 Discipline Policy
- 15.5 OSHA 29 CFR 1910.146 and 29 CFR 1926 Subpart AA



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020		BH 10/2020	10/2020

OHSMS-2.4 Confined Space Program

Appendix A

Confined Space Assessment Forms



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020			

OHSMS-2.4.A Confined Space Assessment Forms

Location	Confined Space	Page
4 Mile Run	450,000 GALLON DETENTION TANK	30
	650,000 GALLON DETENTION TANK	32
	BIOXIDE TANK	34
	CHECK VALVE VAULT	36
	COARSE FILTER	38
	FLOW METER VAULT	40
	GRINDER VAULT	42
	HIGH FLOW WET WELL	44
	STORM WATER COLLECTION TANK	46
	VALVE VAULT	48
20	DIGESTERS	50
44	BRB DRAIN WELL	52
55	PREPASTURIZATION TANK	54
A	COARSE SCREEN CHANNEL	56
	COARSE SCREEN VAULT	58
	MAIN SLEW SKATE VAULT	60
C	THICKENING TANKS	62
G2	FLOCCULATOR TANKS	64
G3	FLOCCULATOR TANKS	66
	SAND FILTER TANKS	68
	TERTIARY TANKS	70
G4	SAND FILTER TANKS	72
G5	BACKWASH WASTE WATER TANK	74
	WASH WATER PUMP TANKS	76

Print date:
10/15/2020

WARNING! This document is uncontrolled when printed.

Page 27 of 136

Verify current revisions using the Alexandria Renew Enterprises OHSMS web site.



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020			

OHSMS-2.4.A Confined Space Assessment Forms

Location	Confined Space	Page
G6	BACKWASH WASTE WATER TANK	78
K	COMMON CHANNEL	80
	FINE SCREEN VAULT	82
	PISTA GRITS	84
	SCUM HOLDING TANK	86
L	ALUMINUM SULFATE TANKS	88
	DEWATERING CENTRATE TANK	90
	FERRIC CHLORIDE TANKS	92
	FERTILIZER SILO TANKS	94
	LIME SILO TANKS	96
	SODIUM HYDROXIDE TANKS	98
	TSET/RSBT TANKS	100
N	AERATION TANK	102
	PHOSPHORIC ACID TANK	104
	UV CHANNELS	106
BUSH HILL STATION	WET WELL	108
MAIN HAUL ROAD	PRIMARY TANK VAULT	110
	PRIMARY SETTLING TANKS	112
	SCUM BOX	114
	FLARE	116
	METHANOL TANKS	118



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020			

OHSMS-2.4.A Confined Space Assessment Forms

Location	Confined Space	Page
MILL ROAD STATION	WET WELL	120
POTOMAC YARDS	STOP LOGS VAULT	122
SLATER'S LANE	METERING VAULT	124
	VALVE VAULT	126
	WET WELL	128

CONFINED SPACE RISK ASSESSMENT

System: 450,000g Detention Tank

Confined Space Designation: **PERMIT-REQUIRED**

Type: Tank

Area: 4 Mile Run

Evaluation Date: 10/21/2015

Description of Space: _____

Evaluated By: Andrew Faust

HAZARD ASSESSMENT

PHYSICAL HAZARDS

YES

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? (If YES, check all that apply below)



Engulfment



Extreme Temperatures



Converging Walls/Floors



Hazardous Energy:



Moving Parts/Sharp Objects



Other:

Describe any items checked above:

ATMOSPHERIC HAZARDS

YES

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? (If YES, check all that apply below)



Low Oxygen (<19.5%)



Flammable Atmosphere (>10% of LEL)



Elevated Oxygen (>23.5%)



Hydrogen Sulfide (H₂S)



Carbon Monoxide



Other: [<Click here to add other hazards>](#)

Describe any items checked above: Conduct pre-entry atmospheric monitoring for oxygen and H₂S, and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:



Lock out/Tag Out



Disconnecting



Blanking/Bleeding of lines



Forced Air Ventilation (*Depending on Atmospheric Monitoring/Conditions*)



Securing of moving parts



Other: Draining/blocking flow and lock out incoming water valve(s)

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:



Usage of chemicals will change this space to a PERMIT-REQUIRED confined space.



Limited field of view at entry into space



Ladder needed for entry.



Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space.



Key access ONLY for entry



Temporary lighting needed for entry

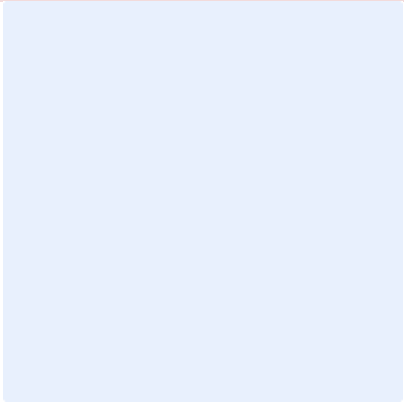


OTHER: Fall protection/retrieval system

PHOTOGRAPHS



PHOTO #1



PHOTO#2

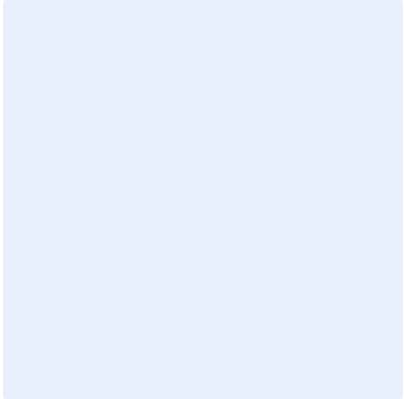
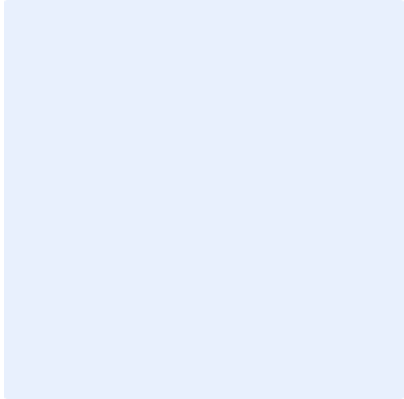


Photo #3

CONFINED SPACE RISK ASSESSMENT

System: 650,000g Detention Tank

Confined Space Designation: **PERMIT-REQUIRED**

Type: Tank

Area: 4 Mile Run

Evaluation Date: 10/21/2015

Description of Space: _____

Evaluated By: Andrew Faust

HAZARD ASSESSMENT

PHYSICAL HAZARDS

YES Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? (If YES, check all that apply below)

- | | |
|---|---|
| <input checked="" type="checkbox"/> Engulfment | <input type="checkbox"/> Extreme Temperatures |
| <input type="checkbox"/> Converging Walls/Floors | <input type="checkbox"/> Hazardous Energy: |
| <input type="checkbox"/> Moving Parts/Sharp Objects | <input type="checkbox"/> Other: |

Describe any items checked above:

ATMOSPHERIC HAZARDS

YES Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? (If YES, check all that apply below)

- | | |
|---|---|
| <input checked="" type="checkbox"/> Low Oxygen (<19.5%) | <input type="checkbox"/> Flammable Atmosphere (>10% of LEL) |
| <input type="checkbox"/> Elevated Oxygen (>23.5%) | <input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S) |
| <input type="checkbox"/> Carbon Monoxide | <input type="checkbox"/> Other: <Click here to add other hazards> |

Describe any items checked above: [Conduct pre-entry atmospheric monitoring for oxygen and H₂S, and monitor throughout entry.](#)

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

- | | |
|--|--|
| <input checked="" type="checkbox"/> Lock out/Tag Out | <input type="checkbox"/> Disconnecting |
| <input type="checkbox"/> Blanking/Bleeding of lines | <input checked="" type="checkbox"/> Forced Air Ventilation (<i>Depending on Atmospheric Monitoring/Conditions</i>) |
| <input type="checkbox"/> Securing of moving parts | <input checked="" type="checkbox"/> Other: Draining/blocking flow and lock out incoming water valve(s) |

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

- | | |
|---|---|
| <input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space. | <input type="checkbox"/> Limited field of view at entry into space |
| <input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space. | <input type="checkbox"/> Ladder needed for entry. |
| <input checked="" type="checkbox"/> OTHER: Fall protection/retrieval system | <input type="checkbox"/> Key access ONLY for entry |
| | <input checked="" type="checkbox"/> Temporary lighting needed for entry |

PHOTOGRAPHS

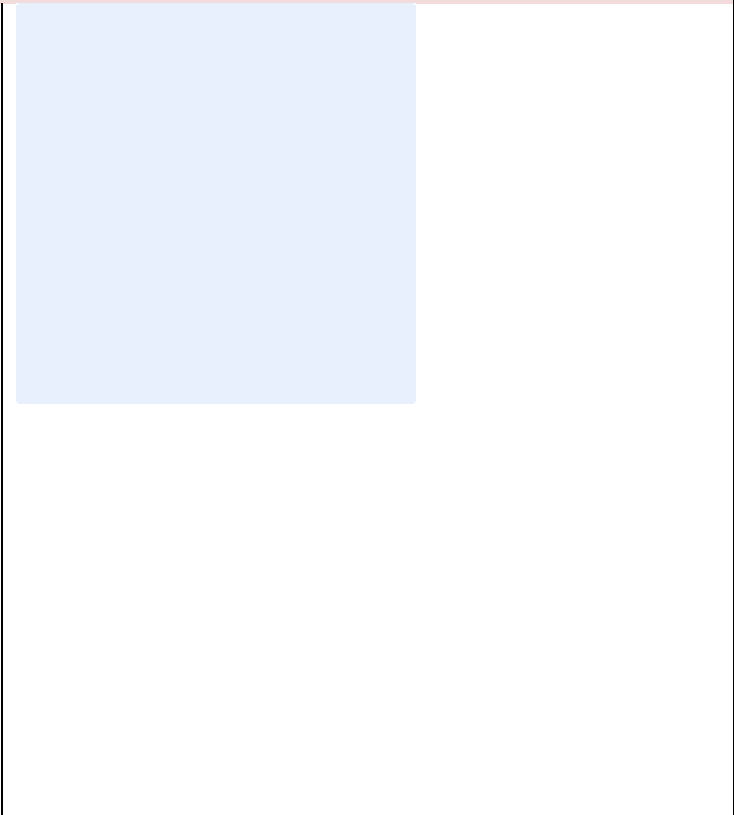
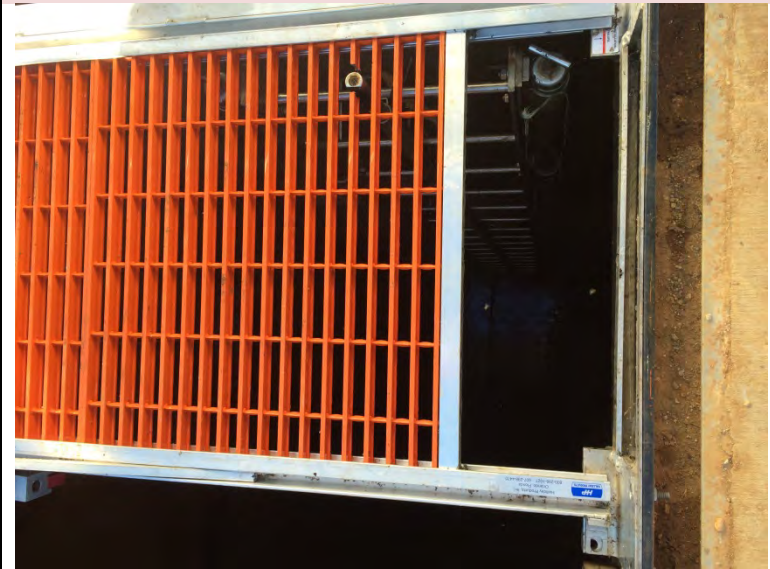


PHOTO #1

PHOTO#2

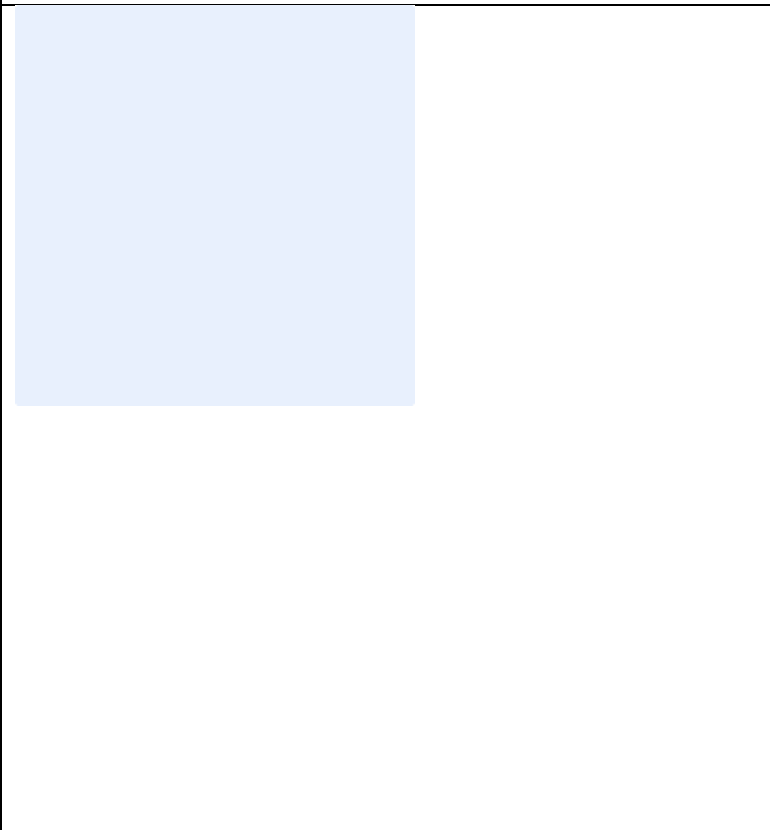


Photo #3

CONFINED SPACE RISK ASSESSMENT

System: <u>Bioxide Tank</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>4 Mile Run</u>	Evaluation Date: <u>10/21/2015</u>
Description of Space: _____		Evaluated By: <u>Andrew Faust</u>

HAZARD ASSESSMENT

PHYSICAL HAZARDS

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Engulfment	<input type="checkbox"/> Extreme Temperatures
<input type="checkbox"/> Converging Walls/Floors	<input type="checkbox"/> Hazardous Energy:
<input type="checkbox"/> Moving Parts/Sharp Objects	<input type="checkbox"/> Other:

Describe any items checked above:

ATMOSPHERIC HAZARDS

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Low Oxygen (<19.5%)	<input type="checkbox"/> Flammable Atmosphere (>10% of LEL)
<input type="checkbox"/> Elevated Oxygen (>23.5%)	<input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S)
<input type="checkbox"/> Carbon Monoxide	<input type="checkbox"/> Other: <Click here to add other hazards>

Describe any items checked above: Conduct pre-entry atmospheric monitoring for oxygen and H₂S, and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

<input checked="" type="checkbox"/> Lock out/Tag Out	<input type="checkbox"/> Disconnecting
<input type="checkbox"/> Blanking/Bleeding of lines	<input checked="" type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i>
<input type="checkbox"/> Securing of moving parts	<input checked="" type="checkbox"/> Other: <u>Drain tank</u>

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

<input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space. <input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space. <input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u>	<input type="checkbox"/> Limited field of view at entry into space <input checked="" type="checkbox"/> Ladder needed for entry. <input type="checkbox"/> Key access ONLY for entry <input checked="" type="checkbox"/> Temporary lighting needed for entry
---	---

PHOTOGRAPHS



PHOTO #1

PHOTO#2

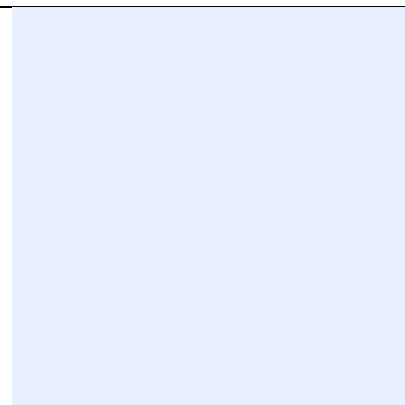
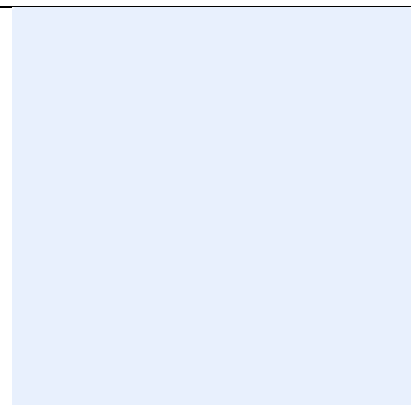


Photo #3

CONFINED SPACE RISK ASSESSMENT

System: <u>Check Valve Vault</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>4 Mile Run</u>	Evaluation Date: <u>10/21/2015</u>
Description of Space: _____		Evaluated By: <u>Andrew Faust</u>

HAZARD ASSESSMENT

PHYSICAL HAZARDS

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Engulfment	<input type="checkbox"/> Extreme Temperatures
<input type="checkbox"/> Converging Walls/Floors	<input type="checkbox"/> Hazardous Energy:
<input type="checkbox"/> Moving Parts/Sharp Objects	<input type="checkbox"/> Other:

Describe any items checked above:

ATMOSPHERIC HAZARDS

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Low Oxygen (<19.5%)	<input type="checkbox"/> Flammable Atmosphere (>10% of LEL)
<input type="checkbox"/> Elevated Oxygen (>23.5%)	<input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S)
<input type="checkbox"/> Carbon Monoxide	<input type="checkbox"/> Other: <Click here to add other hazards>

Describe any items checked above: Conduct pre-entry atmospheric monitoring for oxygen and H₂S, and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

<input checked="" type="checkbox"/> Lock out/Tag Out	<input type="checkbox"/> Disconnecting
<input type="checkbox"/> Blanking/Bleeding of lines	<input checked="" type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i>
<input type="checkbox"/> Securing of moving parts	<input checked="" type="checkbox"/> Other: <u>Draining/blocking flow and lock out incoming water valve(s)</u>

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

<input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space. <input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space. <input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u>	<input type="checkbox"/> Limited field of view at entry into space <input checked="" type="checkbox"/> Ladder needed for entry. <input type="checkbox"/> Key access ONLY for entry <input checked="" type="checkbox"/> Temporary lighting needed for entry
---	---

PHOTOGRAPHS



PHOTO #1

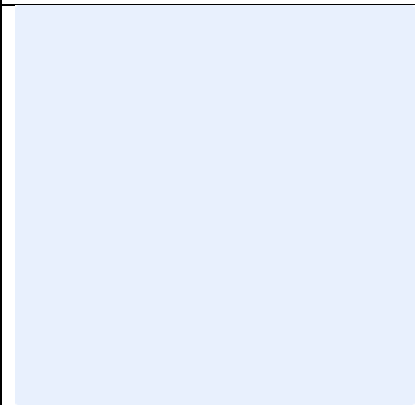
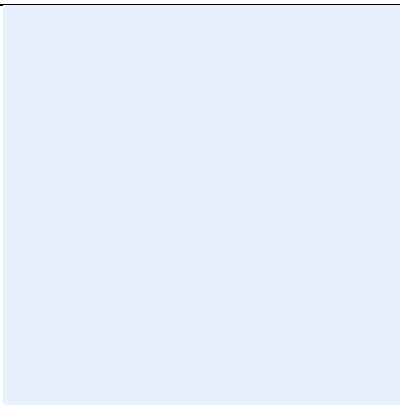


Photo #3

PHOTO#2



CONFINED SPACE RISK ASSESSMENT

System: <u>Coarse Filter</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>4 Mile Run</u>	Evaluation Date: <u>10/21/2015</u>
Description of Space: _____		Evaluated By: <u>Andrew Faust</u>

HAZARD ASSESSMENT

PHYSICAL HAZARDS

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Engulfment	<input type="checkbox"/> Extreme Temperatures
<input type="checkbox"/> Converging Walls/Floors	<input type="checkbox"/> Hazardous Energy:
<input type="checkbox"/> Moving Parts/Sharp Objects	<input type="checkbox"/> Other:

Describe any items checked above:

ATMOSPHERIC HAZARDS

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Low Oxygen (<19.5%)	<input type="checkbox"/> Flammable Atmosphere (>10% of LEL)
<input type="checkbox"/> Elevated Oxygen (>23.5%)	<input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S)
<input type="checkbox"/> Carbon Monoxide	<input type="checkbox"/> Other: <Click here to add other hazards>

Describe any items checked above: Conduct pre-entry atmospheric monitoring for oxygen and H₂S, and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

<input checked="" type="checkbox"/> Lock out/Tag Out	<input type="checkbox"/> Disconnecting
<input type="checkbox"/> Blanking/Bleeding of lines	<input checked="" type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i>
<input type="checkbox"/> Securing of moving parts	<input checked="" type="checkbox"/> Other: <u>Draining/blocking flow and lock out incoming water valve(S)</u>

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

<input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space.	<input type="checkbox"/> Limited field of view at entry into space
<input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space.	<input checked="" type="checkbox"/> Ladder needed for entry.
<input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u>	<input type="checkbox"/> Key access ONLY for entry
	<input checked="" type="checkbox"/> Temporary lighting needed for entry

PHOTOGRAPHS

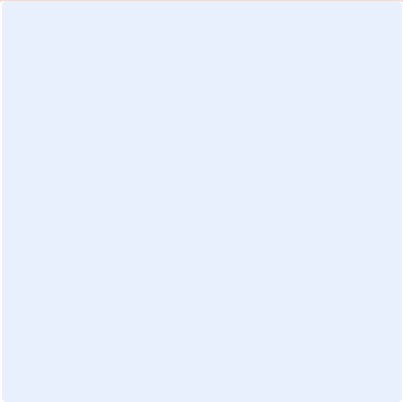


PHOTO #1

PHOTO#2

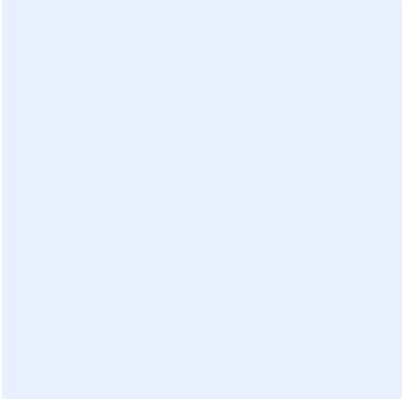
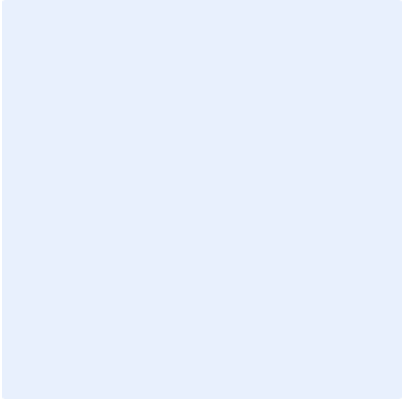


Photo #3

CONFINED SPACE RISK ASSESSMENT

System: <u>Flow Meter Vault</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>4 Mile Run</u>	Evaluation Date: <u>10/21/2015</u>
Description of Space: _____		Evaluated By: <u>Andrew Faust</u>

HAZARD ASSESSMENT

PHYSICAL HAZARDS

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Engulfment	<input type="checkbox"/> Extreme Temperatures
<input type="checkbox"/> Converging Walls/Floors	<input type="checkbox"/> Hazardous Energy:
<input type="checkbox"/> Moving Parts/Sharp Objects	<input type="checkbox"/> Other:

Describe any items checked above:

ATMOSPHERIC HAZARDS

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Low Oxygen (<19.5%)	<input type="checkbox"/> Flammable Atmosphere (>10% of LEL)
<input type="checkbox"/> Elevated Oxygen (>23.5%)	<input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S)
<input type="checkbox"/> Carbon Monoxide	<input type="checkbox"/> Other: <Click here to add other hazards>

Describe any items checked above: Conduct pre-entry atmospheric monitoring for oxygen and H₂S, and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

<input checked="" type="checkbox"/> Lock out/Tag Out	<input type="checkbox"/> Disconnecting
<input type="checkbox"/> Blanking/Bleeding of lines	<input checked="" type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i>
<input type="checkbox"/> Securing of moving parts	<input checked="" type="checkbox"/> Other: <u>Draining/blocking flow and lock out incoming water valve(s)</u>

CONSIDERATIONS FOR ENTRY

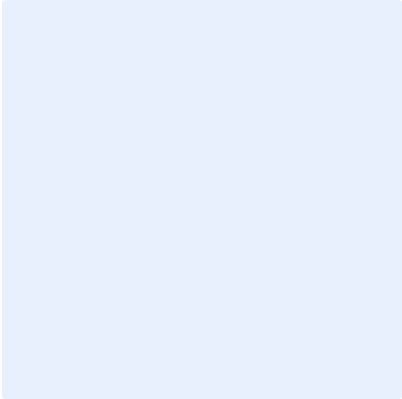
The following conditions/issues must be considered prior to entry:

<input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space.	<input type="checkbox"/> Limited field of view at entry into space
<input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space.	<input type="checkbox"/> Ladder needed for entry.
<input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u>	<input type="checkbox"/> Key access ONLY for entry
	<input checked="" type="checkbox"/> Temporary lighting needed for entry

PHOTOGRAPHS



PHOTO #1



PHOTO#2



Photo #3

CONFINED SPACE RISK ASSESSMENT

System: <u>Grinder Vault</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>4 Mile Run</u>	Evaluation Date: <u>10/21/2015</u>
Description of Space: _____		Evaluated By: <u>Andrew Faust</u>

HAZARD ASSESSMENT

PHYSICAL HAZARDS

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Engulfment	<input type="checkbox"/> Extreme Temperatures
<input type="checkbox"/> Converging Walls/Floors	<input checked="" type="checkbox"/> Hazardous Energy:
<input checked="" type="checkbox"/> Moving Parts/Sharp Objects	<input type="checkbox"/> Other:

Describe any items checked above: Grinder

ATMOSPHERIC HAZARDS

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Low Oxygen (<19.5%)	<input type="checkbox"/> Flammable Atmosphere (>10% of LEL)
<input type="checkbox"/> Elevated Oxygen (>23.5%)	<input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S)
<input type="checkbox"/> Carbon Monoxide	<input type="checkbox"/> Other: <u><Click here to add other hazards></u>

Describe any items checked above: Conduct pre-entry atmospheric monitoring for oxygen and H₂S, and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

<input checked="" type="checkbox"/> Lock out/Tag Out	<input checked="" type="checkbox"/> Disconnecting
<input type="checkbox"/> Blanking/Bleeding of lines	<input checked="" type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i>
<input checked="" type="checkbox"/> Securing of moving parts	<input checked="" type="checkbox"/> Other: <u>Draining/blocking flow and lock out incoming water valve(s)</u>

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

<input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space.	<input type="checkbox"/> Limited field of view at entry into space
<input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space.	<input checked="" type="checkbox"/> Ladder needed for entry.
<input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u>	<input type="checkbox"/> Key access ONLY for entry
	<input checked="" type="checkbox"/> Temporary lighting needed for entry

PHOTOGRAPHS

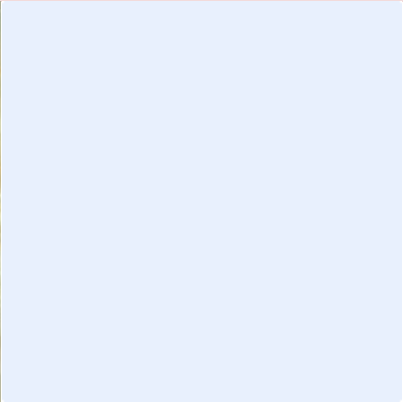


PHOTO #1

PHOTO#2

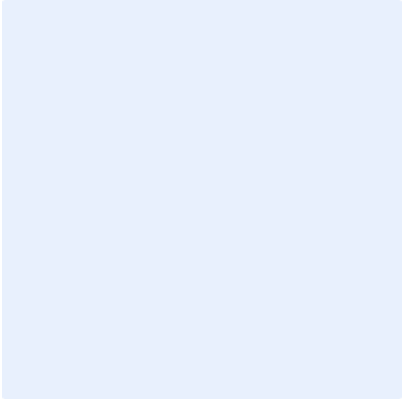


Photo #3

CONFINED SPACE RISK ASSESSMENT

System: <u>High Flow Wet Well</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>4 Mile Run</u>	Evaluation Date: <u>10/21/2015</u>
Description of Space: _____		Evaluated By: <u>Andrew Faust</u>

HAZARD ASSESSMENT

PHYSICAL HAZARDS

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Engulfment	<input type="checkbox"/> Extreme Temperatures
<input type="checkbox"/> Converging Walls/Floors	<input type="checkbox"/> Hazardous Energy:
<input type="checkbox"/> Moving Parts/Sharp Objects	<input type="checkbox"/> Other:

Describe any items checked above:

ATMOSPHERIC HAZARDS

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Low Oxygen (<19.5%)	<input checked="" type="checkbox"/> Flammable Atmosphere (>10% of LEL)
<input type="checkbox"/> Elevated Oxygen (>23.5%)	<input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S)
<input type="checkbox"/> Carbon Monoxide	<input type="checkbox"/> Other: <Click here to add other hazards>

Describe any items checked above: Conduct pre-entry atmospheric monitoring for H₂S, oxygen, and combustible gas, and monitor throughout entry

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

<input checked="" type="checkbox"/> Lock out/Tag Out	<input type="checkbox"/> Disconnecting
<input type="checkbox"/> Blanking/Bleeding of lines	<input type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i>
<input type="checkbox"/> Securing of moving parts	<input checked="" type="checkbox"/> Other: <u>Draining/blocking flow and lock out incoming water valve(s)</u>

CONSIDERATIONS FOR ENTRY

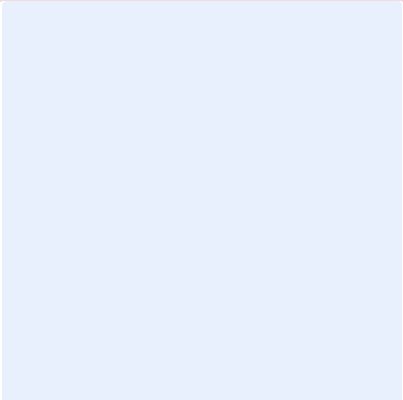
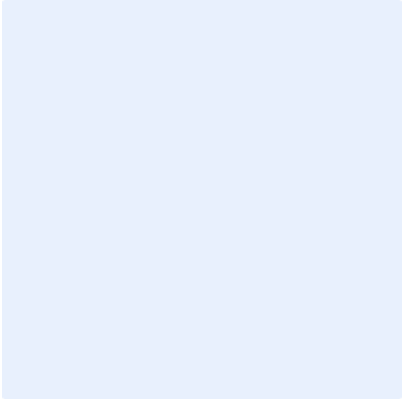
The following conditions/issues must be considered prior to entry:

<input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space. <input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space. <input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u>	<input type="checkbox"/> Limited field of view at entry into space <input checked="" type="checkbox"/> Ladder needed for entry. <input type="checkbox"/> Key access ONLY for entry <input checked="" type="checkbox"/> Temporary lighting needed for entry
---	---

PHOTOGRAPHS



PHOTO #1



PHOTO#2



Photo #3

CONFINED SPACE RISK ASSESSMENT

System: Storm Water Collection Tank Confined Space Designation: **PERMIT-REQUIRED**
 Type: Tank Area: 4 Mile Run Evaluation Date: 10/21/2015
 Description of Space: _____ Evaluated By: Andrew Faust

HAZARD ASSESSMENT

PHYSICAL HAZARDS

YES Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? (If YES, check all that apply below)

- | | |
|---|---|
| <input checked="" type="checkbox"/> Engulfment | <input type="checkbox"/> Extreme Temperatures |
| <input type="checkbox"/> Converging Walls/Floors | <input type="checkbox"/> Hazardous Energy: |
| <input type="checkbox"/> Moving Parts/Sharp Objects | <input type="checkbox"/> Other: |

Describe any items checked above:

ATMOSPHERIC HAZARDS

YES Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? (If YES, check all that apply below)

- | | |
|---|---|
| <input checked="" type="checkbox"/> Low Oxygen (<19.5%) | <input type="checkbox"/> Flammable Atmosphere (>10% of LEL) |
| <input type="checkbox"/> Elevated Oxygen (>23.5%) | <input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S) |
| <input type="checkbox"/> Carbon Monoxide | <input type="checkbox"/> Other: <Click here to add other hazards> |

Describe any items checked above: Conduct pre-entry atmospheric monitoring for oxygen and H₂S, and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

- | | |
|--|--|
| <input checked="" type="checkbox"/> Lock out/Tag Out | <input type="checkbox"/> Disconnecting |
| <input type="checkbox"/> Blanking/Bleeding of lines | <input checked="" type="checkbox"/> Forced Air Ventilation (<i>Depending on Atmospheric Monitoring/Conditions</i>) |
| <input type="checkbox"/> Securing of moving parts | <input checked="" type="checkbox"/> Other: <u>Draining/blocking flow and lock out incoming water valve(s)</u> |

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

- | | |
|---|---|
| <input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space. | <input type="checkbox"/> Limited field of view at entry into space |
| <input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space. | <input checked="" type="checkbox"/> Ladder needed for entry. |
| <input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u> | <input type="checkbox"/> Key access ONLY for entry |
| | <input checked="" type="checkbox"/> Temporary lighting needed for entry |

PHOTOGRAPHS

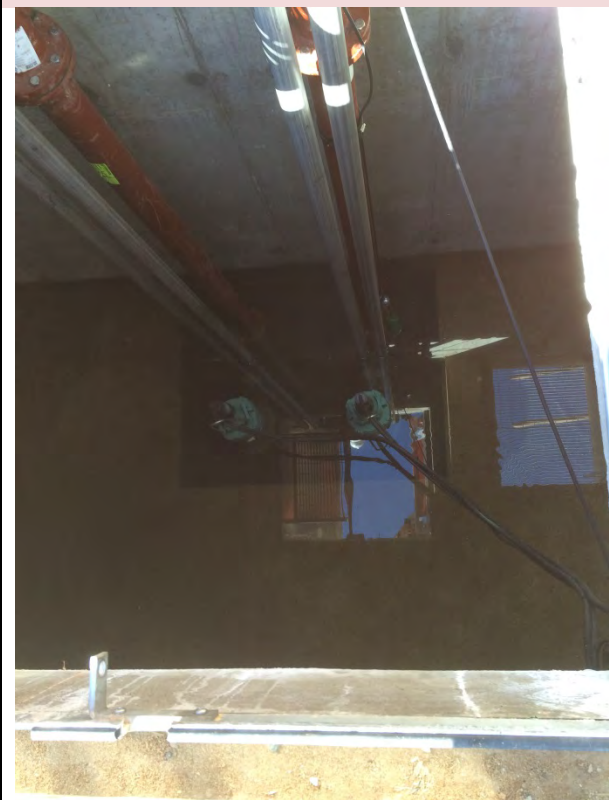


PHOTO #1

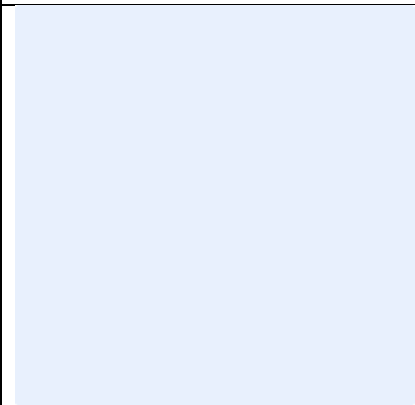
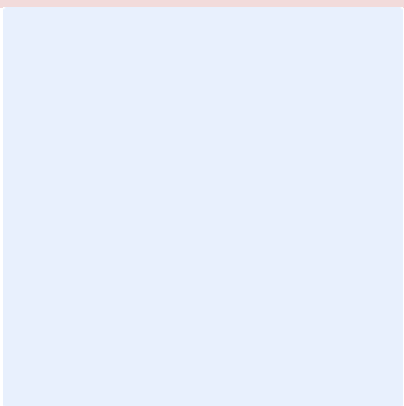
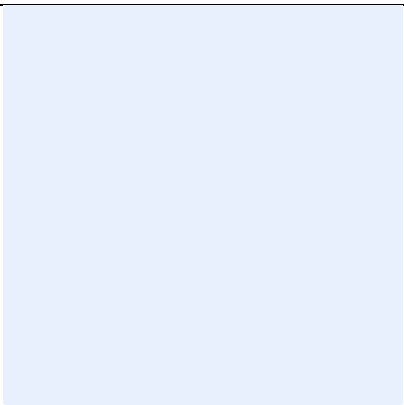


Photo #3



PHOTO#2



CONFINED SPACE RISK ASSESSMENT

System: <u>Valve Vault</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>4 Mile Run</u>	Evaluation Date: <u>10/21/2015</u>
Description of Space: _____		Evaluated By: <u>Andrew Faust</u>

HAZARD ASSESSMENT

PHYSICAL HAZARDS

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Engulfment	<input type="checkbox"/> Extreme Temperatures
<input type="checkbox"/> Converging Walls/Floors	<input type="checkbox"/> Hazardous Energy:
<input type="checkbox"/> Moving Parts/Sharp Objects	<input type="checkbox"/> Other:

Describe any items checked above:

ATMOSPHERIC HAZARDS

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Low Oxygen (<19.5%)	<input type="checkbox"/> Flammable Atmosphere (>10% of LEL)
<input type="checkbox"/> Elevated Oxygen (>23.5%)	<input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S)
<input type="checkbox"/> Carbon Monoxide	<input type="checkbox"/> Other: <Click here to add other hazards>

Describe any items checked above: Conduct pre-entry atmospheric monitoring for oxygen and H₂S, and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

<input checked="" type="checkbox"/> Lock out/Tag Out	<input type="checkbox"/> Disconnecting
<input type="checkbox"/> Blanking/Bleeding of lines	<input checked="" type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i>
<input type="checkbox"/> Securing of moving parts	<input checked="" type="checkbox"/> Other: <u>Draining/blocking flow and lock out incoming water valve(s)</u>

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

<input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space.	<input type="checkbox"/> Limited field of view at entry into space
<input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space.	<input type="checkbox"/> Ladder needed for entry.
<input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u>	<input type="checkbox"/> Key access ONLY for entry
	<input checked="" type="checkbox"/> Temporary lighting needed for entry

PHOTOGRAPHS

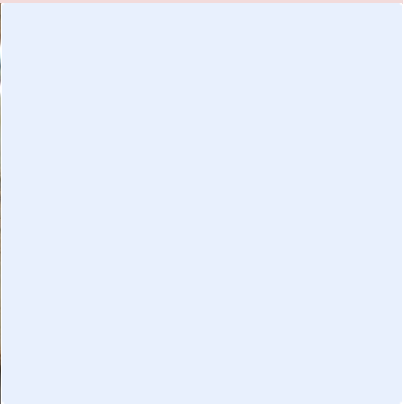


PHOTO #1

PHOTO#2

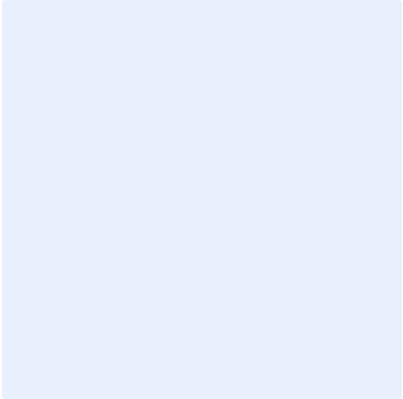
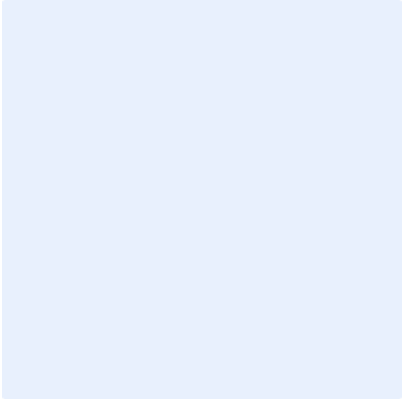


Photo #3

CONFINED SPACE RISK ASSESSMENT

System: <u>Digesters</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>Building 20</u>	Evaluation Date: <u>10/22/2015</u>
Description of Space: <u>4 Digester Tanks</u>		Evaluated By: <u>Andrew Faust</u>

HAZARD ASSESSMENT

PHYSICAL HAZARDS

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Engulfment	<input type="checkbox"/> Extreme Temperatures
<input type="checkbox"/> Converging Walls/Floors	<input type="checkbox"/> Hazardous Energy:
<input type="checkbox"/> Moving Parts/Sharp Objects	<input type="checkbox"/> Other:

Describe any items checked above:

ATMOSPHERIC HAZARDS

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Low Oxygen (<19.5%)	<input checked="" type="checkbox"/> Flammable Atmosphere (>10% of LEL)
<input type="checkbox"/> Elevated Oxygen (>23.5%)	<input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S)
<input type="checkbox"/> Carbon Monoxide	<input type="checkbox"/> Other: <Click here to add other hazards>

Describe any items checked above: Conduct pre-entry atmospheric monitoring for oxygen, combustible gas, H₂S and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

<input checked="" type="checkbox"/> Lock out/Tag Out	<input type="checkbox"/> Disconnecting
<input type="checkbox"/> Blanking/Bleeding of lines	<input type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i>
<input type="checkbox"/> Securing of moving parts	<input checked="" type="checkbox"/> Other: <u>Drain tank and lock out valves</u>

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

<input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space. <input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space. <input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u>	<input type="checkbox"/> Limited field of view at entry into space <input checked="" type="checkbox"/> Ladder needed for entry. <input type="checkbox"/> Key access ONLY for entry <input type="checkbox"/> Temporary lighting needed for entry
---	--

PHOTOGRAPHS



PHOTO #1



PHOTO#2



Photo #3

CONFINED SPACE RISK ASSESSMENT

System: BRB Drain Well

Confined Space Designation: **PERMIT-REQUIRED**

Type: Tank

Area: Building 44

Evaluation Date: 10/22/2015

Description of Space: 2 Tanks

Evaluated By: Andrew Faust

HAZARD ASSESSMENT

PHYSICAL HAZARDS

YES Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? (If YES, check all that apply below)

- | | |
|---|---|
| <input checked="" type="checkbox"/> Engulfment | <input type="checkbox"/> Extreme Temperatures |
| <input type="checkbox"/> Converging Walls/Floors | <input checked="" type="checkbox"/> Hazardous Energy: <u>Electrical</u> |
| <input type="checkbox"/> Moving Parts/Sharp Objects | <input type="checkbox"/> Other: |

Describe any items checked above:

ATMOSPHERIC HAZARDS

YES Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? (If YES, check all that apply below)

- | | |
|---|--|
| <input checked="" type="checkbox"/> Low Oxygen (<19.5%) | <input type="checkbox"/> Flammable Atmosphere (>10% of LEL) |
| <input type="checkbox"/> Elevated Oxygen (>23.5%) | <input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S) |
| <input type="checkbox"/> Carbon Monoxide | <input type="checkbox"/> Other: <u><Click here to add other hazards></u> |

Describe any items checked above: Conduct pre-entry atmospheric monitoring for oxygen and H₂S, and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

- | | |
|--|---|
| <input checked="" type="checkbox"/> Lock out/Tag Out | <input checked="" type="checkbox"/> Disconnecting |
| <input type="checkbox"/> Blanking/Bleeding of lines | <input type="checkbox"/> Forced Air Ventilation (<i>Depending on Atmospheric Monitoring/Conditions</i>) |
| <input type="checkbox"/> Securing of moving parts | <input checked="" type="checkbox"/> Other: <u>Draining/blocking flow and lock out incoming water valve(s)</u> |

CONSIDERATIONS FOR ENTRY

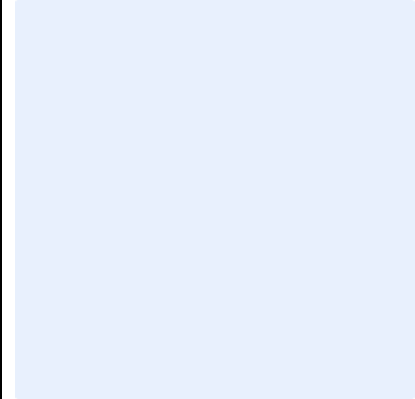
The following conditions/issues must be considered prior to entry:

- | | |
|---|---|
| <input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space. | <input type="checkbox"/> Limited field of view at entry into space |
| <input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space. | <input checked="" type="checkbox"/> Ladder needed for entry. |
| <input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u> | <input type="checkbox"/> Key access ONLY for entry |
| | <input checked="" type="checkbox"/> Temporary lighting needed for entry |

PHOTOGRAPHS



PHOTO #1



PHOTO#2

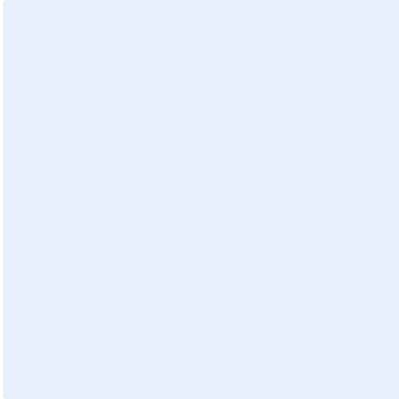


Photo #3

CONFINED SPACE RISK ASSESSMENT

System: Prepasturization Tank Confined Space Designation: **PERMIT-REQUIRED**
 Type: Tank Area: Building 55 Evaluation Date: 10/22/2015
 Description of Space: 4 Prepasturization Tanks Evaluated By: Andrew Faust

HAZARD ASSESSMENT

PHYSICAL HAZARDS

YES Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? (If YES, check all that apply below)

- | | |
|--|---|
| <input checked="" type="checkbox"/> Engulfment | <input type="checkbox"/> Extreme Temperatures |
| <input type="checkbox"/> Converging Walls/Floors | <input type="checkbox"/> Hazardous Energy: |
| <input checked="" type="checkbox"/> Moving Parts/Sharp Objects | <input type="checkbox"/> Other: |

Describe any items checked above:

ATMOSPHERIC HAZARDS

YES Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? (If YES, check all that apply below)

- | | |
|---|---|
| <input checked="" type="checkbox"/> Low Oxygen (<19.5%) | <input checked="" type="checkbox"/> Flammable Atmosphere (>10% of LEL) |
| <input type="checkbox"/> Elevated Oxygen (>23.5%) | <input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S) |
| <input type="checkbox"/> Carbon Monoxide | <input type="checkbox"/> Other: <Click here to add other hazards> |

Describe any items checked above: Conduct pre-entry atmospheric monitoring for oxygen, combustible gas, H₂S and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

- | | |
|--|---|
| <input checked="" type="checkbox"/> Lock out/Tag Out | <input type="checkbox"/> Disconnecting |
| <input checked="" type="checkbox"/> Blanking/Bleeding of lines | <input checked="" type="checkbox"/> Forced Air Ventilation (Depending on Atmospheric Monitoring/Conditions) |
| <input checked="" type="checkbox"/> Securing of moving parts | <input checked="" type="checkbox"/> Other: <u>Draining/blocking flow</u> |

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

- | | |
|---|---|
| <input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space. | <input type="checkbox"/> Limited field of view at entry into space |
| <input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space. | <input checked="" type="checkbox"/> Ladder needed for entry. |
| <input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u> | <input type="checkbox"/> Key access ONLY for entry |
| | <input checked="" type="checkbox"/> Temporary lighting needed for entry |

PHOTOGRAPHS



PHOTO #1

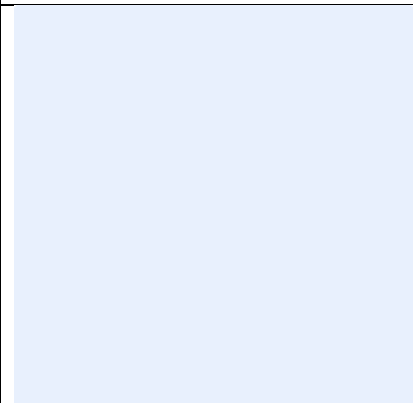
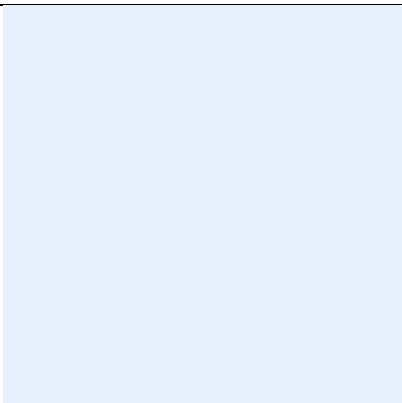


Photo #3



PHOTO#2



CONFINED SPACE RISK ASSESSMENT

System: Coarse Screen Channel

Confined Space Designation: **PERMIT-REQUIRED**

Type: Tank

Area: A Building

Evaluation Date: 10/21/2015

Description of Space: 2 tanks

Evaluated By: Andrew Faust

HAZARD ASSESSMENT

PHYSICAL HAZARDS

YES Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? (If YES, check all that apply below)

- | | |
|---|---|
| <input checked="" type="checkbox"/> Engulfment | <input type="checkbox"/> Extreme Temperatures |
| <input type="checkbox"/> Converging Walls/Floors | <input type="checkbox"/> Hazardous Energy: |
| <input type="checkbox"/> Moving Parts/Sharp Objects | <input type="checkbox"/> Other: |

Describe any items checked above:

ATMOSPHERIC HAZARDS

YES Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? (If YES, check all that apply below)

- | | |
|---|---|
| <input checked="" type="checkbox"/> Low Oxygen (<19.5%) | <input type="checkbox"/> Flammable Atmosphere (>10% of LEL) |
| <input type="checkbox"/> Elevated Oxygen (>23.5%) | <input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S) |
| <input type="checkbox"/> Carbon Monoxide | <input type="checkbox"/> Other: <Click here to add other hazards> |

Describe any items checked above: Conduct pre-entry atmospheric monitoring for oxygen and H₂S, and monitor throughout entry

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

- | | |
|--|--|
| <input checked="" type="checkbox"/> Lock out/Tag Out | <input type="checkbox"/> Disconnecting |
| <input type="checkbox"/> Blanking/Bleeding of lines | <input checked="" type="checkbox"/> Forced Air Ventilation (<i>Depending on Atmospheric Monitoring/Conditions</i>) |
| <input type="checkbox"/> Securing of moving parts | <input checked="" type="checkbox"/> Other: <u>Draining/blocking flow and lock out incoming water valve(s)</u> |

CONSIDERATIONS FOR ENTRY

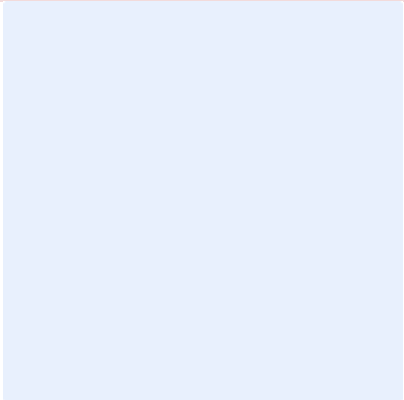
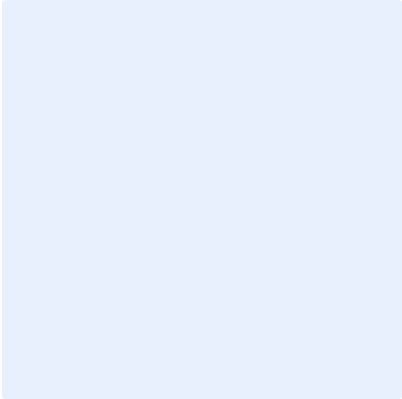
The following conditions/issues must be considered prior to entry:

- | | |
|---|---|
| <input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space. | <input type="checkbox"/> Limited field of view at entry into space |
| <input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space. | <input checked="" type="checkbox"/> Ladder needed for entry. |
| <input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u> | <input type="checkbox"/> Key access ONLY for entry |
| | <input checked="" type="checkbox"/> Temporary lighting needed for entry |

PHOTOGRAPHS



PHOTO #1



PHOTO#2

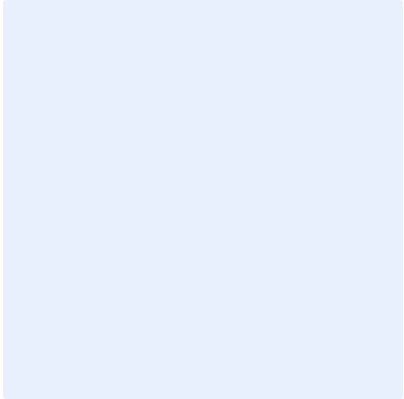


Photo #3

CONFINED SPACE RISK ASSESSMENT

System: Coarse Screen Vault

Confined Space Designation: **PERMIT-REQUIRED**

Type: Tank

Area: A Building

Evaluation Date: 10/21/2015

Description of Space: 2 vaulted tanks

Evaluated By: Andrew Faust

HAZARD ASSESSMENT

PHYSICAL HAZARDS

YES Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? (If YES, check all that apply below)

- | | |
|--|---|
| <input checked="" type="checkbox"/> Engulfment | <input type="checkbox"/> Extreme Temperatures |
| <input type="checkbox"/> Converging Walls/Floors | <input type="checkbox"/> Hazardous Energy: |
| <input checked="" type="checkbox"/> Moving Parts/Sharp Objects | <input type="checkbox"/> Other: |

Describe any items checked above:

ATMOSPHERIC HAZARDS

YES Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? (If YES, check all that apply below)

- | | |
|---|---|
| <input checked="" type="checkbox"/> Low Oxygen (<19.5%) | <input checked="" type="checkbox"/> Flammable Atmosphere (>10% of LEL) |
| <input type="checkbox"/> Elevated Oxygen (>23.5%) | <input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S) |
| <input type="checkbox"/> Carbon Monoxide | <input type="checkbox"/> Other: <Click here to add other hazards> |

Describe any items checked above: [Conduct pre-entry atmospheric monitoring for H₂S, oxygen, and combustible gas, and monitor throughout entry](#)

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

- | | |
|--|--|
| <input checked="" type="checkbox"/> Lock out/Tag Out | <input type="checkbox"/> Disconnecting |
| <input type="checkbox"/> Blanking/Bleeding of lines | <input type="checkbox"/> Forced Air Ventilation (<i>Depending on Atmospheric Monitoring/Conditions</i>) |
| <input type="checkbox"/> Securing of moving parts | <input checked="" type="checkbox"/> Other: Draining/blocking flow and lock out incoming water valve(s) |

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

- | | |
|---|---|
| <input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space. | <input type="checkbox"/> Limited field of view at entry into space |
| <input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space. | <input checked="" type="checkbox"/> Ladder needed for entry. |
| <input checked="" type="checkbox"/> OTHER: Fall protection/retrieval system | <input type="checkbox"/> Key access ONLY for entry |
| | <input checked="" type="checkbox"/> Temporary lighting needed for entry |

PHOTOGRAPHS



PHOTO #1

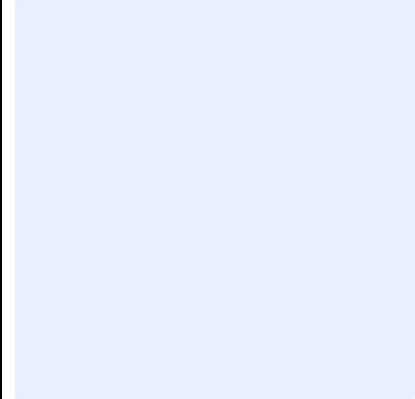
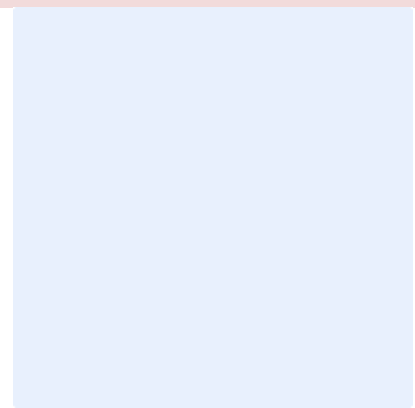
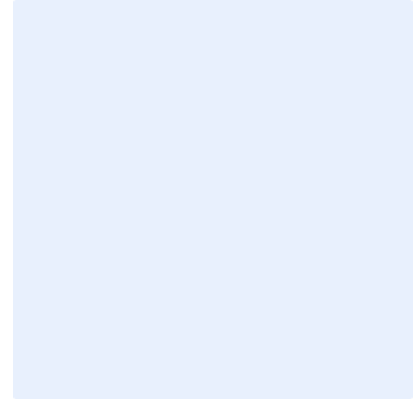


Photo #3



PHOTO#2



CONFINED SPACE RISK ASSESSMENT

System: Main Slew Skate Vault

Confined Space Designation: **PERMIT-REQUIRED**

Type: Tank

Area: A Building

Evaluation Date: 10/21/2015

Description of Space: _____

Evaluated By: Andrew Faust

HAZARD ASSESSMENT

PHYSICAL HAZARDS

YES Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? (If YES, check all that apply below)

- | | |
|---|---|
| <input checked="" type="checkbox"/> Engulfment | <input type="checkbox"/> Extreme Temperatures |
| <input type="checkbox"/> Converging Walls/Floors | <input type="checkbox"/> Hazardous Energy: |
| <input type="checkbox"/> Moving Parts/Sharp Objects | <input type="checkbox"/> Other: |

Describe any items checked above:

ATMOSPHERIC HAZARDS

YES Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? (If YES, check all that apply below)

- | | |
|---|---|
| <input checked="" type="checkbox"/> Low Oxygen (<19.5%) | <input checked="" type="checkbox"/> Flammable Atmosphere (>10% of LEL) |
| <input type="checkbox"/> Elevated Oxygen (>23.5%) | <input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S) |
| <input type="checkbox"/> Carbon Monoxide | <input type="checkbox"/> Other: <Click here to add other hazards> |

Describe any items checked above: [Conduct pre-entry atmospheric monitoring for H₂S, oxygen, and combustible gas, and monitor throughout entry](#)

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

- | | |
|--|--|
| <input checked="" type="checkbox"/> Lock out/Tag Out | <input type="checkbox"/> Disconnecting |
| <input type="checkbox"/> Blanking/Bleeding of lines | <input type="checkbox"/> Forced Air Ventilation (<i>Depending on Atmospheric Monitoring/Conditions</i>) |
| <input type="checkbox"/> Securing of moving parts | <input checked="" type="checkbox"/> Other: Draining/blocking flow and lock out incoming water valve(s) |

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

- | | |
|---|---|
| <input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space. | <input type="checkbox"/> Limited field of view at entry into space |
| <input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space. | <input type="checkbox"/> Ladder needed for entry. |
| <input checked="" type="checkbox"/> OTHER: Fall protection/retrieval system | <input type="checkbox"/> Key access ONLY for entry |
| | <input checked="" type="checkbox"/> Temporary lighting needed for entry |

PHOTOGRAPHS



PHOTO #1

PHOTO#2

Photo #3

CONFINED SPACE RISK ASSESSMENT

System: Thickening Tanks

Confined Space Designation: **PERMIT-REQUIRED**

Type: Tank

Area: Building C

Evaluation Date: 10/22/2015

Description of Space: 5 Thickening Tanks

Evaluated By: Andrew Faust

HAZARD ASSESSMENT

PHYSICAL HAZARDS

YES Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? (If YES, check all that apply below)

- | | |
|--|---|
| <input checked="" type="checkbox"/> Engulfment | <input type="checkbox"/> Extreme Temperatures |
| <input type="checkbox"/> Converging Walls/Floors | <input type="checkbox"/> Hazardous Energy: |
| <input checked="" type="checkbox"/> Moving Parts/Sharp Objects | <input type="checkbox"/> Other: |

Describe any items checked above: Moving rake inside tank

ATMOSPHERIC HAZARDS

YES Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? (If YES, check all that apply below)

- | | |
|---|--|
| <input checked="" type="checkbox"/> Low Oxygen (<19.5%) | <input checked="" type="checkbox"/> Flammable Atmosphere (>10% of LEL) |
| <input type="checkbox"/> Elevated Oxygen (>23.5%) | <input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S) |
| <input type="checkbox"/> Carbon Monoxide | <input type="checkbox"/> Other: <u><Click here to add other hazards></u> |

Describe any items checked above: Conduct pre-entry atmospheric monitoring for oxygen, combustible gas, and H₂S, and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

- | | |
|--|--|
| <input checked="" type="checkbox"/> Lock out/Tag Out | <input type="checkbox"/> Disconnecting |
| <input type="checkbox"/> Blanking/Bleeding of lines | <input checked="" type="checkbox"/> Forced Air Ventilation (<i>Depending on Atmospheric Monitoring/Conditions</i>) |
| <input checked="" type="checkbox"/> Securing of moving parts | <input checked="" type="checkbox"/> Other: <u>Drain tank, block flow/lockout incoming valve</u> |

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

- | | |
|---|--|
| <input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space. | <input type="checkbox"/> Limited field of view at entry into space |
| <input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space. | <input checked="" type="checkbox"/> Ladder needed for entry. |
| <input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u> | <input type="checkbox"/> Key access ONLY for entry |
| | <input type="checkbox"/> Temporary lighting needed for entry |

PHOTOGRAPHS



PHOTO #1

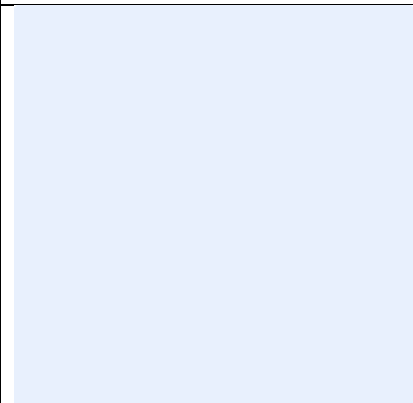
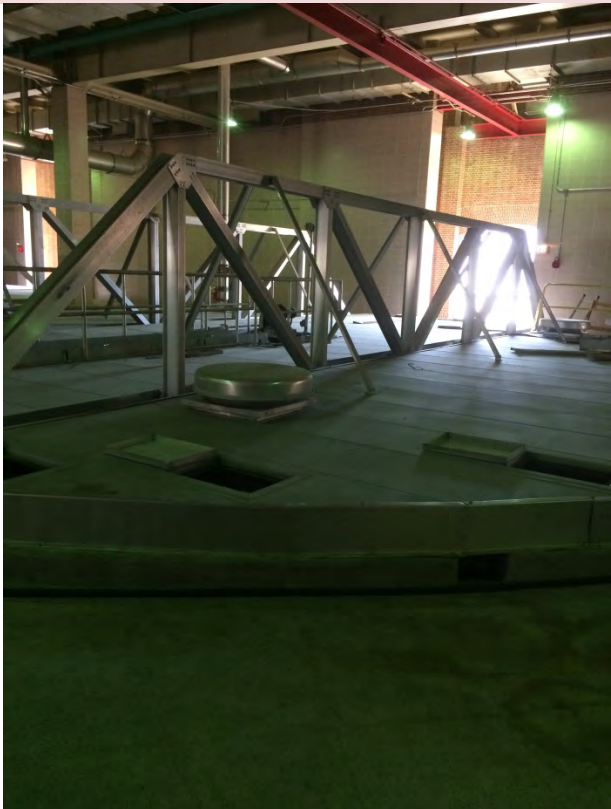
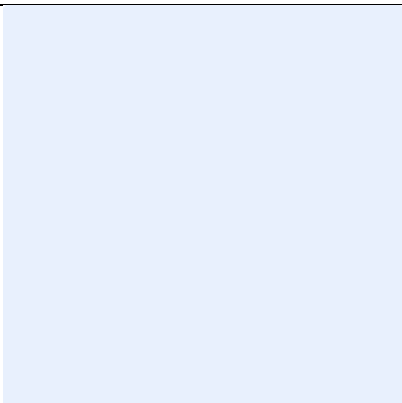


Photo #3



PHOTO#2



CONFINED SPACE RISK ASSESSMENT

System: Flocculator Tanks

Confined Space Designation: **PERMIT-REQUIRED**

Type: Tank

Area: Building G – G2

Evaluation Date: 10/22/2015

Description of Space: 8 Tanks

Evaluated By: Andrew Faust

HAZARD ASSESSMENT

PHYSICAL HAZARDS

YES Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? (If YES, check all that apply below)

- | | |
|--|---|
| <input checked="" type="checkbox"/> Engulfment | <input type="checkbox"/> Extreme Temperatures |
| <input type="checkbox"/> Converging Walls/Floors | <input type="checkbox"/> Hazardous Energy: |
| <input checked="" type="checkbox"/> Moving Parts/Sharp Objects | <input type="checkbox"/> Other: |

Describe any items checked above:

ATMOSPHERIC HAZARDS

YES Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? (If YES, check all that apply below)

- | | |
|---|---|
| <input checked="" type="checkbox"/> Low Oxygen (<19.5%) | <input checked="" type="checkbox"/> Flammable Atmosphere (>10% of LEL) |
| <input type="checkbox"/> Elevated Oxygen (>23.5%) | <input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S) |
| <input type="checkbox"/> Carbon Monoxide | <input type="checkbox"/> Other: <Click here to add other hazards> |

Describe any items checked above: Conduct pre-entry atmospheric monitoring for oxygen, combustible gas, and H₂S, and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

- | | |
|--|--|
| <input checked="" type="checkbox"/> Lock out/Tag Out | <input type="checkbox"/> Disconnecting |
| <input type="checkbox"/> Blanking/Bleeding of lines | <input checked="" type="checkbox"/> Forced Air Ventilation (<i>Depending on Atmospheric Monitoring/Conditions</i>) |
| <input checked="" type="checkbox"/> Securing of moving parts | <input checked="" type="checkbox"/> Other: <u>Draining/blocking flow and lock out incoming water valve(s)</u> |

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

- | | |
|---|---|
| <input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space. | <input type="checkbox"/> Limited field of view at entry into space |
| <input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space. | <input checked="" type="checkbox"/> Ladder needed for entry. |
| <input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u> | <input type="checkbox"/> Key access ONLY for entry |
| | <input checked="" type="checkbox"/> Temporary lighting needed for entry |

PHOTOGRAPHS



PHOTO #1

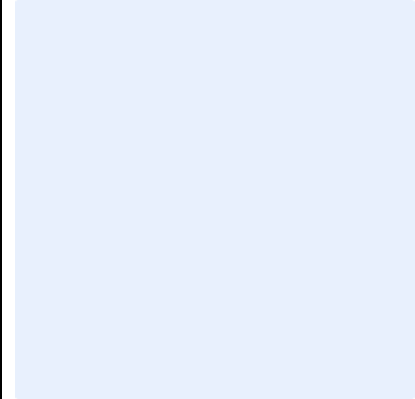
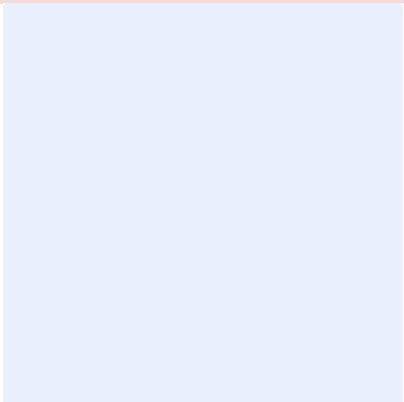
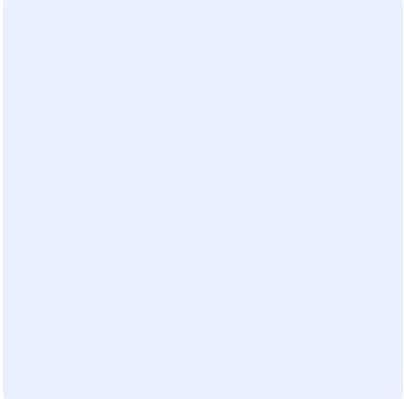


Photo #3



PHOTO#2



CONFINED SPACE RISK ASSESSMENT

System: Flocculator Tanks

Confined Space Designation: **PERMIT-REQUIRED**

Type: Tank

Area: Building G – G3

Evaluation Date: 10/22/2015

Description of Space: 8 Alum treated tanks

Evaluated By: Andrew Faust

HAZARD ASSESSMENT

PHYSICAL HAZARDS

YES Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? (If YES, check all that apply below)

- | | |
|--|---|
| <input checked="" type="checkbox"/> Engulfment | <input type="checkbox"/> Extreme Temperatures |
| <input type="checkbox"/> Converging Walls/Floors | <input type="checkbox"/> Hazardous Energy: |
| <input checked="" type="checkbox"/> Moving Parts/Sharp Objects | <input type="checkbox"/> Other: |

Describe any items checked above:

ATMOSPHERIC HAZARDS

YES Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? (If YES, check all that apply below)

- | | |
|---|---|
| <input checked="" type="checkbox"/> Low Oxygen (<19.5%) | <input checked="" type="checkbox"/> Flammable Atmosphere (>10% of LEL) |
| <input type="checkbox"/> Elevated Oxygen (>23.5%) | <input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S) |
| <input type="checkbox"/> Carbon Monoxide | <input type="checkbox"/> Other: <Click here to add other hazards> |

Describe any items checked above: Conduct pre-entry atmospheric monitoring for oxygen, combustible gas, and H₂S, and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

- | | |
|--|--|
| <input checked="" type="checkbox"/> Lock out/Tag Out | <input type="checkbox"/> Disconnecting |
| <input type="checkbox"/> Blanking/Bleeding of lines | <input checked="" type="checkbox"/> Forced Air Ventilation (<i>Depending on Atmospheric Monitoring/Conditions</i>) |
| <input checked="" type="checkbox"/> Securing of moving parts | <input checked="" type="checkbox"/> Other: <u>Draining/blocking flow and lock out incoming water valve(s)</u> |

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

- | | |
|---|---|
| <input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space. | <input type="checkbox"/> Limited field of view at entry into space |
| <input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space. | <input checked="" type="checkbox"/> Ladder needed for entry. |
| <input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u> | <input type="checkbox"/> Key access ONLY for entry |
| | <input checked="" type="checkbox"/> Temporary lighting needed for entry |

PHOTOGRAPHS



PHOTO #1

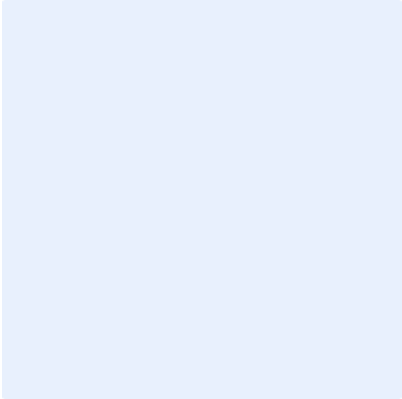
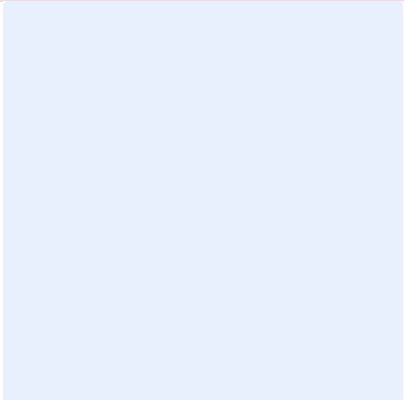
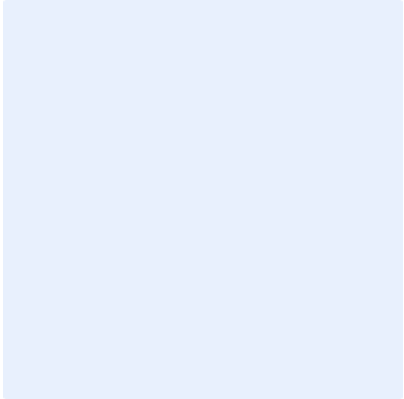


Photo #3



PHOTO#2



CONFINED SPACE RISK ASSESSMENT

System: <u>Sand Filter Tanks</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>Building G – G3</u>	Evaluation Date: <u>10/22/2015</u>
Description of Space: <u>10 Tanks with water/sand media</u>		Evaluated By: <u>Andrew Faust</u>

HAZARD ASSESSMENT

PHYSICAL HAZARDS

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Engulfment	<input type="checkbox"/> Extreme Temperatures
<input type="checkbox"/> Converging Walls/Floors	<input type="checkbox"/> Hazardous Energy:
<input type="checkbox"/> Moving Parts/Sharp Objects	<input type="checkbox"/> Other:

Describe any items checked above:

ATMOSPHERIC HAZARDS

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Low Oxygen (<19.5%)	<input checked="" type="checkbox"/> Flammable Atmosphere (>10% of LEL)
<input type="checkbox"/> Elevated Oxygen (>23.5%)	<input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S)
<input type="checkbox"/> Carbon Monoxide	<input type="checkbox"/> Other: <Click here to add other hazards>

Describe any items checked above: Conduct pre-entry atmospheric monitoring for H₂S, oxygen, and combustible gas, and monitor throughout entry

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

<input checked="" type="checkbox"/> Lock out/Tag Out	<input type="checkbox"/> Disconnecting
<input type="checkbox"/> Blanking/Bleeding of lines	<input checked="" type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i>
<input type="checkbox"/> Securing of moving parts	<input checked="" type="checkbox"/> Other: <u>Draining/blocking flow and lock out incoming water valve(S)</u>

CONSIDERATIONS FOR ENTRY

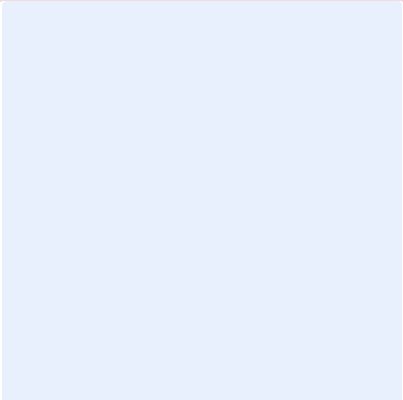
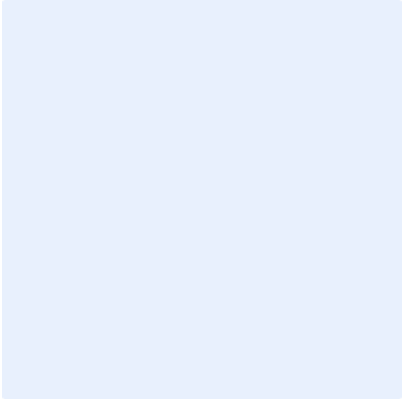
The following conditions/issues must be considered prior to entry:

<input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space.	<input type="checkbox"/> Limited field of view at entry into space
<input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space.	<input checked="" type="checkbox"/> Ladder needed for entry.
<input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u>	<input type="checkbox"/> Key access ONLY for entry
	<input checked="" type="checkbox"/> Temporary lighting needed for entry

PHOTOGRAPHS



PHOTO #1



PHOTO#2



Photo #3

CONFINED SPACE RISK ASSESSMENT

System: <u>Tertiary Tanks</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>Building G – G3</u>	Evaluation Date: <u>10/22/2015</u>
Description of Space: <u>8 Tanks</u>	Evaluated By: <u>Andrew Faust</u>	

HAZARD ASSESSMENT

PHYSICAL HAZARDS

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Engulfment	<input type="checkbox"/> Extreme Temperatures
<input type="checkbox"/> Converging Walls/Floors	<input type="checkbox"/> Hazardous Energy:
<input checked="" type="checkbox"/> Moving Parts/Sharp Objects	<input type="checkbox"/> Other:

Describe any items checked above:

ATMOSPHERIC HAZARDS

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Low Oxygen (<19.5%)	<input checked="" type="checkbox"/> Flammable Atmosphere (>10% of LEL)
<input type="checkbox"/> Elevated Oxygen (>23.5%)	<input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S)
<input type="checkbox"/> Carbon Monoxide	<input type="checkbox"/> Other: <Click here to add other hazards>

Describe any items checked above: Conduct pre-entry atmospheric monitoring for oxygen, combustible gas, H₂S and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

<input checked="" type="checkbox"/> Lock out/Tag Out	<input type="checkbox"/> Disconnecting
<input type="checkbox"/> Blanking/Bleeding of lines	<input checked="" type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i>
<input checked="" type="checkbox"/> Securing of moving parts	<input checked="" type="checkbox"/> Other: <u>Draining/blocking flow and lock out incoming water valve(S)</u>

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

<input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space.	<input type="checkbox"/> Limited field of view at entry into space
<input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space.	<input checked="" type="checkbox"/> Ladder needed for entry.
<input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u>	<input type="checkbox"/> Key access ONLY for entry
	<input checked="" type="checkbox"/> Temporary lighting needed for entry

PHOTOGRAPHS

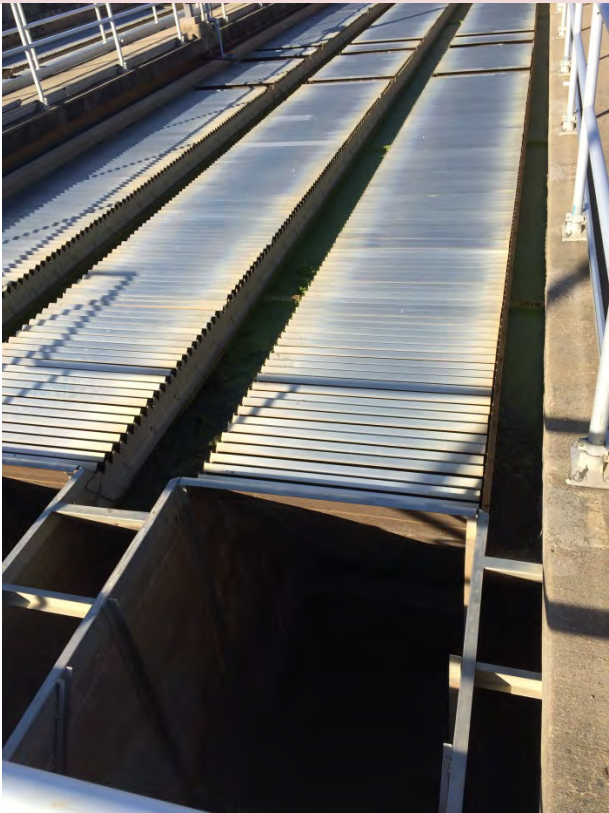
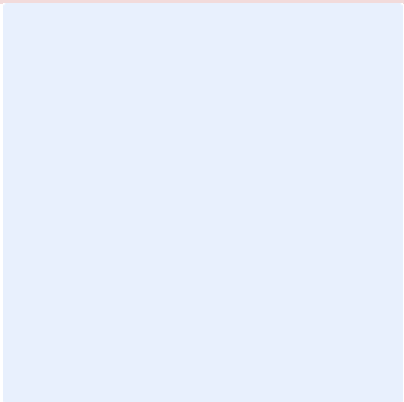
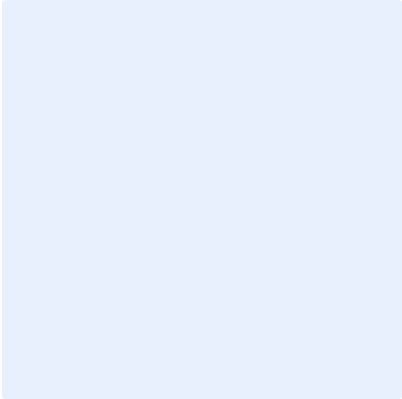


PHOTO #1



PHOTO#2

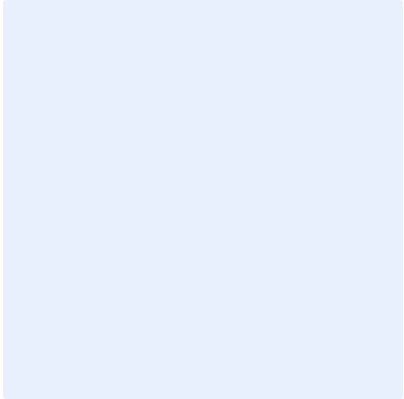


Photo #3

CONFINED SPACE RISK ASSESSMENT

System: G4 Sand Filter Tanks Confined Space Designation: **PERMIT-REQUIRED**
 Type: Tank Area: Building G Evaluation Date: 10/22/2015
 Description of Space: 12 Tanks Evaluated By: Andrew Faust

HAZARD ASSESSMENT

PHYSICAL HAZARDS

YES Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? (If YES, check all that apply below)

- | | |
|---|---|
| <input checked="" type="checkbox"/> Engulfment | <input type="checkbox"/> Extreme Temperatures |
| <input type="checkbox"/> Converging Walls/Floors | <input type="checkbox"/> Hazardous Energy: |
| <input type="checkbox"/> Moving Parts/Sharp Objects | <input type="checkbox"/> Other: |

Describe any items checked above:

ATMOSPHERIC HAZARDS

YES Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? (If YES, check all that apply below)

- | | |
|---|---|
| <input type="checkbox"/> Low Oxygen (<19.5%) | <input type="checkbox"/> Flammable Atmosphere (>10% of LEL) |
| <input type="checkbox"/> Elevated Oxygen (>23.5%) | <input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S) |
| <input type="checkbox"/> Carbon Monoxide | <input type="checkbox"/> Other: <Click here to add other hazards> |

Describe any items checked above: [Conduct pre-entry atmospheric monitoring for H₂S and monitor throughout entry.](#)

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

- | | |
|--|--|
| <input checked="" type="checkbox"/> Lock out/Tag Out | <input type="checkbox"/> Disconnecting |
| <input type="checkbox"/> Blanking/Bleeding of lines | <input checked="" type="checkbox"/> Forced Air Ventilation (Depending on Atmospheric Monitoring/Conditions) |
| <input type="checkbox"/> Securing of moving parts | <input checked="" type="checkbox"/> Other: Draining/blocking flow and lock out incoming water valves |

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

- | | |
|--|---|
| <input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space. | <input type="checkbox"/> Limited field of view at entry into space |
| <input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space. | <input checked="" type="checkbox"/> Ladder needed for entry. |
| <input checked="" type="checkbox"/> OTHER: Fall protection/retrieval system | <input type="checkbox"/> Key access ONLY for entry |
| | <input checked="" type="checkbox"/> Temporary lighting needed for entry |

PHOTOGRAPHS

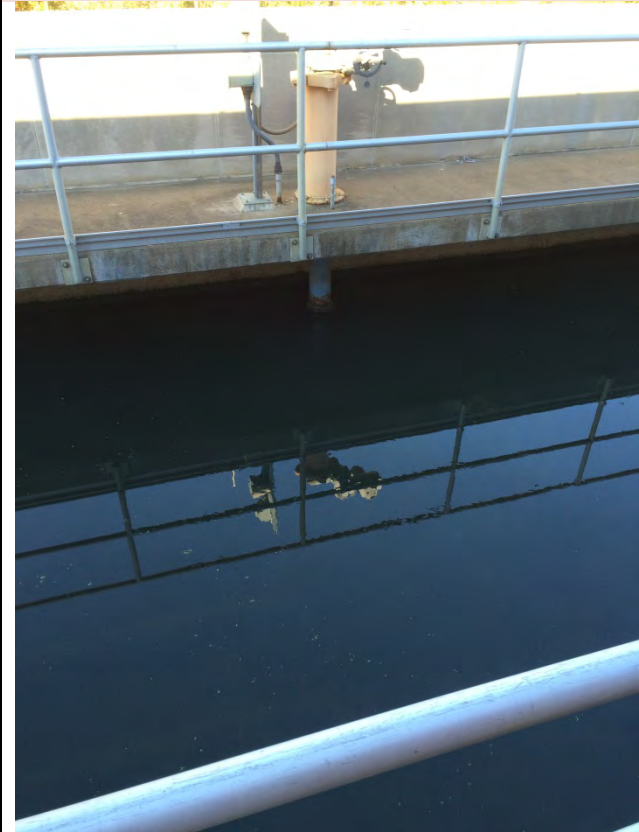


PHOTO #1

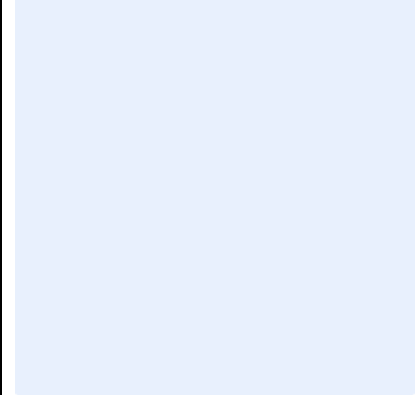
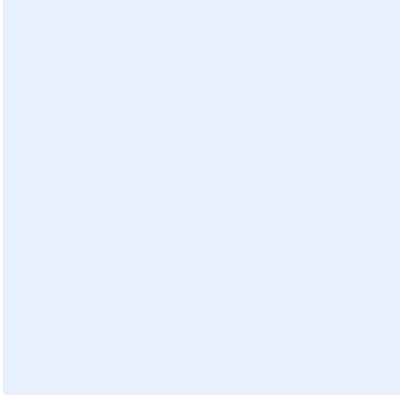


Photo #3



PHOTO#2



CONFINED SPACE RISK ASSESSMENT

System: G5 – Backwash Waste
Water Tank

Confined Space Designation: **PERMIT-REQUIRED**

Type: Tank

Area: Building G

Evaluation Date: 10/22/2015

Description of Space: _____

Evaluated By: Andrew Faust

HAZARD ASSESSMENT

PHYSICAL HAZARDS

YES

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? (If YES, check all that apply below)

- | | |
|---|---|
| <input checked="" type="checkbox"/> Engulfment | <input type="checkbox"/> Extreme Temperatures |
| <input type="checkbox"/> Converging Walls/Floors | <input type="checkbox"/> Hazardous Energy: |
| <input type="checkbox"/> Moving Parts/Sharp Objects | <input type="checkbox"/> Other: |

Describe any items checked above:

ATMOSPHERIC HAZARDS

YES

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? (If YES, check all that apply below)

- | | |
|---|---|
| <input checked="" type="checkbox"/> Low Oxygen (<19.5%) | <input checked="" type="checkbox"/> Flammable Atmosphere (>10% of LEL) |
| <input type="checkbox"/> Elevated Oxygen (>23.5%) | <input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S) |
| <input type="checkbox"/> Carbon Monoxide | <input type="checkbox"/> Other: <Click here to add other hazards> |

Describe any items checked above: [Conduct pre-entry atmospheric monitoring for H₂S, oxygen, and combustible gas, and monitor throughout entry](#)

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

- | | |
|--|--|
| <input checked="" type="checkbox"/> Lock out/Tag Out | <input type="checkbox"/> Disconnecting |
| <input type="checkbox"/> Blanking/Bleeding of lines | <input checked="" type="checkbox"/> Forced Air Ventilation (<i>Depending on Atmospheric Monitoring/Conditions</i>) |
| <input type="checkbox"/> Securing of moving parts | <input checked="" type="checkbox"/> Other: Draining/blocking flow and lock out incoming water valve(s) |

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

- | | |
|---|---|
| <input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space. | <input type="checkbox"/> Limited field of view at entry into space |
| <input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space. | <input checked="" type="checkbox"/> Ladder needed for entry. |
| <input checked="" type="checkbox"/> OTHER: Fall protection/retrieval system | <input type="checkbox"/> Key access ONLY for entry |
| | <input checked="" type="checkbox"/> Temporary lighting needed for entry |

PHOTOGRAPHS



PHOTO #1

PHOTO#2

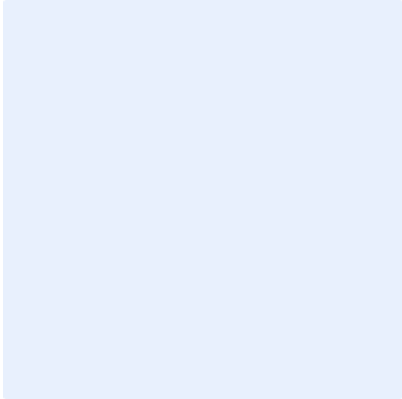
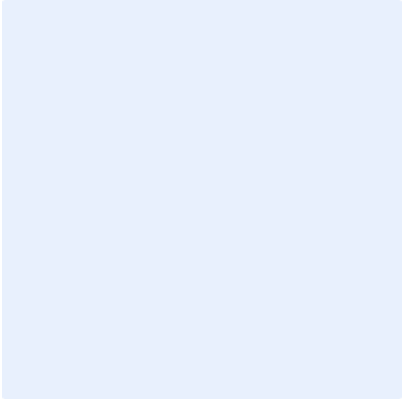


Photo #3

CONFINED SPACE RISK ASSESSMENT

System: G5 – Wash Water Pump Tanks

Confined Space Designation: **PERMIT-REQUIRED**

Type: Tank

Area: Building G

Evaluation Date: 10/22/2015

Description of Space: _____

Evaluated By: Andrew Faust

HAZARD ASSESSMENT

PHYSICAL HAZARDS

YES

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? (If YES, check all that apply below)

- | | |
|---|---|
| <input checked="" type="checkbox"/> Engulfment | <input type="checkbox"/> Extreme Temperatures |
| <input type="checkbox"/> Converging Walls/Floors | <input type="checkbox"/> Hazardous Energy: |
| <input type="checkbox"/> Moving Parts/Sharp Objects | <input type="checkbox"/> Other: |

Describe any items checked above:

ATMOSPHERIC HAZARDS

YES

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? (If YES, check all that apply below)

- | | |
|---|---|
| <input type="checkbox"/> Low Oxygen (<19.5%) | <input type="checkbox"/> Flammable Atmosphere (>10% of LEL) |
| <input type="checkbox"/> Elevated Oxygen (>23.5%) | <input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S) |
| <input type="checkbox"/> Carbon Monoxide | <input type="checkbox"/> Other: <Click here to add other hazards> |

Describe any items checked above: Conduct pre-entry atmospheric monitoring for H₂S and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

- | | |
|--|---|
| <input checked="" type="checkbox"/> Lock out/Tag Out | <input type="checkbox"/> Disconnecting |
| <input type="checkbox"/> Blanking/Bleeding of lines | <input checked="" type="checkbox"/> Forced Air Ventilation (Depending on Atmospheric Monitoring/Conditions) |
| <input type="checkbox"/> Securing of moving parts | <input checked="" type="checkbox"/> Other: <u>Draining/blocking flow and lock out incoming water valve(s)</u> |

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

- | | |
|---|---|
| <input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space. | <input type="checkbox"/> Limited field of view at entry into space |
| <input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space. | <input checked="" type="checkbox"/> Ladder needed for entry. |
| <input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u> | <input type="checkbox"/> Key access ONLY for entry |
| | <input checked="" type="checkbox"/> Temporary lighting needed for entry |

PHOTOGRAPHS

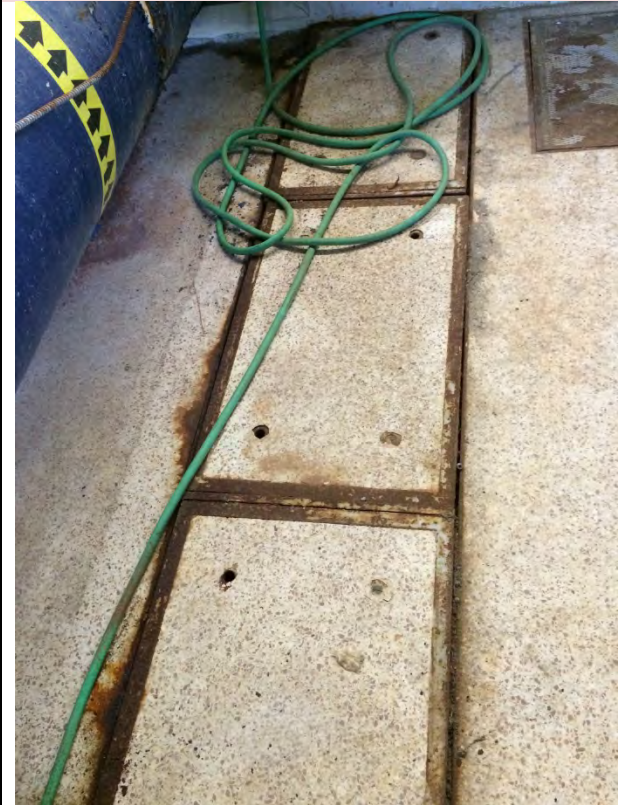


PHOTO #1

PHOTO#2

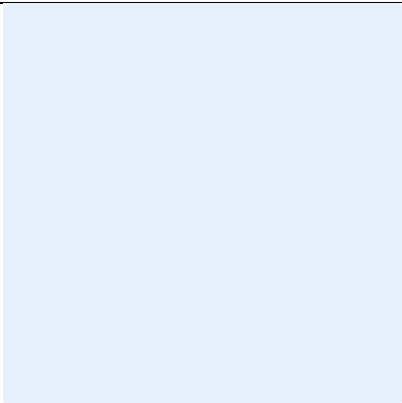
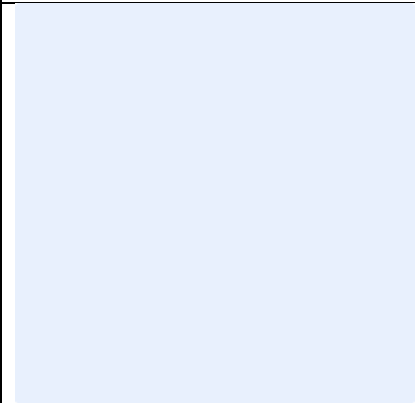


Photo #3

CONFINED SPACE RISK ASSESSMENT

System: Backwash Waste Water Tank

Confined Space Designation: **PERMIT-REQUIRED**

Type: Tank

Area: Building G – G6

Evaluation Date: 10/22/2015

Description of Space: _____

Evaluated By: Andrew Faust

HAZARD ASSESSMENT

PHYSICAL HAZARDS

YES

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? (If YES, check all that apply below)



Engulfment



Extreme Temperatures



Converging Walls/Floors



Hazardous Energy:



Moving Parts/Sharp Objects



Other:

Describe any items checked above:

ATMOSPHERIC HAZARDS

YES

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? (If YES, check all that apply below)



Low Oxygen (<19.5%)



Flammable Atmosphere (>10% of LEL)



Elevated Oxygen (>23.5%)



Hydrogen Sulfide (H₂S)



Carbon Monoxide



Other: [<Click here to add other hazards>](#)

Describe any items checked above: [Conduct pre-entry atmospheric monitoring for H₂S, oxygen, and combustible gas, and monitor throughout entry](#)

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:



Lock out/Tag Out



Disconnecting



Blanking/Bleeding of lines



Forced Air Ventilation (Depending on Atmospheric Monitoring/Conditions)



Securing of moving parts



Other: [Draining/blocking flow and lock out incoming water valve\(s\)](#)

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:



Usage of chemicals will change this space to a PERMIT-REQUIRED confined space.



Limited field of view at entry into space



Ladder needed for entry.



Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space.



Key access ONLY for entry



Temporary lighting needed for entry



OTHER: [Fall protection/retrieval system](#)

PHOTOGRAPHS



PHOTO #1

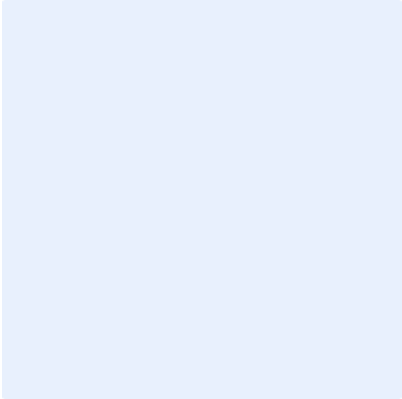
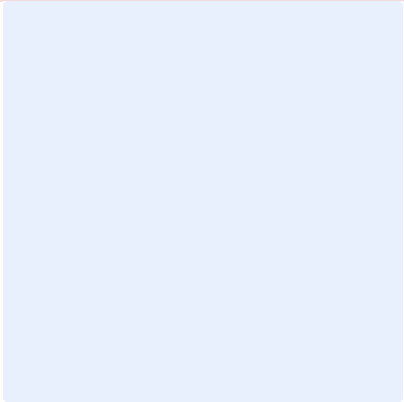
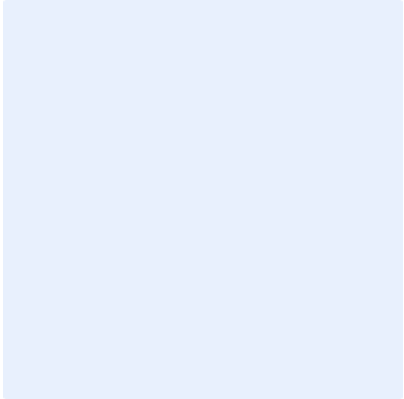


Photo #3



PHOTO#2



CONFINED SPACE RISK ASSESSMENT

System: <u>Common Channel</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>K Building</u>	Evaluation Date: <u>10/21/2015</u>
Description of Space: <u>3 vaulted tanks</u>	Evaluated By: <u>Andrew Faust</u>	

HAZARD ASSESSMENT

PHYSICAL HAZARDS

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Engulfment	<input type="checkbox"/> Extreme Temperatures
<input type="checkbox"/> Converging Walls/Floors	<input type="checkbox"/> Hazardous Energy:
<input checked="" type="checkbox"/> Moving Parts/Sharp Objects	<input type="checkbox"/> Other:

Describe any items checked above:

ATMOSPHERIC HAZARDS

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Low Oxygen (<19.5%)	<input checked="" type="checkbox"/> Flammable Atmosphere (>10% of LEL)
<input type="checkbox"/> Elevated Oxygen (>23.5%)	<input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S)
<input type="checkbox"/> Carbon Monoxide	<input type="checkbox"/> Other: <Click here to add other hazards>

Describe any items checked above: Conduct pre-entry atmospheric monitoring for oxygen, combustible gas, and H₂S, and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

<input checked="" type="checkbox"/> Lock out/Tag Out	<input type="checkbox"/> Disconnecting
<input type="checkbox"/> Blanking/Bleeding of lines	<input checked="" type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i>
<input type="checkbox"/> Securing of moving parts	<input checked="" type="checkbox"/> Other: <u>Draining/blocking flow/lock out incoming water valve(s)</u>

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

<input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space.	<input type="checkbox"/> Limited field of view at entry into space
<input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space.	<input checked="" type="checkbox"/> Ladder needed for entry.
<input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u>	<input type="checkbox"/> Key access ONLY for entry
	<input checked="" type="checkbox"/> Temporary lighting needed for entry

PHOTOGRAPHS



PHOTO #1

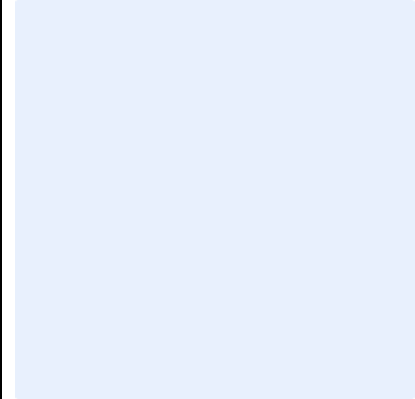
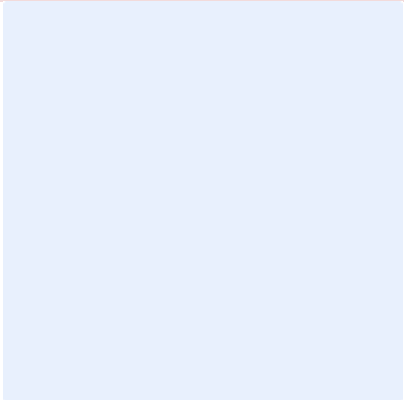
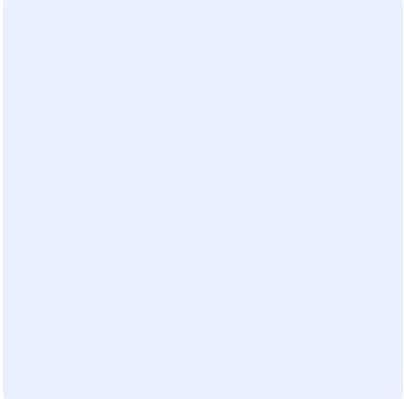


Photo #3



PHOTO#2



CONFINED SPACE RISK ASSESSMENT

System: <u>Fine Screen Vault</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>K Building</u>	Evaluation Date: <u>10/21/2015</u>
Description of Space: <u>5 vaulted tanks</u>	Evaluated By: <u>Andrew Faust</u>	

HAZARD ASSESSMENT

PHYSICAL HAZARDS

YES Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

- | | |
|---|---|
| <input checked="" type="checkbox"/> Engulfment | <input type="checkbox"/> Extreme Temperatures |
| <input type="checkbox"/> Converging Walls/Floors | <input type="checkbox"/> Hazardous Energy: |
| <input type="checkbox"/> Moving Parts/Sharp Objects | <input type="checkbox"/> Other: |

Describe any items checked above:

ATMOSPHERIC HAZARDS

YES Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

- | | |
|---|---|
| <input checked="" type="checkbox"/> Low Oxygen (<19.5%) | <input checked="" type="checkbox"/> Flammable Atmosphere (>10% of LEL) |
| <input type="checkbox"/> Elevated Oxygen (>23.5%) | <input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S) |
| <input type="checkbox"/> Carbon Monoxide | <input type="checkbox"/> Other: <Click here to add other hazards> |

Describe any items checked Conduct pre-entry atmospheric monitoring for H₂S, oxygen, and combustible gas, and monitor throughout entry

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

- | | |
|--|--|
| <input checked="" type="checkbox"/> Lock out/Tag Out | <input type="checkbox"/> Disconnecting |
| <input type="checkbox"/> Blanking/Bleeding of lines | <input checked="" type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i> |
| <input type="checkbox"/> Securing of moving parts | <input checked="" type="checkbox"/> Other: <u>Draining/blocking flow/lock out incoming water valve(s)</u> |

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

- | | |
|---|---|
| <input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space. | <input type="checkbox"/> Limited field of view at entry into space |
| <input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space. | <input checked="" type="checkbox"/> Ladder needed for entry. |
| <input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u> | <input type="checkbox"/> Key access ONLY for entry |
| | <input checked="" type="checkbox"/> Temporary lighting needed for entry |

PHOTOGRAPHS

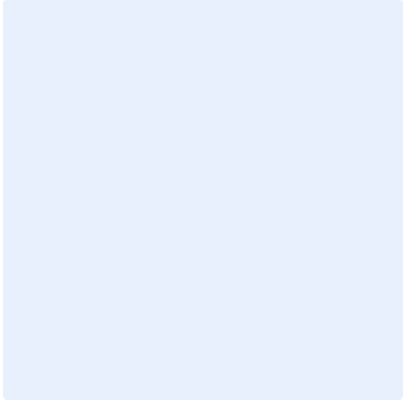


PHOTO #1

PHOTO#2

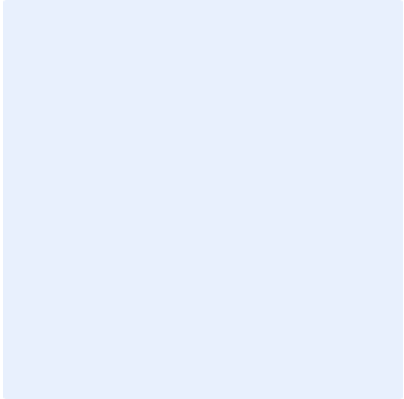
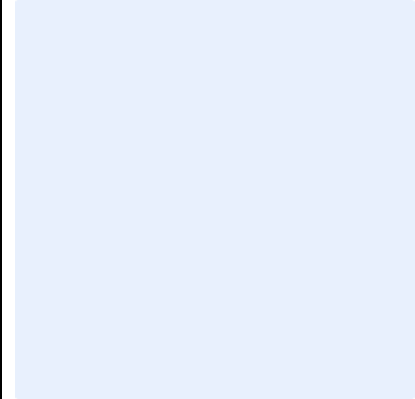


Photo #3

CONFINED SPACE RISK ASSESSMENT

System: <u>Pista Grits</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>K Building</u>	Evaluation Date: <u>10/21/2015</u>
Description of Space: <u>4 vaulted tanks</u>	Evaluated By: <u>Andrew Faust</u>	

HAZARD ASSESSMENT

PHYSICAL HAZARDS

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Engulfment	<input type="checkbox"/> Extreme Temperatures
<input type="checkbox"/> Converging Walls/Floors	<input type="checkbox"/> Hazardous Energy:
<input checked="" type="checkbox"/> Moving Parts/Sharp Objects	<input type="checkbox"/> Other:

Describe any items checked above:

ATMOSPHERIC HAZARDS

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Low Oxygen (<19.5%)	<input type="checkbox"/> Flammable Atmosphere (>10% of LEL)
<input type="checkbox"/> Elevated Oxygen (>23.5%)	<input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S)
<input type="checkbox"/> Carbon Monoxide	<input type="checkbox"/> Other: <Click here to add other hazards>

Describe any items checked above: Conduct pre-entry atmospheric monitoring for oxygen and H₂S, and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

<input checked="" type="checkbox"/> Lock out/Tag Out	<input type="checkbox"/> Disconnecting
<input type="checkbox"/> Blanking/Bleeding of lines	<input checked="" type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i>
<input type="checkbox"/> Securing of moving parts	<input checked="" type="checkbox"/> Other: <u>Draining/blocking flow/lock out incoming water valve(s)</u>

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

<input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space.	<input type="checkbox"/> Limited field of view at entry into space
<input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space.	<input checked="" type="checkbox"/> Ladder needed for entry.
<input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u>	<input type="checkbox"/> Key access ONLY for entry
	<input checked="" type="checkbox"/> Temporary lighting needed for entry

PHOTOGRAPHS



PHOTO #1

PHOTO#2

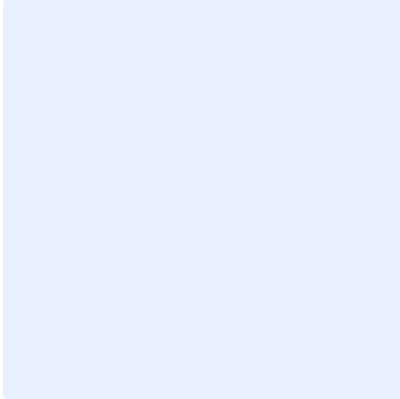
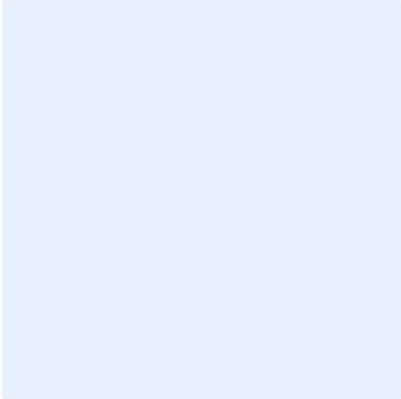


Photo #3

CONFINED SPACE RISK ASSESSMENT

System: <u>Scum Holding Tank</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>K Building</u>	Evaluation Date: <u>10/21/2015</u>
Description of Space: <u>Silo Tank</u>	Evaluated By: <u>Andrew Faust</u>	

HAZARD ASSESSMENT

PHYSICAL HAZARDS

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Engulfment	<input type="checkbox"/> Extreme Temperatures
<input checked="" type="checkbox"/> Converging Walls/Floors	<input type="checkbox"/> Hazardous Energy:
<input checked="" type="checkbox"/> Moving Parts/Sharp Objects	<input type="checkbox"/> Other:

Describe any items checked above:

ATMOSPHERIC HAZARDS

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Low Oxygen (<19.5%)	<input checked="" type="checkbox"/> Flammable Atmosphere (>10% of LEL)
<input type="checkbox"/> Elevated Oxygen (>23.5%)	<input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S)
<input type="checkbox"/> Carbon Monoxide	<input type="checkbox"/> Other: <Click here to add other hazards>

Describe any items checked above: Conduct pre-entry atmospheric monitoring for H₂S, oxygen, and combustible gas, and monitor throughout entry

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

<input checked="" type="checkbox"/> Lock out/Tag Out	<input checked="" type="checkbox"/> Disconnecting
<input type="checkbox"/> Blanking/Bleeding of lines	<input checked="" type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i>
<input checked="" type="checkbox"/> Securing of moving parts	<input checked="" type="checkbox"/> Other: <u>Drain tank, turn of incoming valves, and lockout out valve</u>

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

<input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space.	<input type="checkbox"/> Limited field of view at entry into space
<input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space.	<input checked="" type="checkbox"/> Ladder needed for entry.
<input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u>	<input type="checkbox"/> Key access ONLY for entry
	<input checked="" type="checkbox"/> Temporary lighting needed for entry

PHOTOGRAPHS



PHOTO #1

PHOTO#2

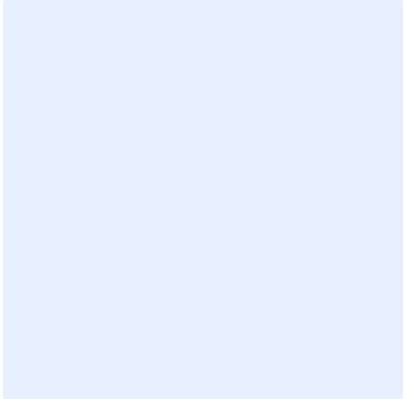
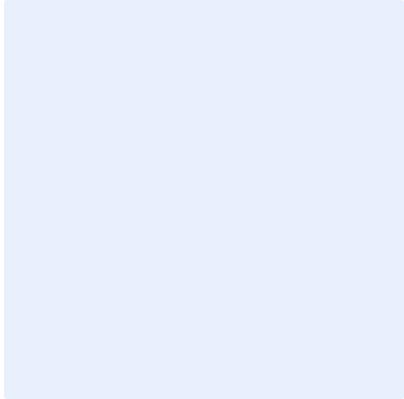


Photo #3

CONFINED SPACE RISK ASSESSMENT

System: <u>Aluminum Tanks</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>Building L – Aluminum Tank Room</u>	Evaluation Date: <u>10/22/2015</u>
Description of Space: <u>2 Aluminum Tanks</u>		Evaluated By: <u>Andrew Faust</u>

HAZARD ASSESSMENT

PHYSICAL HAZARDS

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Engulfment	<input type="checkbox"/> Extreme Temperatures
<input type="checkbox"/> Converging Walls/Floors	<input type="checkbox"/> Hazardous Energy: <u>Chemical</u>
<input type="checkbox"/> Moving Parts/Sharp Objects	<input type="checkbox"/> Other:

Describe any items checked above:

ATMOSPHERIC HAZARDS

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Low Oxygen (<19.5%)	<input type="checkbox"/> Flammable Atmosphere (>10% of LEL)
<input type="checkbox"/> Elevated Oxygen (>23.5%)	<input type="checkbox"/> Hydrogen Sulfide (H ₂ S)
<input type="checkbox"/> Carbon Monoxide	<input type="checkbox"/> Other: <u>< Corrosive powder/residue ></u>

Describe any items checked above: Conduct pre-entry atmospheric monitoring for oxygen and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

<input checked="" type="checkbox"/> Lock out/Tag Out	<input checked="" type="checkbox"/> Disconnecting
<input checked="" type="checkbox"/> Blanking/Bleeding of lines	<input checked="" type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i>
<input type="checkbox"/> Securing of moving parts	<input checked="" type="checkbox"/> Other: <u>Drain tank; Wear appropriate PPE</u>

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

<input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space.	<input type="checkbox"/> Limited field of view at entry into space
<input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space.	<input checked="" type="checkbox"/> Ladder needed for entry.
<input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u>	<input type="checkbox"/> Key access ONLY for entry
	<input type="checkbox"/> Temporary lighting needed for entry

PHOTOGRAPHS



PHOTO #1

PHOTO#2

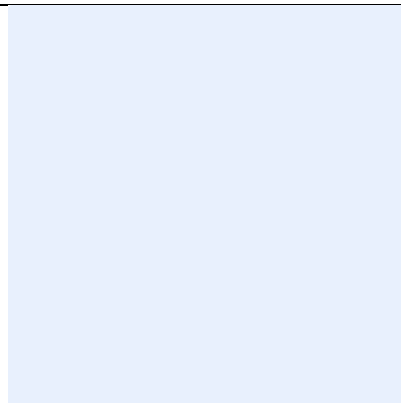
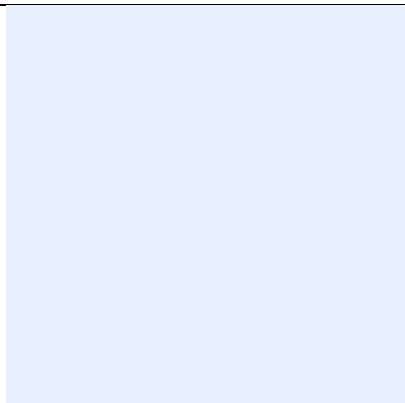


Photo #3

CONFINED SPACE RISK ASSESSMENT

System: <u>Dew Centrate Tank</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>Building L – Ground Floor</u>	Evaluation Date: <u>10/22/2015</u>
Description of Space: _____		Evaluated By: <u>Andrew Faust</u>

HAZARD ASSESSMENT

PHYSICAL HAZARDS

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Engulfment	<input type="checkbox"/> Extreme Temperatures
<input type="checkbox"/> Converging Walls/Floors	<input type="checkbox"/> Hazardous Energy:
<input type="checkbox"/> Moving Parts/Sharp Objects	<input type="checkbox"/> Other:

Describe any items checked above:

ATMOSPHERIC HAZARDS

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Low Oxygen (<19.5%)	<input type="checkbox"/> Flammable Atmosphere (>10% of LEL)
<input type="checkbox"/> Elevated Oxygen (>23.5%)	<input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S)
<input type="checkbox"/> Carbon Monoxide	<input type="checkbox"/> Other: <Click here to add other hazards>

Describe any items checked above: Conduct pre-entry atmospheric monitoring for H₂S and oxygen and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

<input checked="" type="checkbox"/> Lock out/Tag Out	<input type="checkbox"/> Disconnecting
<input type="checkbox"/> Blanking/Bleeding of lines	<input checked="" type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i>
<input type="checkbox"/> Securing of moving parts	<input checked="" type="checkbox"/> Other: <u>Draining/blocking flow</u>

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

<input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space.	<input type="checkbox"/> Limited field of view at entry into space
<input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space.	<input checked="" type="checkbox"/> Ladder needed for entry.
<input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u>	<input type="checkbox"/> Key access ONLY for entry
	<input type="checkbox"/> Temporary lighting needed for entry

PHOTOGRAPHS



PHOTO #1

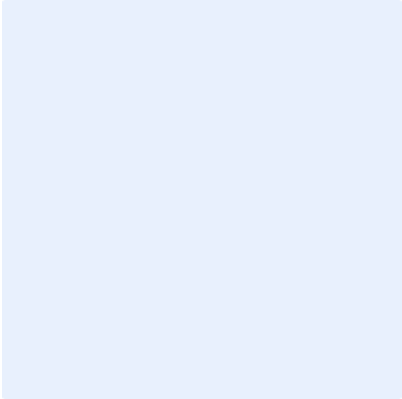
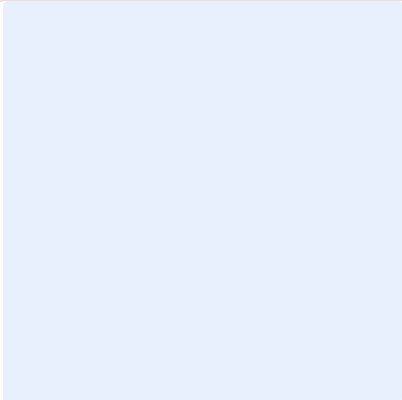
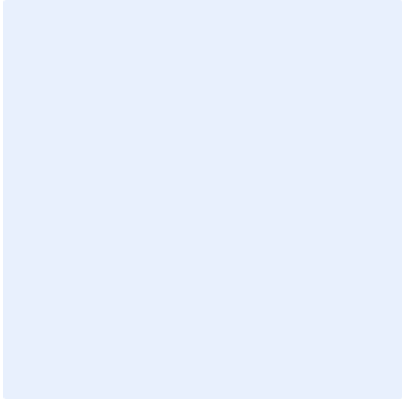


Photo #3



PHOTO#2



CONFINED SPACE RISK ASSESSMENT

System: <u>Ferric Chloride Tanks</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>Building L – Ferric Chloride Tank Room</u>	Evaluation Date: <u>10/22/2015</u>
Description of Space: <u>4 Ferric Chloride Tanks</u>		Evaluated By: <u>Andrew Faust</u>
HAZARD ASSESSMENT		
<u>PHYSICAL HAZARDS</u>		
YES	Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? <i>(If YES, check all that apply below)</i>	
	<input checked="" type="checkbox"/> Engulfment <input type="checkbox"/> Converging Walls/Floors <input type="checkbox"/> Moving Parts/Sharp Objects	<input type="checkbox"/> Extreme Temperatures <input checked="" type="checkbox"/> Hazardous Energy: <u>Chemical</u> <input type="checkbox"/> Other:
<i>Describe any items checked above:</i>		
<u>ATMOSPHERIC HAZARDS</u>		
YES	Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? <i>(If YES, check all that apply below)</i>	
	<input checked="" type="checkbox"/> Low Oxygen (<19.5%) <input type="checkbox"/> Elevated Oxygen (>23.5%) <input type="checkbox"/> Carbon Monoxide	<input type="checkbox"/> Flammable Atmosphere (>10% of LEL) <input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S) <input type="checkbox"/> Other: <u><Click here to add other hazards></u>
<i>Describe any items checked above: Conduct pre-entry atmospheric monitoring for H₂S and oxygen and monitor throughout entry.</i>		
HAZARD CONTROLS		
The following hazard control measures are necessary for entry into this space:		
	<input checked="" type="checkbox"/> Lock out/Tag Out <input checked="" type="checkbox"/> Blanking/Bleeding of lines <input type="checkbox"/> Securing of moving parts	<input checked="" type="checkbox"/> Disconnecting <input checked="" type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i> <input checked="" type="checkbox"/> Other: <u>Drain tank</u>
CONSIDERATIONS FOR ENTRY		
The following conditions/issues must be considered prior to entry:		
<input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space. <input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space. <input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u>	<input type="checkbox"/> Limited field of view at entry into space <input checked="" type="checkbox"/> Ladder needed for entry. <input type="checkbox"/> Key access ONLY for entry <input type="checkbox"/> Temporary lighting needed for entry	

PHOTOGRAPHS



PHOTO #1

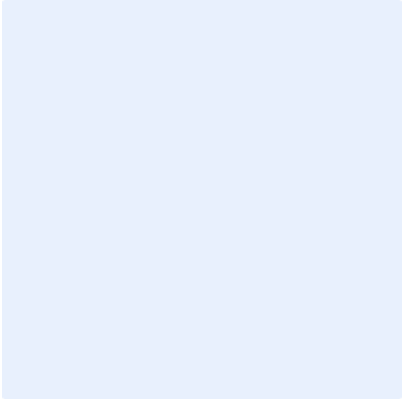
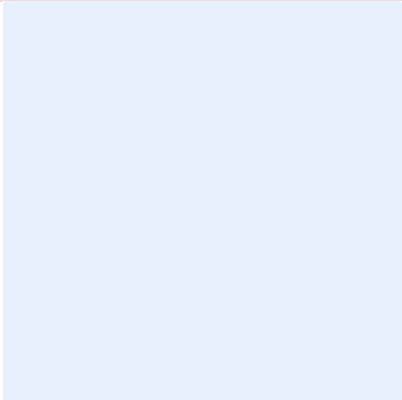
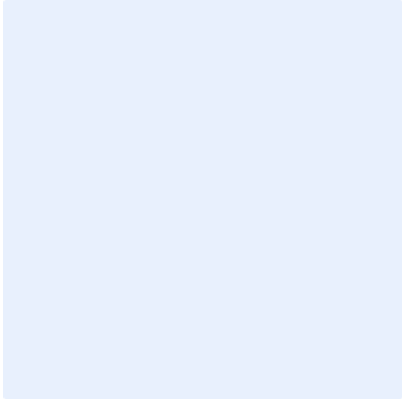


Photo #3



PHOTO#2



CONFINED SPACE RISK ASSESSMENT

System: <u>Fertilizer Silo Tanks</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>Building L – Silo Room</u>	Evaluation Date: <u>10/22/2015</u>
Description of Space: <u>6 Fertilizer Silos</u>		Evaluated By: <u>Andrew Faust</u>

HAZARD ASSESSMENT

PHYSICAL HAZARDS

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Engulfment	<input type="checkbox"/> Extreme Temperatures
<input type="checkbox"/> Converging Walls/Floors	<input type="checkbox"/> Hazardous Energy:
<input checked="" type="checkbox"/> Moving Parts/Sharp Objects	<input type="checkbox"/> Other:

Describe any items checked above:

ATMOSPHERIC HAZARDS

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Low Oxygen (<19.5%)	<input checked="" type="checkbox"/> Flammable Atmosphere (>10% of LEL)
<input type="checkbox"/> Elevated Oxygen (>23.5%)	<input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S)
<input type="checkbox"/> Carbon Monoxide	<input type="checkbox"/> Other: <Click here to add other hazards>

Describe any items checked above: Conduct pre-entry atmospheric monitoring for H₂S, oxygen, and combustible gas, and monitor throughout entry

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

<input checked="" type="checkbox"/> Lock out/Tag Out	<input type="checkbox"/> Disconnecting
<input type="checkbox"/> Blanking/Bleeding of lines	<input checked="" type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i>
<input checked="" type="checkbox"/> Securing of moving parts	<input checked="" type="checkbox"/> Other: <u>Drain tank</u>

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

<input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space.	<input type="checkbox"/> Limited field of view at entry into space
<input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space.	<input checked="" type="checkbox"/> Ladder needed for entry.
<input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u>	<input type="checkbox"/> Key access ONLY for entry
	<input type="checkbox"/> Temporary lighting needed for entry

PHOTOGRAPHS



PHOTO #1

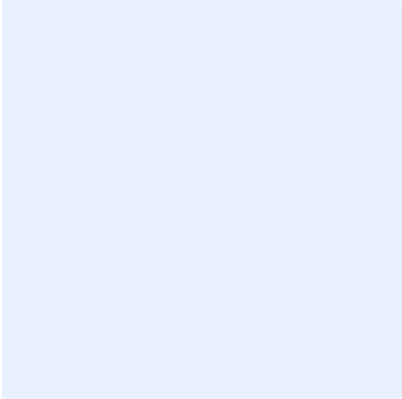
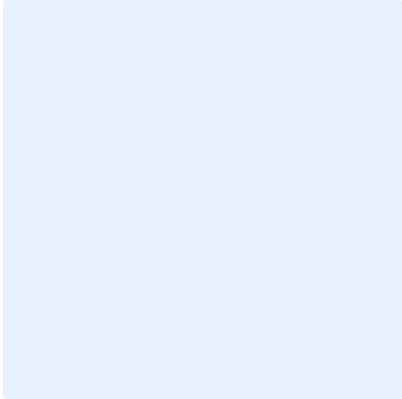


Photo #3

PHOTO#2



CONFINED SPACE RISK ASSESSMENT

System: <u>Lime Silo Tanks</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>Building L – Lime Silo Room</u>	Evaluation Date: <u>10/22/2015</u>
Description of Space: <u>3 Decommissioned Tanks</u>		Evaluated By: <u>Andrew Faust</u>

HAZARD ASSESSMENT

PHYSICAL HAZARDS

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Engulfment	<input type="checkbox"/> Extreme Temperatures
<input type="checkbox"/> Converging Walls/Floors	<input type="checkbox"/> Hazardous Energy:
<input type="checkbox"/> Moving Parts/Sharp Objects	<input type="checkbox"/> Other:

Describe any items checked above:

ATMOSPHERIC HAZARDS

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Low Oxygen (<19.5%)	<input type="checkbox"/> Flammable Atmosphere (>10% of LEL)
<input type="checkbox"/> Elevated Oxygen (>23.5%)	<input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S)
<input type="checkbox"/> Carbon Monoxide	<input type="checkbox"/> Other: <Click here to add other hazards>

Describe any items checked above: Conduct pre-entry atmospheric monitoring for H₂S and oxygen and monitor throughout entry

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

<input checked="" type="checkbox"/> Lock out/Tag Out	<input type="checkbox"/> Disconnecting
<input type="checkbox"/> Blanking/Bleeding of lines	<input checked="" type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i>
<input type="checkbox"/> Securing of moving parts	<input checked="" type="checkbox"/> Other: <u>Drain tank</u>

CONSIDERATIONS FOR ENTRY

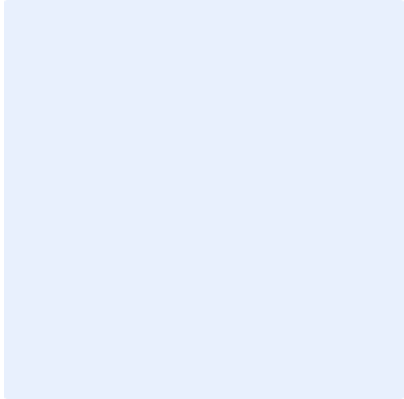
The following conditions/issues must be considered prior to entry:

<input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space.	<input type="checkbox"/> Limited field of view at entry into space
<input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space.	<input checked="" type="checkbox"/> Ladder needed for entry.
<input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u>	<input type="checkbox"/> Key access ONLY for entry
	<input checked="" type="checkbox"/> Temporary lighting needed for entry

PHOTOGRAPHS



PHOTO #1



PHOTO#2

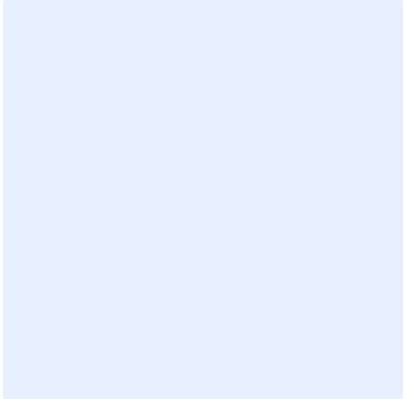


Photo #3

CONFINED SPACE RISK ASSESSMENT

System: Sodium Hydroxide Tanks

Confined Space Designation: **PERMIT-REQUIRED**

Type: Tank

Area: Building L

Evaluation Date: 10/22/2015

Description of Space: 4 Sodium Hydroxide Tanks

Evaluated By: Andrew Faust

HAZARD ASSESSMENT

PHYSICAL HAZARDS

YES

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? (If YES, check all that apply below)



Engulfment



Extreme Temperatures



Converging Walls/Floors



Hazardous Energy: Chemical



Moving Parts/Sharp Objects



Other:

Describe any items checked above:

ATMOSPHERIC HAZARDS

YES

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? (If YES, check all that apply below)



Low Oxygen (<19.5%)



Flammable Atmosphere (>10% of LEL)



Elevated Oxygen (>23.5%)



Hydrogen Sulfide (H₂S)



Carbon Monoxide



Other: <Corrosive powder/residue>

Describe any items checked above: Conduct pre-entry atmospheric monitoring for oxygen and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:



Lock out/Tag Out



Disconnecting



Blanking/Bleeding of lines



Forced Air Ventilation (Depending on Atmospheric Monitoring/Conditions)



Securing of moving parts



Other: Drain tank; Wear appropriate PPE

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:



Usage of chemicals will change this space to a PERMIT-REQUIRED confined space.



Limited field of view at entry into space



Ladder needed for entry.



Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space.



Key access ONLY for entry



Temporary lighting needed for entry



OTHER: Fall protection/retrieval system

PHOTOGRAPHS



PHOTO #1

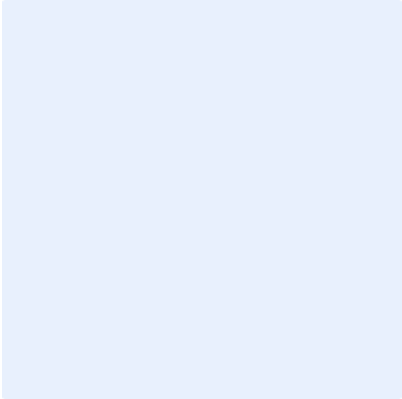
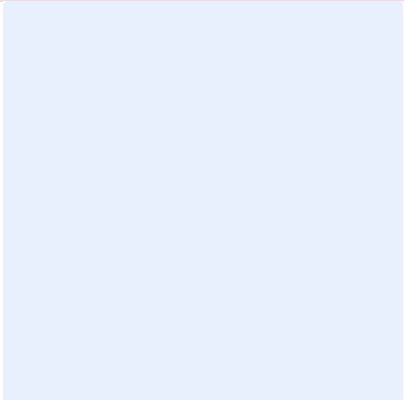
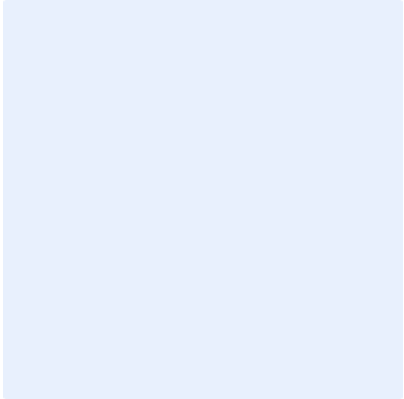


Photo #3



PHOTO#2



CONFINED SPACE RISK ASSESSMENT

System: <u>TSET/RSBT Tanks</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>Building L – Mezzanine</u>	Evaluation Date: <u>10/22/2015</u>
Description of Space: <u>7 Tanks</u>		Evaluated By: <u>Andrew Faust</u>

HAZARD ASSESSMENT

PHYSICAL HAZARDS

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Engulfment	<input type="checkbox"/> Extreme Temperatures
<input type="checkbox"/> Converging Walls/Floors	<input type="checkbox"/> Hazardous Energy:
<input type="checkbox"/> Moving Parts/Sharp Objects	<input type="checkbox"/> Other:

Describe any items checked above:

ATMOSPHERIC HAZARDS

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Low Oxygen (<19.5%)	<input type="checkbox"/> Flammable Atmosphere (>10% of LEL)
<input type="checkbox"/> Elevated Oxygen (>23.5%)	<input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S)
<input type="checkbox"/> Carbon Monoxide	<input type="checkbox"/> Other: <Click here to add other hazards>

Describe any items checked above: Conduct pre-entry atmospheric monitoring for H₂S and oxygen and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

<input checked="" type="checkbox"/> Lock out/Tag Out	<input type="checkbox"/> Disconnecting
<input type="checkbox"/> Blanking/Bleeding of lines	<input checked="" type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i>
<input type="checkbox"/> Securing of moving parts	<input checked="" type="checkbox"/> Other: <u>Draining/blocking flow</u>

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

<input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space.	<input type="checkbox"/> Limited field of view at entry into space
<input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space.	<input checked="" type="checkbox"/> Ladder needed for entry.
<input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u>	<input type="checkbox"/> Key access ONLY for entry
	<input type="checkbox"/> Temporary lighting needed for entry

PHOTOGRAPHS



PHOTO #1

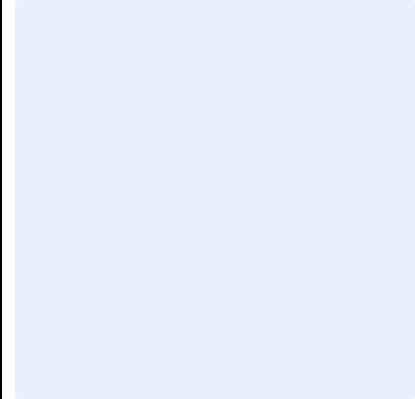
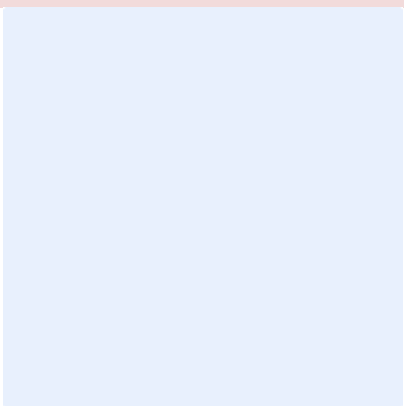
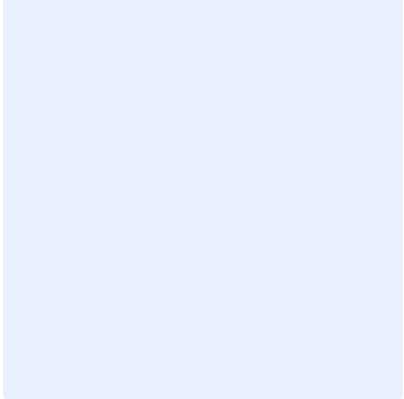


Photo #3



PHOTO#2



CONFINED SPACE RISK ASSESSMENT

System: <u>Aeration Tanks</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>Building N - Outside</u>	Evaluation Date: <u>10/22/2015</u>
Description of Space: <u>2 Aeration Tanks</u>		Evaluated By: <u>Andrew Faust</u>

HAZARD ASSESSMENT

PHYSICAL HAZARDS

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Engulfment	<input type="checkbox"/> Extreme Temperatures
<input type="checkbox"/> Converging Walls/Floors	<input type="checkbox"/> Hazardous Energy:
<input type="checkbox"/> Moving Parts/Sharp Objects	<input type="checkbox"/> Other:

Describe any items checked above:

ATMOSPHERIC HAZARDS

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Low Oxygen (<19.5%)	<input checked="" type="checkbox"/> Flammable Atmosphere (>10% of LEL)
<input type="checkbox"/> Elevated Oxygen (>23.5%)	<input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S)
<input type="checkbox"/> Carbon Monoxide	<input type="checkbox"/> Other: <Click here to add other hazards>

Describe any items checked above: Conduct pre-entry atmospheric monitoring for oxygen, combustible gas, H₂S and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

<input checked="" type="checkbox"/> Lock out/Tag Out	<input type="checkbox"/> Disconnecting
<input type="checkbox"/> Blanking/Bleeding of lines	<input checked="" type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i>
<input type="checkbox"/> Securing of moving parts	<input checked="" type="checkbox"/> Other: <u>Draining/blocking flow and lockout incoming valve(s)</u>

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

<input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space.	<input type="checkbox"/> Limited field of view at entry into space
<input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space.	<input checked="" type="checkbox"/> Ladder needed for entry.
<input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u>	<input type="checkbox"/> Key access ONLY for entry
	<input type="checkbox"/> Temporary lighting needed for entry

PHOTOGRAPHS



PHOTO #1

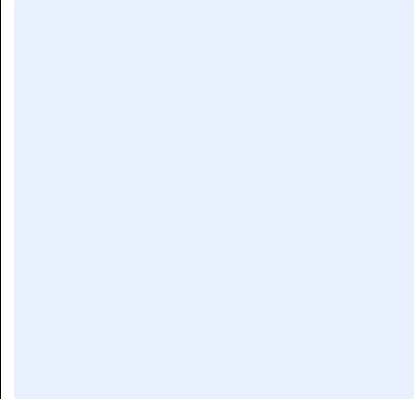
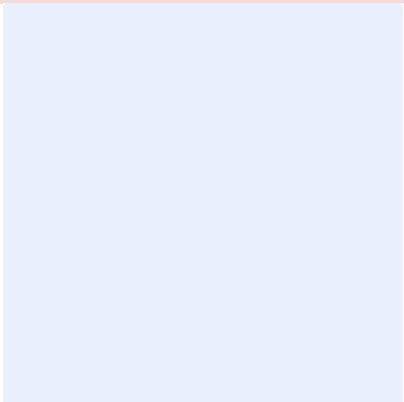
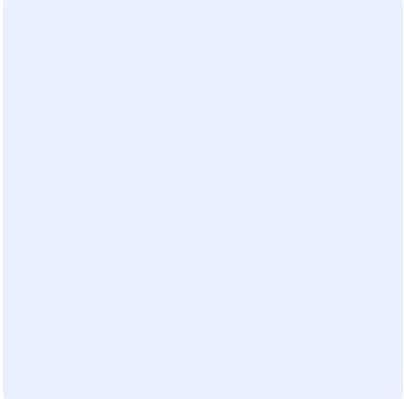


Photo #3



PHOTO#2



CONFINED SPACE RISK ASSESSMENT

System: <u>Phosphoric Acid Tank</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>Building N</u>	Evaluation Date: <u>10/22/2015</u>
Description of Space: _____		Evaluated By: <u>Andrew Faust</u>

HAZARD ASSESSMENT

PHYSICAL HAZARDS

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Engulfment	<input type="checkbox"/> Extreme Temperatures
<input type="checkbox"/> Converging Walls/Floors	<input type="checkbox"/> Hazardous Energy: <u>Chemical</u>
<input type="checkbox"/> Moving Parts/Sharp Objects	<input checked="" type="checkbox"/> Other: _____

Describe any items checked above: Phosphoric acid is corrosive. Eye/skin contact can cause serious/permanent damage

ATMOSPHERIC HAZARDS

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Low Oxygen (<19.5%)	<input type="checkbox"/> Flammable Atmosphere (>10% of LEL)
<input type="checkbox"/> Elevated Oxygen (>23.5%)	<input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S)
<input type="checkbox"/> Carbon Monoxide	<input type="checkbox"/> Other: <u><Click here to add other hazards></u>

Describe any items checked above: Conduct pre-entry atmospheric monitoring for H₂S and oxygen, and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

<input type="checkbox"/> Lock out/Tag Out	<input type="checkbox"/> Disconnecting
<input type="checkbox"/> Blanking/Bleeding of lines	<input checked="" type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i>
<input type="checkbox"/> Securing of moving parts	<input checked="" type="checkbox"/> Other: <u>Drain tank; appropriate PPE for corrosive liquids</u>

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

<input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space. <input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space. <input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u>	<input type="checkbox"/> Limited field of view at entry into space <input checked="" type="checkbox"/> Ladder needed for entry. <input type="checkbox"/> Key access ONLY for entry <input type="checkbox"/> Temporary lighting needed for entry
---	--

PHOTOGRAPHS



PHOTO #1

PHOTO#2

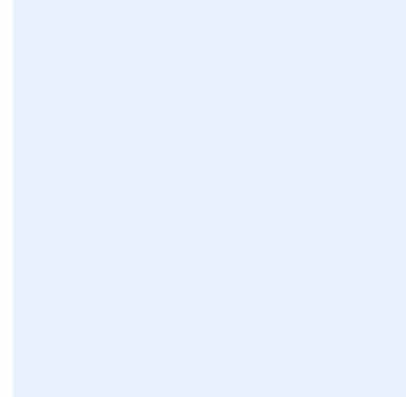
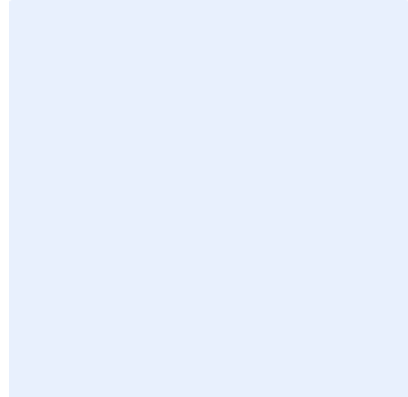


Photo #3

CONFINED SPACE RISK ASSESSMENT

System: <u>UV Channels</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>Building N</u>	Evaluation Date: <u>10/22/2015</u>
Description of Space: <u>6 UV Channels</u>		Evaluated By: <u>Andrew Faust</u>

HAZARD ASSESSMENT

PHYSICAL HAZARDS

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Engulfment	<input type="checkbox"/> Extreme Temperatures
<input type="checkbox"/> Converging Walls/Floors	<input checked="" type="checkbox"/> Hazardous Energy: <u>Electrical</u>
<input checked="" type="checkbox"/> Moving Parts/Sharp Objects	<input type="checkbox"/> Other:

Describe any items checked above: Possible electrocution if underwater lights are damaged

ATMOSPHERIC HAZARDS

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Low Oxygen (<19.5%)	<input type="checkbox"/> Flammable Atmosphere (>10% of LEL)
<input type="checkbox"/> Elevated Oxygen (>23.5%)	<input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S)
<input type="checkbox"/> Carbon Monoxide	<input type="checkbox"/> Other: <u><Click here to add other hazards></u>

Describe any items checked above: Conduct pre-entry atmospheric monitoring for H₂S and oxygen, and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

<input checked="" type="checkbox"/> Lock out/Tag Out	<input checked="" type="checkbox"/> Disconnecting
<input type="checkbox"/> Blanking/Bleeding of lines	<input checked="" type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i>
<input checked="" type="checkbox"/> Securing of moving parts	<input checked="" type="checkbox"/> Other: <u>Draining/blocking flow and lockout out incoming valve(s)</u>

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

<input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space.	<input type="checkbox"/> Limited field of view at entry into space
<input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space.	<input checked="" type="checkbox"/> Ladder needed for entry.
<input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u>	<input type="checkbox"/> Key access ONLY for entry
	<input type="checkbox"/> Temporary lighting needed for entry

PHOTOGRAPHS

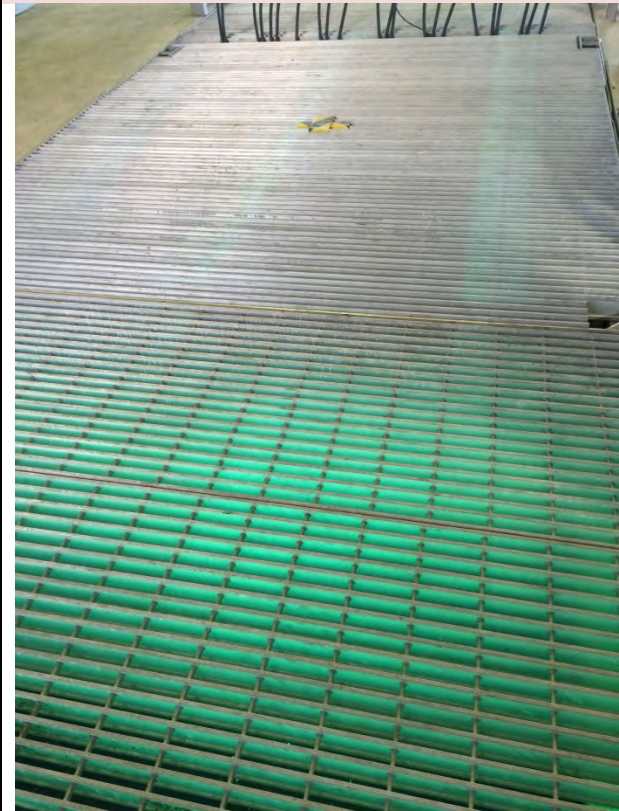


PHOTO #1

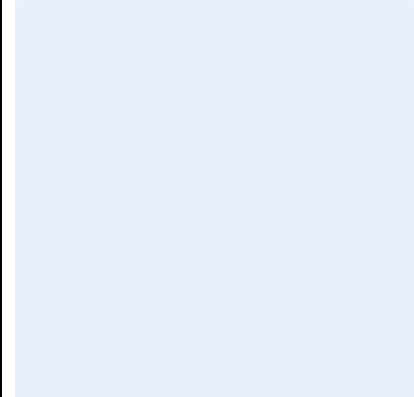
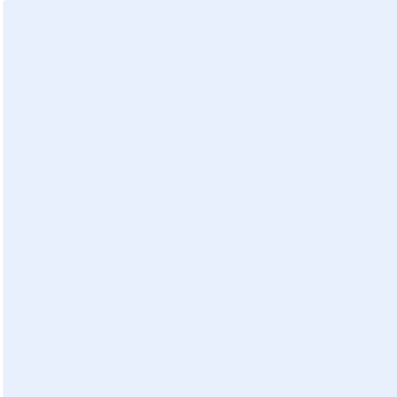


Photo #3



PHOTO#2



CONFINED SPACE RISK ASSESSMENT

System: <u>Wet Well</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>Bush Hill Station</u>	Evaluation Date: <u>10/21/2015</u>
Description of Space: _____		Evaluated By: <u>Andrew Faust</u>

HAZARD ASSESSMENT

PHYSICAL HAZARDS

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Engulfment	<input type="checkbox"/> Extreme Temperatures
<input type="checkbox"/> Converging Walls/Floors	<input type="checkbox"/> Hazardous Energy:
<input type="checkbox"/> Moving Parts/Sharp Objects	<input type="checkbox"/> Other:

Describe any items checked above:

ATMOSPHERIC HAZARDS

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input type="checkbox"/> Low Oxygen (<19.5%)	<input type="checkbox"/> Flammable Atmosphere (>10% of LEL)
<input type="checkbox"/> Elevated Oxygen (>23.5%)	<input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S)
<input type="checkbox"/> Carbon Monoxide	<input type="checkbox"/> Other: <Click here to add other hazards>

Describe any items checked above: Conduct pre-entry atmospheric monitoring for H₂S and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

<input checked="" type="checkbox"/> Lock out/Tag Out	<input type="checkbox"/> Disconnecting
<input type="checkbox"/> Blanking/Bleeding of lines	<input checked="" type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i>
<input type="checkbox"/> Securing of moving parts	<input checked="" type="checkbox"/> Other: <u>Draining/blocking flow and lock out incoming water valve(s)</u>

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

<input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space.	<input type="checkbox"/> Limited field of view at entry into space
<input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space.	<input checked="" type="checkbox"/> Ladder needed for entry.
<input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u>	<input type="checkbox"/> Key access ONLY for entry
	<input checked="" type="checkbox"/> Temporary lighting needed for entry

PHOTOGRAPHS

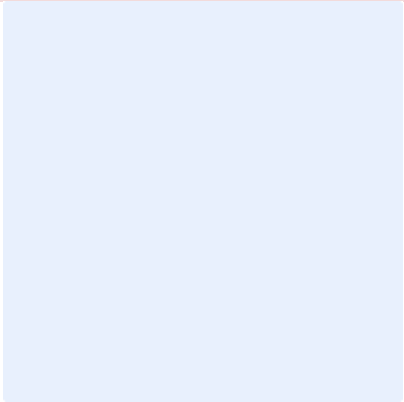


PHOTO #1

PHOTO#2

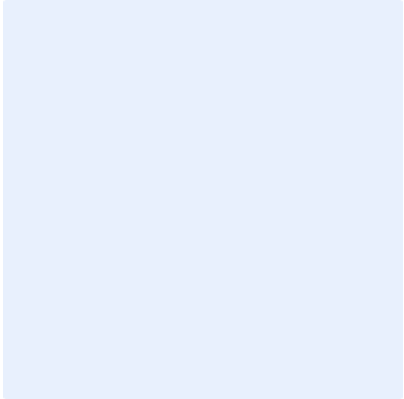
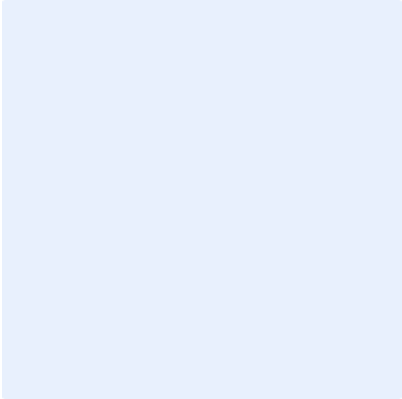


Photo #3

CONFINED SPACE RISK ASSESSMENT

System: Primary Tank Vault

Confined Space Designation: **PERMIT-REQUIRED**

Type: Tank

Area: Main Haul Road

Evaluation Date: 10/21/2015

Description of Space: Open exterior tanks

Evaluated By: Andrew Faust

HAZARD ASSESSMENT

PHYSICAL HAZARDS

YES Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? (If YES, check all that apply below)

- | | |
|---|---|
| <input checked="" type="checkbox"/> Engulfment | <input type="checkbox"/> Extreme Temperatures |
| <input type="checkbox"/> Converging Walls/Floors | <input type="checkbox"/> Hazardous Energy: |
| <input type="checkbox"/> Moving Parts/Sharp Objects | <input type="checkbox"/> Other: |

Describe any items checked above: Water

ATMOSPHERIC HAZARDS

YES Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? (If YES, check all that apply below)

- | | |
|---|--|
| <input type="checkbox"/> Low Oxygen (<19.5%) | <input type="checkbox"/> Flammable Atmosphere (>10% of LEL) |
| <input type="checkbox"/> Elevated Oxygen (>23.5%) | <input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S) |
| <input type="checkbox"/> Carbon Monoxide | <input type="checkbox"/> Other: <u><Click here to add other hazards></u> |

Describe any items checked above: Conduct pre-entry atmospheric monitoring for H₂S and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

- | | |
|--|---|
| <input checked="" type="checkbox"/> Lock out/Tag Out | <input type="checkbox"/> Disconnecting |
| <input type="checkbox"/> Blanking/Bleeding of lines | <input checked="" type="checkbox"/> Forced Air Ventilation (Depending on Atmospheric Monitoring/Conditions) |
| <input type="checkbox"/> Securing of moving parts | <input checked="" type="checkbox"/> Other: <u>Draining/blocking flow</u> |

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

- | | |
|---|---|
| <input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space. | <input type="checkbox"/> Limited field of view at entry into space |
| <input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space. | <input checked="" type="checkbox"/> Ladder needed for entry. |
| <input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u> | <input type="checkbox"/> Key access ONLY for entry |
| | <input checked="" type="checkbox"/> Temporary lighting needed for entry |

PHOTOGRAPHS

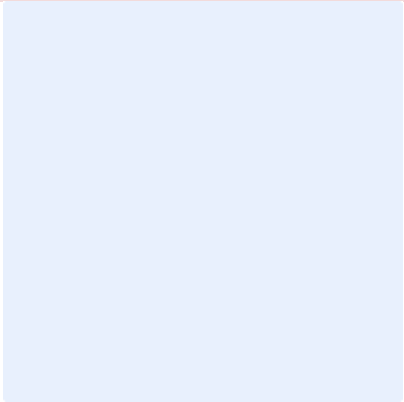


PHOTO #1

PHOTO#2

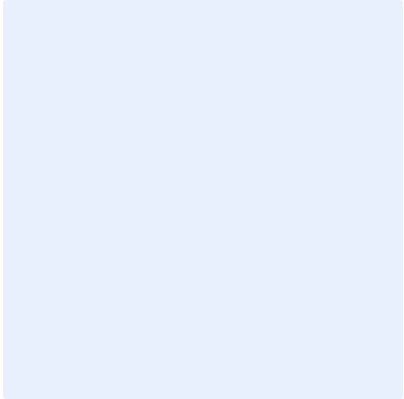
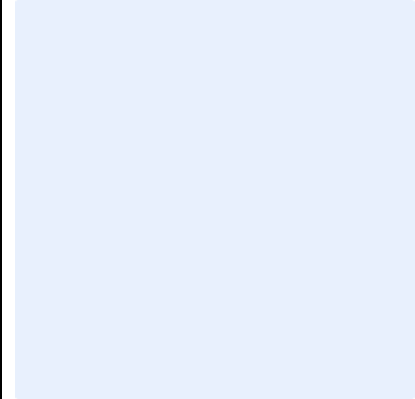


Photo #3

CONFINED SPACE RISK ASSESSMENT

System: <u>Primary Tank</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>Main Haul Road</u>	Evaluation Date: <u>10/21/2015</u>
Description of Space: <u>Open exterior tanks (8)</u>		Evaluated By: <u>Andrew Faust</u>

HAZARD ASSESSMENT

PHYSICAL HAZARDS

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Engulfment	<input type="checkbox"/> Extreme Temperatures
<input type="checkbox"/> Converging Walls/Floors	<input type="checkbox"/> Hazardous Energy:
<input checked="" type="checkbox"/> Moving Parts/Sharp Objects	<input type="checkbox"/> Other:

Describe any items checked above:

ATMOSPHERIC HAZARDS

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Low Oxygen (<19.5%)	<input checked="" type="checkbox"/> Flammable Atmosphere (>10% of LEL)
<input type="checkbox"/> Elevated Oxygen (>23.5%)	<input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S)
<input type="checkbox"/> Carbon Monoxide	<input type="checkbox"/> Other: <Click here to add other hazards>

Describe any items checked above: Conduct pre-entry atmospheric monitoring for oxygen, combustible gas, and H₂S, and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

<input checked="" type="checkbox"/> Lock out/Tag Out	<input type="checkbox"/> Disconnecting
<input type="checkbox"/> Blanking/Bleeding of lines	<input checked="" type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i>
<input type="checkbox"/> Securing of moving parts	<input checked="" type="checkbox"/> Other: <u>Draining/blocking flow</u>

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

<input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space. <input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space. <input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u>	<input type="checkbox"/> Limited field of view at entry into space <input checked="" type="checkbox"/> Ladder needed for entry. <input type="checkbox"/> Key access ONLY for entry <input checked="" type="checkbox"/> Temporary lighting needed for entry
---	---

PHOTOGRAPHS



PHOTO #1

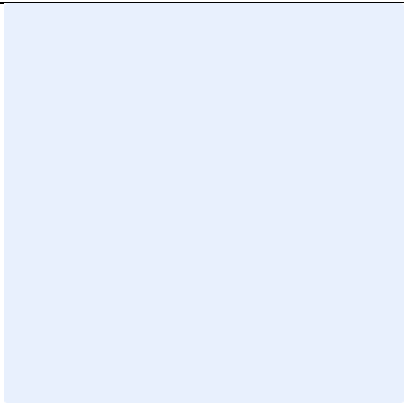
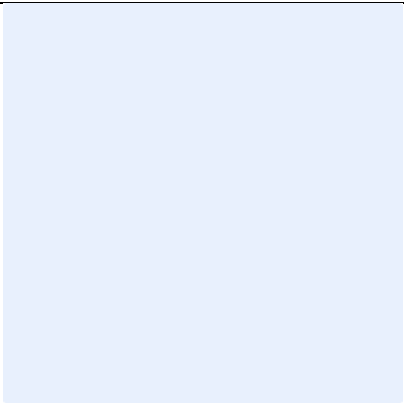


Photo #3



PHOTO#2 – Moving Parts



CONFINED SPACE RISK ASSESSMENT

System: Scum Box

Confined Space Designation: **PERMIT-REQUIRED**

Type: Tank

Area: Main Haul Road

Evaluation Date: 10/21/2015

Description of Space: Open exterior tank

Evaluated By: Andrew Faust

HAZARD ASSESSMENT

PHYSICAL HAZARDS

YES

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? (If YES, check all that apply below)



Engulfment



Extreme Temperatures



Converging Walls/Floors



Hazardous Energy:



Moving Parts/Sharp Objects



Other:

Describe any items checked above: 20' Deep

ATMOSPHERIC HAZARDS

YES

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? (If YES, check all that apply below)



Low Oxygen (<19.5%)



Flammable Atmosphere (>10% of LEL)



Elevated Oxygen (>23.5%)



Hydrogen Sulfide (H₂S)



Carbon Monoxide



Other: <Click here to add other hazards>

Describe any items checked above: Conduct pre-entry atmospheric monitoring for H₂S, oxygen, and combustible gas, and monitor throughout entry

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:



Lock out/Tag Out



Disconnecting



Blanking/Bleeding of lines



Forced Air Ventilation (Depending on Atmospheric Monitoring/Conditions)



Securing of moving parts



Other: Draining/blocking flow/lock out incoming water valve(s)

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:



Usage of chemicals will change this space to a PERMIT-REQUIRED confined space.



Limited field of view at entry into space



Ladder needed for entry.



Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space.



Key access ONLY for entry



Temporary lighting needed for entry

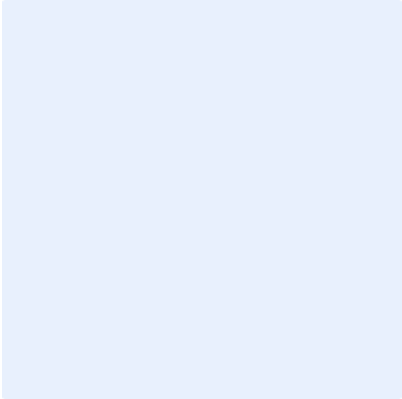


OTHER: Fall protection/retrieval system

PHOTOGRAPHS



PHOTO #1



PHOTO#2

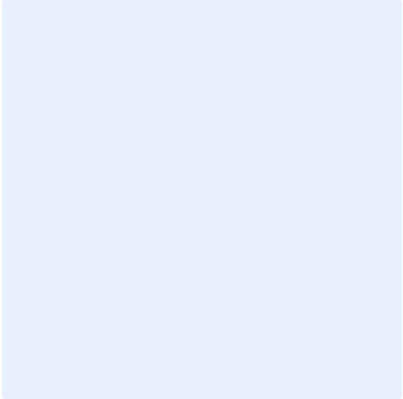


Photo #3

CONFINED SPACE RISK ASSESSMENT

System: <u>Flare</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>Main Haul Road</u>	Evaluation Date: <u>10/22/2015</u>
Description of Space: <u>2 Flares</u>	Evaluated By: <u>Andrew Faust</u>	

HAZARD ASSESSMENT

PHYSICAL HAZARDS

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Engulfment	<input checked="" type="checkbox"/> Extreme Temperatures
<input type="checkbox"/> Converging Walls/Floors	<input checked="" type="checkbox"/> Hazardous Energy: <u>Thermal</u>
<input type="checkbox"/> Moving Parts/Sharp Objects	<input type="checkbox"/> Other:

Describe any items checked above: Live flame coupled with extreme temperature conditions exist

ATMOSPHERIC HAZARDS

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Low Oxygen (<19.5%)	<input checked="" type="checkbox"/> Flammable Atmosphere (>10% of LEL)
<input type="checkbox"/> Elevated Oxygen (>23.5%)	<input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S)
<input checked="" type="checkbox"/> Carbon Monoxide	<input type="checkbox"/> Other: <u><Click here to add other hazards></u>

Describe any items checked above: Conduct pre-entry atmospheric monitoring for H₂S, oxygen, carbon monoxide, and combustible gas, and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

<input checked="" type="checkbox"/> Lock out/Tag Out	<input checked="" type="checkbox"/> Disconnecting
<input checked="" type="checkbox"/> Blanking/Bleeding of lines	<input checked="" type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i>
<input type="checkbox"/> Securing of moving parts	<input checked="" type="checkbox"/> Other: <u>Drain tank and lock out incoming gas valve</u>

CONSIDERATIONS FOR ENTRY

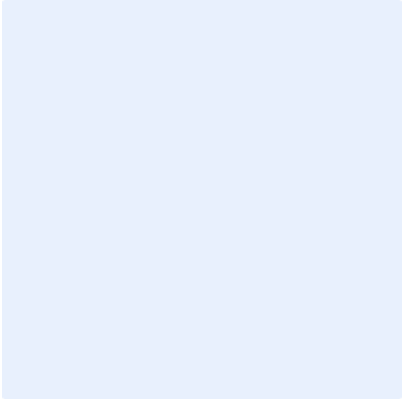
The following conditions/issues must be considered prior to entry:

<input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space.	<input type="checkbox"/> Limited field of view at entry into space
<input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space.	<input checked="" type="checkbox"/> Ladder needed for entry.
<input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u>	<input type="checkbox"/> Key access ONLY for entry
	<input type="checkbox"/> Temporary lighting needed for entry

PHOTOGRAPHS



PHOTO #1



PHOTO#2



Photo #3

CONFINED SPACE RISK ASSESSMENT

System: <u>Methanol Tanks</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>Main Haul Road</u>	Evaluation Date: <u>10/22/2015</u>
Description of Space: <u>2 Methanol Tanks</u>		Evaluated By: <u>Andrew Faust</u>

HAZARD ASSESSMENT

PHYSICAL HAZARDS

YES Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

- | | |
|---|---|
| <input type="checkbox"/> Engulfment | <input type="checkbox"/> Extreme Temperatures |
| <input type="checkbox"/> Converging Walls/Floors | <input type="checkbox"/> Hazardous Energy: |
| <input type="checkbox"/> Moving Parts/Sharp Objects | <input type="checkbox"/> Other: |

Describe any items checked above:

ATMOSPHERIC HAZARDS

YES Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

- | | |
|---|---|
| <input checked="" type="checkbox"/> Low Oxygen (<19.5%) | <input checked="" type="checkbox"/> Flammable Atmosphere (>10% of LEL) |
| <input type="checkbox"/> Elevated Oxygen (>23.5%) | <input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S) |
| <input type="checkbox"/> Carbon Monoxide | <input type="checkbox"/> Other: <Click here to add other hazards> |

Describe any items checked above: Conduct pre-entry atmospheric monitoring for H₂S, oxygen, and combustible gas, and monitor throughout entry

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

- | | |
|--|--|
| <input checked="" type="checkbox"/> Lock out/Tag Out | <input checked="" type="checkbox"/> Disconnecting |
| <input checked="" type="checkbox"/> Blanking/Bleeding of lines | <input checked="" type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i> |
| <input type="checkbox"/> Securing of moving parts | <input checked="" type="checkbox"/> Other: <u>Drain tank</u> |

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

- | | |
|---|---|
| <input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space.

<input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space.

<input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u> | <input checked="" type="checkbox"/> Limited field of view at entry into space
<input checked="" type="checkbox"/> Ladder needed for entry.
<input type="checkbox"/> Key access ONLY for entry
<input type="checkbox"/> Temporary lighting needed for entry |
|---|---|

PHOTOGRAPHS



PHOTO #1

PHOTO#2

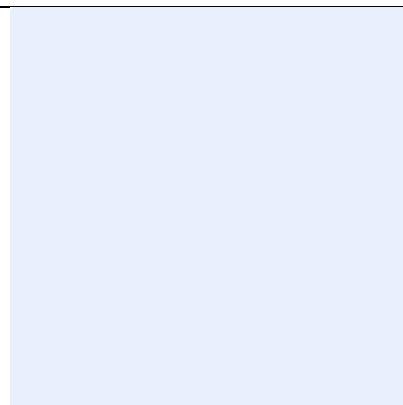
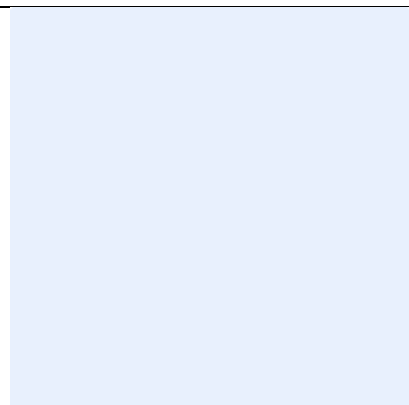


Photo #3

CONFINED SPACE RISK ASSESSMENT

System: Wet Well

Confined Space Designation: **PERMIT-REQUIRED**

Type: Tank

Area: Mill Road Station

Evaluation Date: 10/21/2015

Description of Space: _____

Evaluated By: Andrew Faust

HAZARD ASSESSMENT

PHYSICAL HAZARDS

YES

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? (If YES, check all that apply below)



Engulfment



Extreme Temperatures



Converging Walls/Floors



Hazardous Energy:



Moving Parts/Sharp Objects



Other:

Describe any items checked above:

ATMOSPHERIC HAZARDS

YES

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? (If YES, check all that apply below)



Low Oxygen (<19.5%)



Flammable Atmosphere (>10% of LEL)



Elevated Oxygen (>23.5%)



Hydrogen Sulfide (H₂S)



Carbon Monoxide



Other: [<Click here to add other hazards>](#)

Describe any items checked above: [Conduct pre-entry atmospheric monitoring for H₂S and monitor throughout entry.](#)

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:



Lock out/Tag Out



Disconnecting



Blanking/Bleeding of lines



Forced Air Ventilation (*Depending on Atmospheric Monitoring/Conditions*)



Securing of moving parts



Other: [Draining/blocking flow and lock out incoming water valve\(S\)](#)

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:



Usage of chemicals will change this space to a PERMIT-REQUIRED confined space.



Limited field of view at entry into space



Ladder needed for entry.



Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space.



Key access ONLY for entry



Temporary lighting needed for entry



OTHER: [Fall protection/retrieval system](#)

PHOTOGRAPHS



PHOTO #1

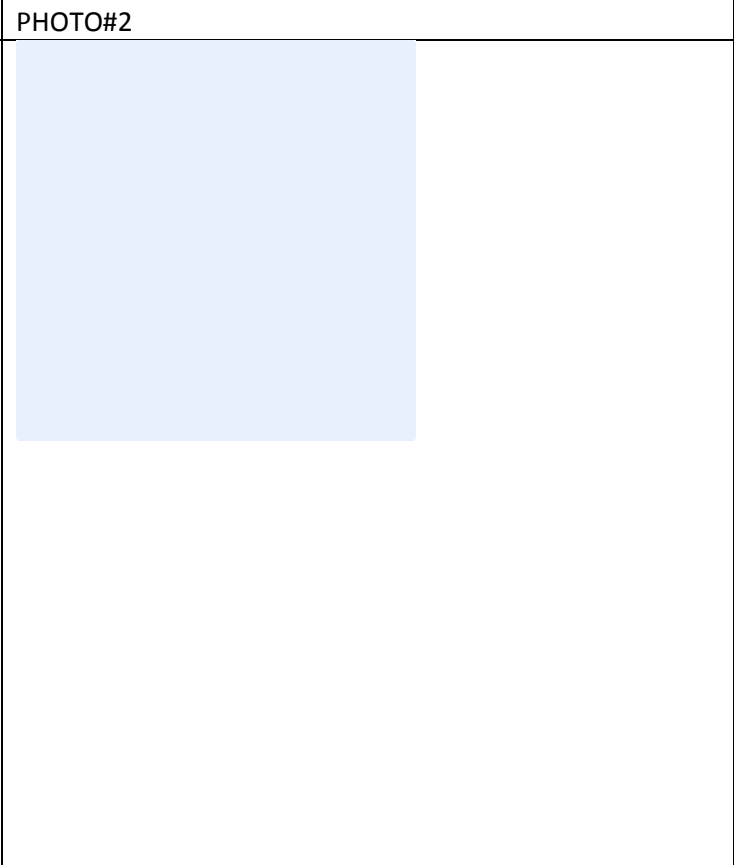
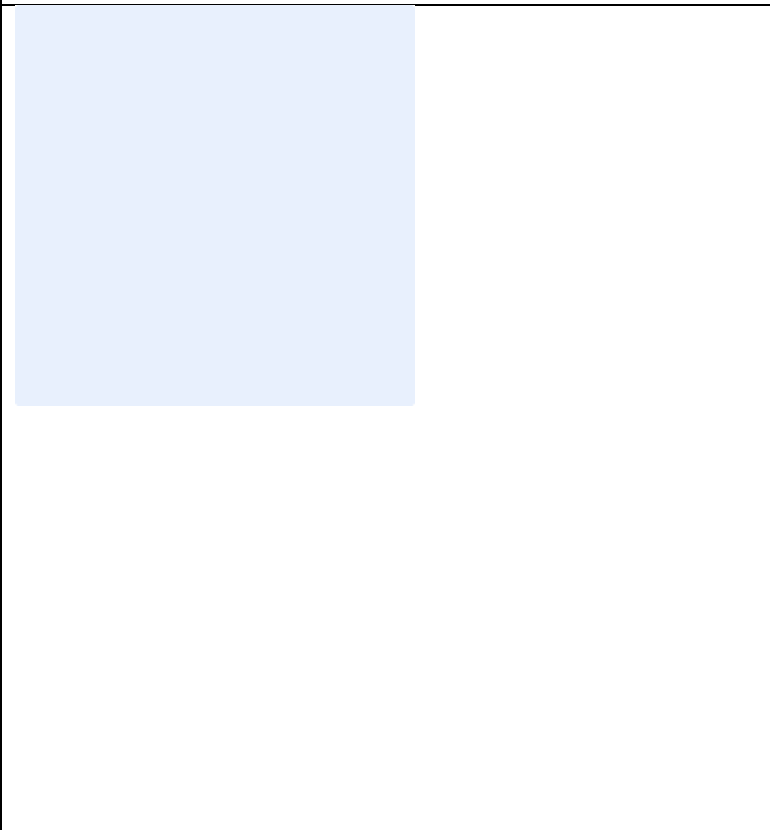


Photo #3



CONFINED SPACE RISK ASSESSMENT

System: <u>Stop Logs Vault</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>Potomac Yards</u>	Evaluation Date: <u>10/21/2015</u>
Description of Space: <u>Click here to enter text.</u>		Evaluated By: <u>Andrew Faust</u>

HAZARD ASSESSMENT

PHYSICAL HAZARDS

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Engulfment	<input type="checkbox"/> Extreme Temperatures
<input type="checkbox"/> Converging Walls/Floors	<input type="checkbox"/> Hazardous Energy:
<input type="checkbox"/> Moving Parts/Sharp Objects	<input type="checkbox"/> Other:

Describe any items checked above:

ATMOSPHERIC HAZARDS

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Low Oxygen (<19.5%)	<input type="checkbox"/> Flammable Atmosphere (>10% of LEL)
<input type="checkbox"/> Elevated Oxygen (>23.5%)	<input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S)
<input type="checkbox"/> Carbon Monoxide	<input type="checkbox"/> Other: <u><Click here to add other hazards></u>

Describe any items checked above: Conduct pre-entry atmospheric monitoring for oxygen and H₂S, and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

<input checked="" type="checkbox"/> Lock out/Tag Out	<input type="checkbox"/> Disconnecting
<input type="checkbox"/> Blanking/Bleeding of lines	<input checked="" type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i>
<input type="checkbox"/> Securing of moving parts	<input checked="" type="checkbox"/> Other: <u>Draining/blocking flow and lock out incoming water valve(s)</u>

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

<input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space. <input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space. <input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u>	<input type="checkbox"/> Limited field of view at entry into space <input type="checkbox"/> Ladder needed for entry. <input type="checkbox"/> Key access ONLY for entry <input checked="" type="checkbox"/> Temporary lighting needed for entry
---	--

PHOTOGRAPHS

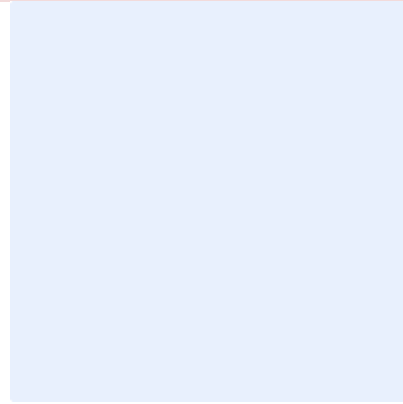


PHOTO #1

PHOTO#2

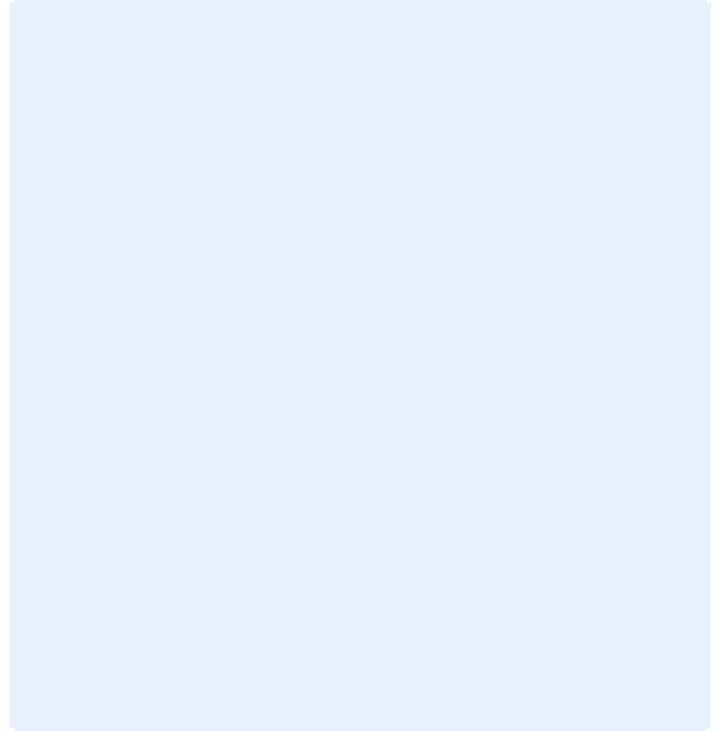
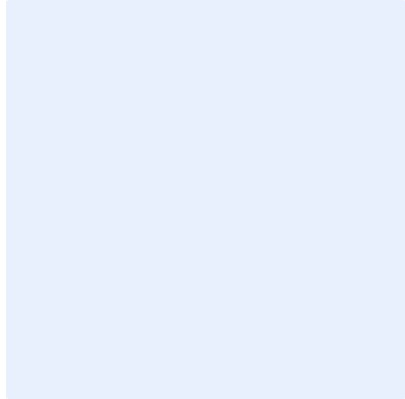


Photo #3

CONFINED SPACE RISK ASSESSMENT

System: <u>Metering Vault</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>Slater's Lane</u>	Evaluation Date: <u>10/21/2015</u>
Description of Space: _____		Evaluated By: <u>Andrew Faust</u>

HAZARD ASSESSMENT

PHYSICAL HAZARDS

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Engulfment	<input type="checkbox"/> Extreme Temperatures
<input type="checkbox"/> Converging Walls/Floors	<input type="checkbox"/> Hazardous Energy:
<input type="checkbox"/> Moving Parts/Sharp Objects	<input type="checkbox"/> Other:

Describe any items checked above:

ATMOSPHERIC HAZARDS

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Low Oxygen (<19.5%)	<input type="checkbox"/> Flammable Atmosphere (>10% of LEL)
<input type="checkbox"/> Elevated Oxygen (>23.5%)	<input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S)
<input type="checkbox"/> Carbon Monoxide	<input type="checkbox"/> Other: <Click here to add other hazards>

Describe any items checked above: Conduct pre-entry atmospheric monitoring for oxygen and H₂S, and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

<input checked="" type="checkbox"/> Lock out/Tag Out	<input type="checkbox"/> Disconnecting
<input type="checkbox"/> Blanking/Bleeding of lines	<input checked="" type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i>
<input type="checkbox"/> Securing of moving parts	<input checked="" type="checkbox"/> Other: <u>Draining/blocking flow and lock out incoming water valve(s)</u>

CONSIDERATIONS FOR ENTRY

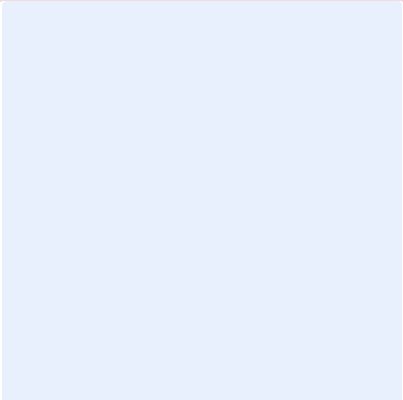
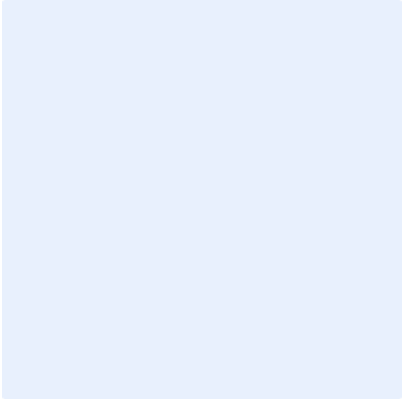
The following conditions/issues must be considered prior to entry:

<input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space.	<input type="checkbox"/> Limited field of view at entry into space
<input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space.	<input checked="" type="checkbox"/> Ladder needed for entry.
<input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u>	<input type="checkbox"/> Key access ONLY for entry
	<input checked="" type="checkbox"/> Temporary lighting needed for entry

PHOTOGRAPHS



PHOTO #1



PHOTO#2



Photo #3

CONFINED SPACE RISK ASSESSMENT

System: <u>Valve Vault</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>Slater's Lane</u>	Evaluation Date: <u>10/21/2015</u>
Description of Space: _____		Evaluated By: <u>Andrew Faust</u>

HAZARD ASSESSMENT

PHYSICAL HAZARDS

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Engulfment	<input type="checkbox"/> Extreme Temperatures
<input type="checkbox"/> Converging Walls/Floors	<input type="checkbox"/> Hazardous Energy:
<input type="checkbox"/> Moving Parts/Sharp Objects	<input type="checkbox"/> Other:

Describe any items checked above:

ATMOSPHERIC HAZARDS

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Low Oxygen (<19.5%)	<input type="checkbox"/> Flammable Atmosphere (>10% of LEL)
<input type="checkbox"/> Elevated Oxygen (>23.5%)	<input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S)
<input type="checkbox"/> Carbon Monoxide	<input type="checkbox"/> Other: <Click here to add other hazards>

Describe any items checked above: Conduct pre-entry atmospheric monitoring for oxygen and H₂S, and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

<input checked="" type="checkbox"/> Lock out/Tag Out	<input type="checkbox"/> Disconnecting
<input type="checkbox"/> Blanking/Bleeding of lines	<input checked="" type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i>
<input type="checkbox"/> Securing of moving parts	<input checked="" type="checkbox"/> Other: <u>Draining/blocking flow and lock out incoming water valve</u>

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

<input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space.	<input type="checkbox"/> Limited field of view at entry into space
<input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space.	<input type="checkbox"/> Ladder needed for entry.
<input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u>	<input type="checkbox"/> Key access ONLY for entry
	<input checked="" type="checkbox"/> Temporary lighting needed for entry

PHOTOGRAPHS

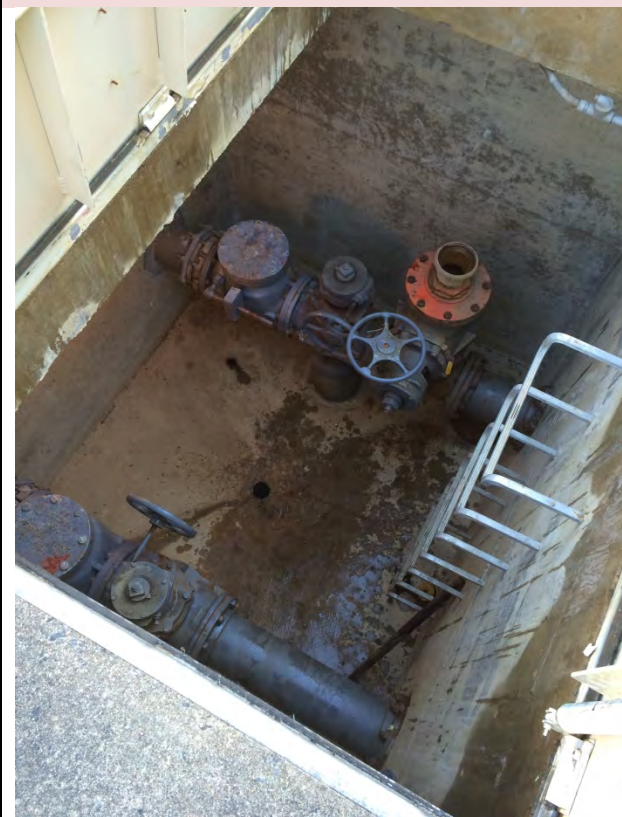


PHOTO #1

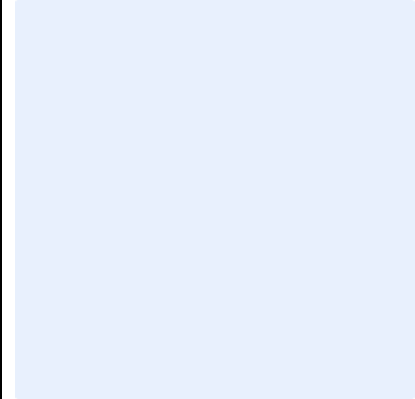
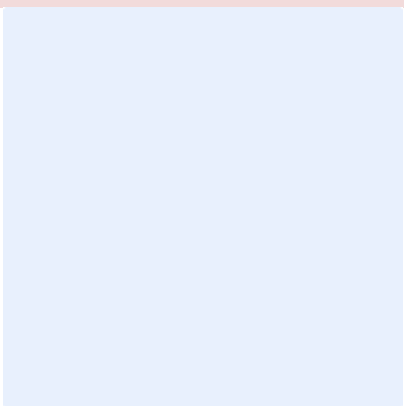
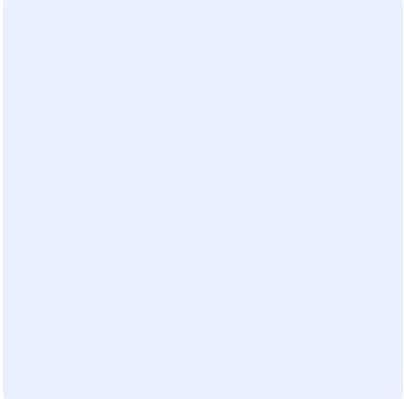


Photo #3



PHOTO#2



CONFINED SPACE RISK ASSESSMENT

System: <u>Wet well</u>	Confined Space Designation: PERMIT-REQUIRED	
Type: <u>Tank</u>	Area: <u>Slater's Lane</u>	Evaluation Date: <u>10/21/2015</u>
Description of Space: _____		Evaluated By: <u>Andrew Faust</u>

HAZARD ASSESSMENT

PHYSICAL HAZARDS

Does this space contain or have the potential to contain one or more of the following physical hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Engulfment	<input type="checkbox"/> Extreme Temperatures
<input type="checkbox"/> Converging Walls/Floors	<input type="checkbox"/> Hazardous Energy:
<input type="checkbox"/> Moving Parts/Sharp Objects	<input type="checkbox"/> Other:

Describe any items checked above:

ATMOSPHERIC HAZARDS

Does this space contains or have the potential to contain one or more of the following atmospheric hazards qualifying it as a permit required confined space? *(If YES, check all that apply below)*

YES

<input checked="" type="checkbox"/> Low Oxygen (<19.5%)	<input type="checkbox"/> Flammable Atmosphere (>10% of LEL)
<input type="checkbox"/> Elevated Oxygen (>23.5%)	<input checked="" type="checkbox"/> Hydrogen Sulfide (H ₂ S)
<input type="checkbox"/> Carbon Monoxide	<input type="checkbox"/> Other: <Click here to add other hazards>

Describe any items checked above: Conduct pre-entry atmospheric monitoring for oxygen and H₂S, and monitor throughout entry.

HAZARD CONTROLS

The following hazard control measures are necessary for entry into this space:

<input checked="" type="checkbox"/> Lock out/Tag Out	<input type="checkbox"/> Disconnecting
<input type="checkbox"/> Blanking/Bleeding of lines	<input checked="" type="checkbox"/> Forced Air Ventilation <i>(Depending on Atmospheric Monitoring/Conditions)</i>
<input type="checkbox"/> Securing of moving parts	<input checked="" type="checkbox"/> Other: <u>Draining/blocking flow and lock out incoming water valve(s)</u>

CONSIDERATIONS FOR ENTRY

The following conditions/issues must be considered prior to entry:

<input type="checkbox"/> Usage of chemicals will change this space to a PERMIT-REQUIRED confined space.	<input type="checkbox"/> Limited field of view at entry into space
<input type="checkbox"/> Performance of HOT WORK will change this space to a PERMIT-REQUIRED confined space.	<input checked="" type="checkbox"/> Ladder needed for entry.
<input checked="" type="checkbox"/> OTHER: <u>Fall protection/retrieval system</u>	<input type="checkbox"/> Key access ONLY for entry
	<input checked="" type="checkbox"/> Temporary lighting needed for entry

PHOTOGRAPHS

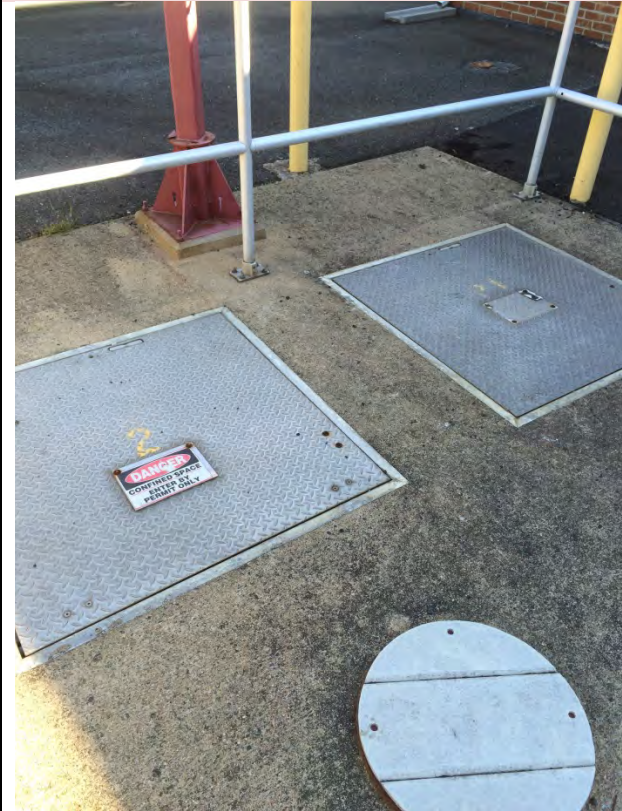


PHOTO #1

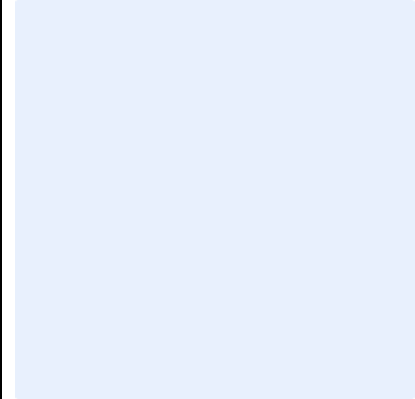
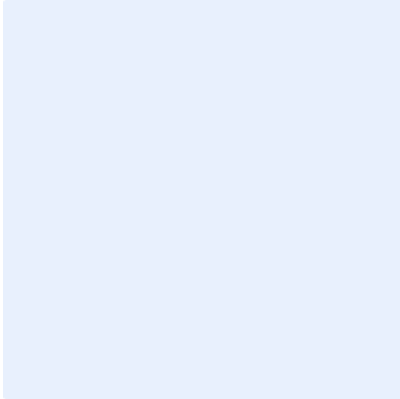


Photo #3



PHOTO#2





Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020		BH 10/2020	10/2020

OHSMS-2.4 Confined Space Program

Appendix B

Job Safety Analysis (JSA) Form

Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020			

OHSMS-2.4.B Confined Space Job Safety Analysis

Section 1: General Details

Confined Space Identifier:		<table border="1"> <tr> <th colspan="2" rowspan="2">Risk Ranking Matrix</th> <th colspan="4">Likelihood</th> </tr> <tr> <th>Remote</th> <th>Unlikely</th> <th>Likely</th> <th>Frequent</th> </tr> <tr> <td rowspan="4">Consequence</td> <td>Minor</td> <td>Low</td> <td>Low</td> <td>Medium</td> <td>High</td> </tr> <tr> <td>Moderate</td> <td>Low</td> <td>Medium</td> <td>High</td> <td>Extreme</td> </tr> <tr> <td>Major</td> <td>Medium</td> <td>High</td> <td>Extreme</td> <td>Extreme</td> </tr> <tr> <td>Serious</td> <td>High</td> <td>Extreme</td> <td>Extreme</td> <td>Extreme</td> </tr> </table>	Risk Ranking Matrix		Likelihood				Remote	Unlikely	Likely	Frequent	Consequence	Minor	Low	Low	Medium	High	Moderate	Low	Medium	High	Extreme	Major	Medium	High	Extreme	Extreme	Serious	High	Extreme	Extreme	Extreme
Risk Ranking Matrix					Likelihood																												
			Remote	Unlikely	Likely	Frequent																											
Consequence	Minor		Low	Low	Medium	High																											
	Moderate		Low	Medium	High	Extreme																											
	Major	Medium	High	Extreme	Extreme																												
	Serious	High	Extreme	Extreme	Extreme																												
Confined Space Location (Building/Floor/Etc.):																																	
Work to be Completed:																																	
Prepared By:																																	
Reviewed By:																																	

Section 2: Job Safety Assessment

Task Description (Describe each step taken to complete the task)	Hazard Identified (What may result in injury or environmental harm?)	Risk Level (Current)	Control Measures (How will the hazards be controlled?)	Risk Level (Post Control)

Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020			

OHSMS-2.4.B Confined Space Job Safety Analysis

Task Description (Describe each step taken to complete the task)	Hazard Identified (What may result in injury or environmental harm?)	Risk Level (Current)	Control Measures (How will the hazards be controlled?)	Risk Level (Post Control)

Section 3: Post Job Review

Were any previously unidentified hazards encountered while conducting the work task? If so, what?

Did any incidents, injuries, or near misses occur during while conducting the work task? If so, describe them:

Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020			

OHSMS-2.4.B Confined Space Job Safety Analysis

Section 4: Definitions

Estimation of Consequence				
Level	People	Environment	Assets	Reputation
Minor	Minor injury, illness; First aid required	Minor environmental damage and effect confined to private property	Negligible production loss; Losses less than \$5,000	Localized concerns and no media attention; Minimal impact on public
Moderate	Medical aid required; Restricted work	Moderate environmental damage; Localized off site impacts; Immediate cleanup	Short term facility/equipment outage; Losses greater than \$5,000	Company wide attention; Brief local area attention; Regulatory action resulting in administrative response
Major	Lost time; Multiple injuries; Short term health impact	Severe reversible or short term environmental impact	24 hour facility outage; Losses greater than \$50,000	Prolonged local area attention; Brief operating region attention; Regulatory action resulting in fines or punitive action
Serious	Fatality; Long term health impact; Permanent disability	Severe irreversible or long term environmental damage	One week facility outage; Losses greater than \$100,000	Widespread concerns with extensive adverse media coverage; Prolonged operating region attention; Action resulting in legal prosecution

Estimation of Likelihood		
Likelihood	Description	Likelihood
Remote	Could occur at some time	Once in the lifetime of the facility
Unlikely	Should occur at some time	Once every 10 years
Likely	Will probably occur at some time	One occurrence per year
Frequent	Expected to occur in most circumstances	More than one occurrence per year

Management of Risk	
Low	Represents an acceptable level of risk
Medium	Represents a manageable amount of risk; requires mitigation measures
High	Extensive risk controls must be immediately implemented
Extreme	Stop all activities unless risk controls have been implemented and the risk is reduced to a lower level

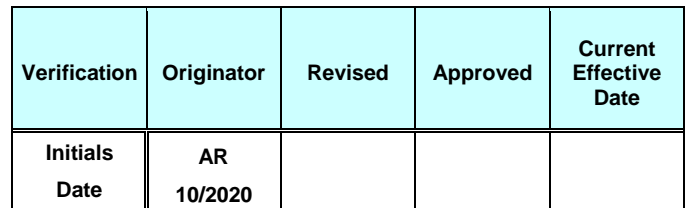


Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020		BH 10/2020	10/2020

OHSMS-2.4 Confined Space Program

Appendix C

Job Safety Analysis (JSA) For



Confined Space Identifier:		Confined Space Location (Building/Floor/Etc.):			
Work to be Completed:		Authorized Permit Date/Time:			
		From: To:			
Potential Hazards					
Atmosphere:		Physical:			
<input type="checkbox"/> Oxygen Enriched (>23.5%) <input type="checkbox"/> Oxygen Deficient (<19.5%) <input type="checkbox"/> Carbon Monoxide <input type="checkbox"/> Hydrogen Sulfide <input type="checkbox"/> Other Toxic Chemicals: _____ _____		<input type="checkbox"/> Flammable Gasses/Vapors <input type="checkbox"/> Moving/Rotating Equipment <input type="checkbox"/> Electrical Hazards <input type="checkbox"/> Traffic <input type="checkbox"/> Slips/Trips <input type="checkbox"/> Irritants <input type="checkbox"/> Falling Objects <input type="checkbox"/> Hot Work <input type="checkbox"/> Falls <input type="checkbox"/> Engulfment (List hazard): <input type="checkbox"/> Noise			
Equipment Requirements					
Air Monitoring:		Protective Clothing:		Other PPE:	
<input type="checkbox"/> Four Gas/Multigas Monitor <input type="checkbox"/> PID <input type="checkbox"/> Aerosol Monitor <input type="checkbox"/> Direct Indicator Tubes <input type="checkbox"/> Other (specify):		<input type="checkbox"/> Coveralls (specify type): <input type="checkbox"/> Gloves (specify type): <input type="checkbox"/> Boots (specify type):		<input type="checkbox"/> Safety Glasses <input type="checkbox"/> Hearing Protection <input type="checkbox"/> Hard Hat <input type="checkbox"/> Other (specify):	
Rescue Equipment:		Communication Equipment:		Other Equipment:	
<input type="checkbox"/> Harness <input type="checkbox"/> Hoist <input type="checkbox"/> Tripod <input type="checkbox"/> Other (specify):		<input type="checkbox"/> Two-way radios <input type="checkbox"/> Cell Phone <input type="checkbox"/> Visual <input type="checkbox"/> Other (specify):		<input type="checkbox"/> Continuous Forced-Air Ventilation <input type="checkbox"/> Line/Pipe Blanks <input type="checkbox"/> Lockout/Tagout Devices <input type="checkbox"/> Intrinsically Safe Tools/Lights	
Emergency Entry Rescue Service					
Name of service:		Address:			
Phone Number:		Travel Time:			
Entry Preparations					
Notifications:	Additional Permits Required:		Other Preparations:	Complete	N/A
Control Room (Date/Time):	<input type="checkbox"/> Hot Work <input type="checkbox"/> Lifting/Rigging <input type="checkbox"/> Other (specify):		Lockout Tagout		
Rescue Service (Date/Time):			Barriers/Barricades		
			Purging/Cleaning		
			Other (specify):		
Ventilation Requirements					
Volume of Confined Space (cubic feet)		Blower Size (CFM):			
Time Required to Complete 6 Air Changes		Ventilation Start Time:			

Page 135 of 136

Verify current revisions using the Alexandria Renew Enterprises OHSMS web site.



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 10/2020			

OHSMS-2.4.C Confined Space Entry Permit

Air Monitor Calibration							
Calibration Date/Time:							
Instrument ID Number							
Calibration gas used:		O ₂ :	%LEL:	CO:	H ₂ S:		
Oxygen Reading					PASS / FAIL		
LEL Reading					PASS / FAIL		
CO Reading					PASS / FAIL		
H ₂ S Reading					PASS / FAIL		
Atmospheric Monitoring							
Parameter	Acceptable Conditions	Results					
		Time:	Time:	Time:	Time:	Time:	Time:
Oxygen	> 19.5% < 23.5%						
Flammability	< 10% LEL						
Carbon Monoxide	< 12.5 ppm						
Hydrogen Sulfide	< 1 ppm						
Other:							
Testing Performed By (Initial):							
Authorization by Entry Supervisor							
I certify that all required precautions have been taken and that necessary testing, safety, and rescue equipment is provided for safe entry and work in this confined space.							
Printed Name:				Signature:			
Date:				Time:			
Personnel Entry Log							
Entrant Name	Initials	Time In	Time Out	Attendant			
Entry Activity Completion							
The Permit-Required Confined Space entry conducted under the provisions of this entry permit has been completed. This permit is hereby cancelled.							
Printed Name:				Signature:			
Date:				Time:			

Print date:
10/15/2020

WARNING! This document is uncontrolled when printed.

Page 136 of 136

Verify current revisions using the Alexandria Renew Enterprises OHSMS web site.



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 09/2020		BH 09/2020	09/2020

OHSMS-2.3 Control of Hazardous Energy Program (Lockout/Tagout)

Person responsible: Safety Coordinator

Document location: OHSMS SharePoint

Original issue date: 09/2020

Version Number: 0000

Revisions

Rev. No.	Date	Description	Author
0000	09/2020	Original Document	Alex Rigby

Recurring action items

Activity	Responsibility	Frequency
1. Review and revise the procedure as necessary.	Safety Coordinator	Annually
2. Perform annual evaluations of authorized employees	Supervisors	Annually
3. Safety Training for authorized & affected employees	Safety Coordinator	Biennially

Procedure Index

1.0 Purpose

2.0 Scope

3.0 Definitions

4.0 Responsibilities

5.0 Equipment Inventory and Hazard Assessment

6.0 Lockout Tagout Devices

7.0 Energy Control Procedures

8.0 Removal of LOTO Devices



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 09/2020		BH 09/2020	09/2020

OHSMS-2.3 Control of Hazardous Energy Program (Lockout/Tagout)

9.0 Group Lockout/Tagout

10.0 Contractor/Third-Party Personnel

11.0 Employee Training and Communication

12.0 Program Review

13.0 Disciplinary Action

14.0 References / Related Documents





Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 09/2020		BH 09/2020	09/2020

OHSMS-2.3 Control of Hazardous Energy Program (Lockout/Tagout)

1.0 PURPOSE

- 1.1** This program establishes the minimum requirements for the lockout/tagout (LOTO) of energy isolating devices whenever maintenance or servicing is done on machines or equipment on AlexRenew property. It shall be used to ensure that the machine or equipment is stopped, isolated from all potentially hazardous energy sources, locked out, and verified before employees perform any servicing or maintenance where the unexpected energization or start-up of the machine or equipment or release of stored energy could cause serious injury. Procedures have been developed, implemented, and documented in accordance with 29 CFR 1910.147, Control of Hazardous Energy and 29 CFR 1910.333, Selection and Use of Work Practices as promulgated by the Occupational Safety and Health Administration (OSHA). This program serves to:
- 1.1.1** Establish a safe and positive means of shutting down machinery, equipment and systems.
 - 1.1.2** Prohibit unauthorized personnel or remote control systems from starting machinery or equipment while it is being serviced.
 - 1.1.3** Provide a secondary control system (tagout) when it is impossible to positively lockout the machinery or equipment.
 - 1.1.4** Establish responsibility for implementing and controlling lockout/tagout procedures.
 - 1.1.5** Ensure that only approved locks, standardized tags and fastening devices provided by AlexRenew will be utilized in the lockout/tagout procedures.
 - 1.1.6** Establish the training requirements for employees who are engaged in work requiring the locking and tagging out of equipment or who are affected by such work.
 - 1.1.7** Establish procedures for regular review of the program, the employees authorized by this program, and the equipment that falls under this program.

2.0 SCOPE

- 2.1** This program applies to all employees or contractor/third party personnel who are required to perform servicing, commissioning, maintenance, installation or decommissioning on



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 09/2020		BH 09/2020	09/2020

OHSMS-2.3 Control of Hazardous Energy Program (Lockout/Tagout)

equipment or machinery that may contain or produce hazardous energy that could cause them harm. This LOTO program applies to all other employees or outside personnel who may be working around or possibly be exposed to these hazardous energy sources. All contractors who are hired to perform servicing or maintenance on the premises of AlexRenew must follow the procedures contained herein at a minimum. This program is not intended to include the requirements of NFPA 70E for working on or near live parts of electrical equipment. Procedures for working on or near live parts of electrical equipment can be found in AlexRenew's Electrical/Arc Flash Safety Program.

- 2.2 Servicing or maintenance on cord and plug connected electric equipment for which exposure to the hazards of unexpected energization or startup of the equipment is controlled by the unplugging of the equipment from the energy source and by the plug being under the exclusive control of the employee performing the servicing or maintenance may be performed without the use of LOTO.

3.0 DEFINITIONS

- 3.1 Affected Employee - An employee whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.
- 3.2 Authorized Employee - A person who locks out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance covered under this section.
- 3.3 Authorized LOTO Trainer – Authorized LOTO Trainer may refer to any employee who has had training and extensive experience in the proper use and application of the Lockout Tagout Procedure. Prior to being authorized as a trainer by AlexRenew, the employee must undergo an evaluation and be approved by the safety coordinator, the Deputy General Manager of Operations and Maintenance, and be approved by all supervisors who oversee authorized employees. Authorized LOTO Trainer may also refer to an authorized instructor from an OSHA Training Institute Education Center.
- 3.4 Electrical testing - The use of instruments to verify that electrical energy sources are isolated. Voltage meters and non-contact voltage detectors, that alarm in the proximity of low and medium voltage applications are acceptable based on the skills and training of the Electrician/Qualified Person. Non-contact voltage detectors cannot be utilized on voltages



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 09/2020		BH 09/2020	09/2020

OHSMS-2.3 Control of Hazardous Energy Program (Lockout/Tagout)

less 600 volts for purposes of LOTO.

- 3.5** Electrician/Qualified Person - A person who is competent, by their electrical knowledge and skills, to safely work on energized circuits. This includes the proper use of precautionary techniques, personal protective equipment, insulating materials and insulated tools.
- 3.6** Energized – Connected to an energy source or containing residual or stored energy.
- 3.7** Energy Isolating Device - A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: A manually operated electrical circuit breaker; a disconnect switch; and/or a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors. In addition, no pole can be operated independently; a line valve; a block; and any similar device used to block or isolate energy. Push buttons, selector switches and other control circuit type devices are not energy isolating devices.
- 3.8** Energy Source - Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.
- 3.9** Job Lock - A device used to ensure the continuity of energy isolation during a multiple-shift operation, or a group lock. A group lock is placed on the equipment at each energy isolating device. The key(s) for the job lock are then placed in a lockbox. Authorized employees will then place their personal locks on the lockbox.
- 3.10** Lockout - The placement of a lockout device on an energy isolating device, in accordance with an established procedure. This ensures that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.
- 3.11** Lockout Device - A device that utilizes a positive means such as a lock, either key or combination type, to hold an energy isolating device in the safe position and prevent the energizing of a machine or equipment. Included are blank flanges and bolted slip blinds.
- 3.12** LOTO - Lockout Tagout.
- 3.13** Normal Production Operations - The utilization of a machine or equipment to perform its intended production function.
- 3.14** OSHA – Occupational Safety and Health Administration.



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 09/2020		BH 09/2020	09/2020

OHSMS-2.3 Control of Hazardous Energy Program (Lockout/Tagout)

3.15 PPE – Personal Protective Equipment.

3.16 Servicing and/or Maintenance - Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or unjamming of machines or equipment and making adjustments or tool changes, where the employee may be exposed to the unexpected energization or startup of the equipment or release of hazardous energy.

3.17 Setting Up - Any work performed to prepare a machine or equipment to perform its normal production operation

3.18 Supervisor – May refer to any of the following: Plant Superintendent of Operations and Maintenance, Construction Programs Coordinator, Electrical Supervisor, Mechanical Supervisor, or Shift Leaders.

3.19 Tagout - The placement of a tagout device on an energy isolating device, in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

3.20 Tagout Device - A prominent warning device, such as a tag and a means of attachment, which can be securely fastened to an energy isolating device in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

4.0 RESPONSIBILITY

4.1 The Director of Environmental Performance maintains overall responsibility for the administration of the Control of Hazardous Energy Program.

4.2 The Safety Coordinator is responsible for the overall implementation, maintenance, oversight, and communication of this program. The Safety Coordinator will conduct, at a minimum, an annual audit of this program or whenever deficiencies in this program are identified. Additional responsibilities include:

4.2.1 Overseeing the training and evaluation of all affected and authorized employees;

4.2.2 Maintaining training records for employees trained as part of this program;

4.2.3 Conducting periodic inspections of equipment covered under this program in



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 09/2020		BH 09/2020	09/2020

OHSMS-2.3 Control of Hazardous Energy Program (Lockout/Tagout)

conjunction with supervisors;

4.2.4 Maintaining an inventory of all lockout tagout devices;

4.2.5 Assisting in the creation/update of equipment energy control procedures any time new equipment is installed or some change is made to current equipment that would affect the lockout tagout procedure for that equipment; and

4.3 Supervisors are responsible for:

4.3.1 Implementing the Control of Hazardous Energy and LOTO procedure;

4.3.2 Conducting periodic inspections/evaluations as described in the Program Review section in conjunction with the Safety Coordinator;

4.3.3 Reviewing scope of work for activities which require LOTO;

4.3.4 Ensuring that LOTO will not interrupt the continuity of operations of the plant;

4.3.5 Assigning an authorized employee to conduct the work under the procedures prescribed in this plan;

4.3.6 Conducting a system walk down with the authorized employee for particularly hazardous or complicated systems;

4.3.7 Assisting in the creation/update of equipment energy control procedures any time new equipment is installed or some change is made to current equipment that would affect the lockout tagout procedure for that equipment;

4.3.8 Assigning a competent authorized employee to mentor and monitor employees new to the program;

4.3.9 Following the proper procedure when completing the Approval to Cut/Remove LOTO Devices from the Program; and

4.3.10 Ensuring LOTO conducted by contractor/third-party personnel is completed in compliance with the procedures described in the Contractor/Third-Party Section of this program.

4.4 Authorized Employees are responsible for:



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 09/2020		BH 09/2020	09/2020

OHSMS-2.3 Control of Hazardous Energy Program (Lockout/Tagout)

- 4.4.1 Ensuring their own safety as well as the safety of those around them;
- 4.4.2 Stopping work if there is a perceived imminent hazard to the health and safety of any individual at any time;
- 4.4.3 Knowing and understanding the policies and procedures implemented as a part of this program;
- 4.4.4 Using a questioning attitude when developing a plan to control the hazardous energy of a piece of equipment in need of maintenance;
- 4.4.5 Notifying affected employees prior to the lockout of any equipment and coordinating to ensure continuity of operations is maintained;
- 4.4.6 Implementing the LOTO process as described in this program;
- 4.4.7 Verifying that all sources of hazardous energy have been properly isolated from the equipment prior to commencing work (this could include attempting to start the equipment manually, contacting the control room to have them attempt to start the equipment remotely, ensuring drains/vents are open and pressure is bled off, and/or using a testing device to ensure electrical lines have been de-energized);
- 4.4.8 Visually verifying that personnel are not exposed to equipment and that all tools and materials have been removed from equipment before removing locks and re-energizing the equipment;
- 4.4.9 Walking down the completed equipment with the affected employees to ensure the equipment is operational and ready to return to service;
- 4.4.10 Never adjusting, removing, or modifying the locking devices or tags of another authorized employee;
- 4.4.11 Never working on a system that they have not personally applied their locks and tags to and verified is in a zero energy state; and
- 4.4.12 Stopping work and notifying their supervisor if they have any concerns with the LOTO procedure or potentially energized equipment.

4.5 Affected Employees are responsible for:



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 09/2020		BH 09/2020	09/2020

OHSMS-2.3 Control of Hazardous Energy Program (Lockout/Tagout)

- 4.5.1 Understanding the purpose of these procedures and that attempting to restart machines or equipment under LOTO is prohibited;
- 4.5.2 Never adjusting, removing, or modifying the locking devices or tags of authorized employees;
- 4.5.3 Never working on a system that has been locked and tagged out by another employee;
- 4.5.4 Stopping work and notifying their supervisor if they have any concerns with the LOTO procedure; and
- 4.5.5 Maintaining a list of all equipment currently locked out (Appendix E) and communicating that list to the next shift during the shift debrief.

4.6 Outside Personnel (contractors) are responsible for:

- 4.6.1 Ensuring all employees expected to conduct work under LOTO procedures have received the appropriate training;
- 4.6.2 Supplying locks and tags compliant with 29 CFR 1910.147 to all employees expected to conduct work under LOTO procedures;
- 4.6.3 Ensuring all personnel's tags have company contact information as well as the information required by 29 CFR 1910.147;
- 4.6.4 Following all of AlexRenew's policies and procedures;
- 4.6.5 Submitting a process shutdown or equipment removal from service notice as directed by the AlexRenew point of contact prior to conducting any work applicable to this Program;
- 4.6.6 Conducting a system walk down with their AlexRenew supervisor or designated person for work on any system requiring lockout tagout on AlexRenew property. AlexRenew's authorized employee and contractor personnel will all apply locks and tags appropriate for the work to be conducted and verify the isolation of all sources of hazardous energy prior to the contractor beginning work; and
- 4.6.7 Stopping work and notifying their AlexRenew supervisor/lead person if they have any concerns with the LOTO procedure.



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 09/2020		BH 09/2020	09/2020

OHSMS-2.3 Control of Hazardous Energy Program (Lockout/Tagout)

- 4.7** Failure to comply with LOTO procedures is an intolerable safety violation which will result in disciplinary action up to and including termination of employment. For contractors/third-parties who violate LOTO procedures, it will result in their immediate removal from the site and possible cancellation of any contract with their employer for repeated violations by their employees.

5.0 EQUIPMENT INVENTORY AND HAZARD ASSESSMENT

- 5.1** With the exception of equipment listed in Appendix A (which have equipment specific LOTO procedures), AlexRenew is not required to document the equipment specific procedure for each particular machine or equipment because these machines and/or equipment meet all the following requirements:
- 5.1.1** No potential for stored or residual energy or re-accumulation of stored energy after shut down which could endanger employees;
 - 5.1.2** The machine or equipment has a single energy source that can be readily identified and isolated;
 - 5.1.3** The isolation and locking out of the energy source will completely de-energize and deactivate the machine or equipment;
 - 5.1.4** The machine or equipment is isolated from the energy source and locked out during servicing or maintenance;
 - 5.1.5** A single lockout device will achieve a locked-out condition;
 - 5.1.6** The lockout device is under the exclusive control of the authorized employee performing the servicing or maintenance;
 - 5.1.7** The service or maintenance does not create hazards for other employees; and
 - 5.1.8** AlexRenew in utilizing this exception, has had no accidents involving the unexpected activation or re-energization of the machine or equipment during servicing or maintenance.
- 5.2** Prior to placing any newly installed, majorly modified, or translocated equipment into service, a new assessment of the equipment will be conducted to determine whether or not an equipment specific lockout tagout procedure is necessary. The results of this assessment



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 09/2020		BH 09/2020	09/2020

OHSMS-2.3 Control of Hazardous Energy Program (Lockout/Tagout)

will be maintained on file for review.

6.0 LOCKOUT TAGOUT DEVICES

6.1 Locks

6.1.1 Authorized Employee Locks – Red Locks

6.1.1.1 Authorized Employees will be assigned a set of six locks each keyed the same with one unique key. A master key will not be available. Labels will be affixed to each lock indicating who the lock belongs to. Locks will not be removed by anyone other than the authorized employee who placed it on the energy isolation device unless the procedure described in the “Removal of LOTO Devices” section of this program are followed. Employees working on the same machine will each use their own lock to lockout the equipment. Authorized Employee locks are identified in Figure 1 below.

6.1.2 Job Locks – Yellow Locks

6.1.2.1 Job locks will be grouped into sets of fifteen locks each keyed the same with one unique key. A master key will not be available. Job locks will be maintained at a central location within the plant. Only the Safety Coordinator and Supervisors will have access to the job locks. In the event the use of job locks becomes necessary, the job locks will be signed out by the lead authorized employee who will assume responsibility for ensuring the job locks are returned to the storage location after the work has been completed. Job locks will be used under the following circumstances:

6.1.2.1.1 Large groups of employees will all be working on the same equipment;

6.1.2.1.2 The equipment requires more than six locks to isolate; and

6.1.2.1.3 The equipment shutdown is anticipated to last more than a single shift.

6.1.2.2 If one of these circumstances arises, the lead authorized employee will apply the yellow job locks to the equipment to be isolated following the procedure outlined below. After complete isolation has been achieved, and all employees involved have verified isolation, the lead authorized employee will place the key for the job locks into a group lock box. All involved



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 09/2020		BH 09/2020	09/2020

OHSMS-2.3 Control of Hazardous Energy Program (Lockout/Tagout)

employees will then place their personal red locks on the lock box.

- 6.1.2.3** If the equipment shutdown is anticipated to last more than a single shift, the supervisor will leave his/her lock on the box and notify affected personnel as to the anticipated duration of the equipment lockout. If another supervisor will be assuming responsibility for the equipment that has been locked out, the oncoming supervisor will lock onto the equipment and the outgoing supervisor will remove their lock during the shift debrief. Job locks are identified in Figure 1 below.

6.1.3 Abandoned or Obsolete Equipment Locks – Blue Locks

- 6.1.3.1** When equipment is no longer used with the current processes, it will be placed in caretaker status. Caretaker status means that the equipment will be removed from the normal LOTO process.

- 6.1.3.2** Any specific equipment deemed by the Deputy General Manager of Operations & Maintenance to not add value to a LOTO process can be placed in caretaker status. When a piece of equipment is placed into caretaker status:

- 6.1.3.2.1** The equipment will be tested, drained, disconnected, vented, and verified to be at a zero energy state;

- 6.1.3.2.2** A blue lock will be placed on all Energy Isolation Devices to ensure the equipment cannot be inadvertently re-energized;

- 6.1.3.2.3** A list of equipment in caretaker status will be maintained by the Safety Coordinator; and

- 6.1.3.2.4** The Safety Coordinator will maintain the keys to equipment in caretaker status in a secure manner.

- 6.1.3.3** Abandoned/Obsolete equipment locks are identified in Figure 1 below.

6.1.4 Contractor Locks

- 6.1.4.1** Contractors will be allowed to utilize the locks specified by their internal procedures as long as they meet or exceed the specifications outlined in 29

Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 09/2020		BH 09/2020	09/2020

OHSMS-2.3 Control of Hazardous Energy Program (Lockout/Tagout)

CFR 1910.147. Contractor locks, however, shall be supplemented by an additional tag that identifies the company the contractor is employed by and a telephone number at which the contractor company can be reached at all times while the contractor is engaged in work requiring LOTO on AlexRenew property.

6.1.5 Figure 1 – Approved Lockout Devices



Authorized Employee Lock



Job Lock



Abandoned/Obsolete Equipment Lock

6.2 Tags

- 6.2.1 Each lockout device will be supplemented by a tag which is capable of withstanding the environment to which they are exposed without deteriorating or the message on the tag becoming illegible.
- 6.2.2 Each tag must readily identify the employee to whom the tag belongs with the employee's printed name, department, and the words "DANGER", and "DO NOT OPERATE" OR "DO NOT USE" printed on the tag.
- 6.2.3 Tags for group locks should be identical in design to the personnel tags but be labelled with the group lock number assigned to the set by the Safety Coordinator.
- 6.2.4 In the event that a piece of equipment is not capable of being locked out, a tag alone will not be used as a means of control of hazardous energy. A tag without a lock must be supplemented by at least one additional safety measure that provides a level of safety equivalent to that obtained by use of a lock. Examples of additional safety measures include the removal of an isolating circuit element, blocking of a controlling switch, or opening of an extra disconnecting device. Equipment incapable of being locked out must be reported to the Safety Coordinator for evaluation. Authorized Employee and Job Tags are identified in Figure 2 below.

Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 09/2020		BH 09/2020	09/2020

OHSMS-2.3 Control of Hazardous Energy Program (Lockout/Tagout)

6.2.5 Tags will also be utilized for abandoned/obsolete equipment. These tags must be visually dissimilar to the tags used for group & personal lockout tagout. The tags will be similarly durable and labelled with equipment identifying information and any deficiencies the equipment might possess. Abandoned/Obsolete equipment tags are identified in Figure 2 below.

6.2.6 Figure 2 – Approved Tagout Devices



Authorized Employee LOTO Tag



Obsolete/Abandoned Equipment Tag

6.3 Other Lockout Devices

6.3.1 Other lockout devices utilized to isolate equipment may include: chains, valve covers, wedges, key blocks, adapter pins, self-locking fasteners, lockboxes, hasps, circuit breaker lockouts, etc. Each of these devices must be able to withstand the environment in which they will be used and must be substantial enough to prevent removal without the use of excessive force or unusual techniques such as using bolt cutters or other metal cutting tools.

7.0 ENERGY CONTROL PROCEDURES

7.1 No AlexRenew employee will be permitted to commence with LOTO procedures without first being properly trained (see the section below on Employee Training and Communication).

7.2 Equipment Isolation/Lockout Tagout

7.2.1 All work requiring isolation of hazardous energy shall follow these steps:

7.2.1.1 Identification of Need. The person that identifies the need for equipment



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 09/2020		BH 09/2020	09/2020

OHSMS-2.3 Control of Hazardous Energy Program (Lockout/Tagout)

repair or maintenance will shut down the equipment and submit a Work Request using AVANTIS.

7.2.1.2 Supervisor Review. A supervisor will review the Work Request and issue a Work Order to an authorized employee.

7.2.1.2.1 For equipment which has been assigned an equipment specific procedure, the supervisor will print the procedure and review it with the authorized employee prior to allowing work to commence.

7.2.1.3 Prepare for LOTO. The authorized employee will refer to the equipment-specific LOTO procedure to identify the type and magnitude of the energy that the machine or equipment utilizes, understand the hazards of the energy, and know the methods to control the energy.

7.2.1.3.1 For equipment requiring the use of job locks, the lead authorized employee will sign out the job locks which are held by one of the Supervisors. The Group LOTO Device Checkout Sheet is included as Appendix F.

7.2.1.4 Notify Affected Employees. Notify all affected employees including operations by calling the control room that servicing or maintenance is required on a machine or equipment and that the machine or equipment must be shut down and locked out to perform the servicing or maintenance.

7.2.1.4.1 If necessary, the authorized and affected employees will walk down the system together to ensure that continuity of operations is maintained during the work.

7.2.1.5 Shutdown. If the machine or equipment is operating, shut it down by the normal stopping procedure (depress the stop button, open switch, close valve, etc.).

7.2.1.6 Isolate the energy. De-activate the energy isolating device(s) so that the machine or equipment is isolated from the energy source(s).

7.2.1.6.1 When auxiliary equipment or machine controls are powered by separate supply sources, such equipment or controls shall also be locked or tagged to prevent any hazard that may be caused by operating the



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 09/2020		BH 09/2020	09/2020

OHSMS-2.3 Control of Hazardous Energy Program (Lockout/Tagout)

equipment or exposure to live circuits.

- 7.2.1.6.2** When equipment uses pneumatic or hydraulic power, pressure in lines or accumulators will be checked. Using whatever safe means possible, this pressure will be relieved or pressure lines disconnected.
- 7.2.1.6.3** When stored energy is a factor as a result of position, spring tension or counter-weighting, the equipment will be placed in the bottom position, or it will be blocked to prevent movement or closure.
- 7.2.1.7 Apply the LOTO devices.** Lock out the energy isolating device(s) with assigned individual lock(s) and tag(s). If a device cannot be locked using a padlock or built in lock mechanism, the authorized employee must securely fasten a tagout device as close as safely possible to the energy-isolating device in a position where it will be immediately obvious to anyone attempting to operate the device utilizing a durable attachment such as a plastic zip tie.
- 7.2.1.8 Control stored energy.** Stored or residual energy (such as that in capacitors, springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas, steam, or water pressure, etc.) must be dissipated or restrained by methods such as grounding, repositioning, blocking, bleeding down, etc. When stored energy is a factor as a result of position, spring tension or counterweighting, the equipment will be placed in the bottom position, or it will be blocked to prevent movement or closure.
- 7.2.1.9 Verify LOTO.** Ensure that the equipment is disconnected from the energy source(s) by first checking that no personnel are exposed, then verify the machine or equipment has been turned off or shutdown properly as required by the equipment specific energy isolation procedures; all the energy isolating devices were identified, located and operated as required; the LOTO devices have been attached to the energy isolating devices as required; and the stored energy has been rendered safe as required.
- 7.2.1.9.1** If the work may expose an employee to contact with parts of fixed electric equipment or circuits, a qualified person will use test equipment to test the circuit elements and electrical parts of equipment to which employees will be exposed and will verify that the circuit elements and equipment parts are deenergized. The test will also determine if any



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 09/2020		BH 09/2020	09/2020

OHSMS-2.3 Control of Hazardous Energy Program (Lockout/Tagout)

energized condition exists as a result of inadvertently induced voltage or unrelated voltage backfeed even though specific parts of the circuit have been deenergized and presumed to be safe. If the circuit to be tested is over 600 nominal volts, the test equipment will be checked for proper operation immediately after this test.

7.2.1.9.2 Note: As part of the verification of LOTO, the authorized employee must contact the control room who will attempt to restart the equipment remotely and notify the authorized employee regarding their ability to do so.

7.2.1.9.3 Caution: Return operating control(s) to neutral or "off" position after verifying the isolation of the equipment.

7.3 Restoring Equipment to Service

7.3.1 Inspection. Check the machine or equipment and the immediate area around the machine to ensure that nonessential items have been removed and that the machine or equipment components are operationally intact.

7.3.2 Check for Employee Safety. Check the work area to ensure that all employees have been safely removed from the area.

7.3.3 Ensure Controls are in Neutral. Verify that the controls are in neutral.

7.3.4 Remove LOTO Devices. Remove the lockout devices and reenergize the machine or equipment. Each LOTO device must be removed by the employee who applied the device. The removal of some forms of blocking may require energization of the machine before safe removal.

7.3.5 Notify Affected Employees. A walk down should be conducted with the affected employees to ensure that the equipment repairs were successful and can be safely returned to service.

7.4 Machine or Equipment Testing or Repositioning

7.4.1 In situations in which lockout or tagout devices must be temporarily removed from the energy isolating device and the machine or equipment energized to test or position the machine, equipment or component thereof, the following sequence



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 09/2020		BH 09/2020	09/2020

OHSMS-2.3 Control of Hazardous Energy Program (Lockout/Tagout)

of actions shall be followed:

- 7.4.1.1** Clear the machine or equipment of tools and material;
- 7.4.1.2** Remove the LOTO devices by the authorized employee who applied it;
- 7.4.1.3** Energize the machine and employ effective employee protection while testing or positioning machinery; and
- 7.4.1.4** Turn off all systems, isolate the machine from the energy source, and reapply LOTO devices as specified, if additional servicing or maintenance is required.

8.0 REMOVAL OF LOTO DEVICES

8.1 It cannot be over-emphasized that employees who work on de-energized machinery or equipment may be seriously injured or killed if LOTO devices are removed and the machinery or equipment is re-energized without their authorization. Lockout or tagout is personal protection. For this reason, it is extremely important that all employees respect lockout and tagout devices and that the personal LOTO devices be removed only by the person(s) who applied them.

8.2 Authorization to Cut/Remove.

8.2.1 In the rare situation in which the employee who placed the personal LOTO device is not available to remove that LOTO device, the device may be removed utilizing the following procedures. Prior to removal of the device, the Approval to Cut/Remove LOTO Device(s) form (Appendix B) must be completed to verify that the authorized employee (who applied the device) is not at the facility. The Safety Coordinator or designated Supervisor must give final authorization before the removal of another employee's lock. The person authorizing the removal shall be responsible for ensuring the following steps have been followed:

8.2.1.1 Verify that the authorized employee (who applied the device) is not at the facility by:

8.2.1.1.1 Making all reasonable efforts to contact the employee to receive verbal verification from them that they are not on AlexRenew property. Inform the employee that their LOTO device(s) have been removed;



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 09/2020		BH 09/2020	09/2020

OHSMS-2.3 Control of Hazardous Energy Program (Lockout/Tagout)

8.2.1.1.2 Physically walk down the equipment to ensure all tools and materials are removed from the area and that no employees are in harm's way; and

8.2.1.2 Complete the Approval to Cut/Remove LOTO Device form (Appendix B).

8.2.1.3 Ensure that this employee knows of the removal of the device(s) before they resume work at the facility.

8.2.2 NOTE: Removal of a personal LOTO device by another person may not be based on convenience and may not be done simply because the employee is not available at the LOTO location, but is still at the workplace. The steps above are necessary to ensure that the employee who is protected by the device is not exposed to energy hazards either at the time of its removal or after its removal.

8.3 Removal of a personal LOTO device by another person without following the procedures described above constitutes a serious violation of health and safety rules and the employee who removed the lock shall be subject to disciplinary actions up to and including termination of employment.

8.4 Completed Approval to Cut/Remove LOTO Device forms must be forwarded to the Safety Coordinator for appropriate storage/filing and will be maintained for a period not less than 3 years.

8.5 If the employee forgets to remove their LOTO device prior to the end of the shift, the cost of replacement devices will be deducted from their next paycheck. If the task has been scheduled to last longer than a single shift, or the authorized employee was directed to leave LOTO devices in place by a supervisor and changing conditions necessitated the removal of the lock, the employee will not be deducted the cost of replacement devices. An inventory of all locks that have been assigned to AlexRenew personnel will be maintained with their associated key numbers in the event replacement keys or locks need to be ordered from the manufacturer.

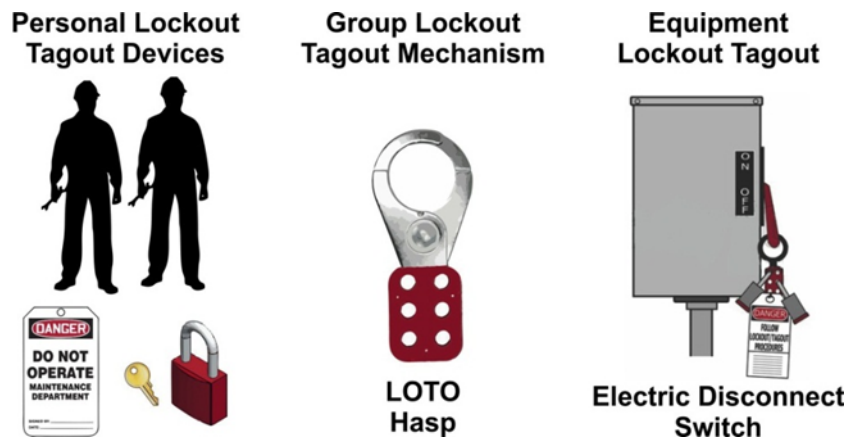
9.0 GROUP LOCKOUT/TAGOUT

9.1 Basic Group LOTO – Small Group. Each authorized employee places their personal LOTO device on each energy isolating device using a group LOTO mechanism and removes it upon completion of the assignment. Each authorized employee verifies or observes the de-energization of the equipment.

Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 09/2020		BH 09/2020	09/2020

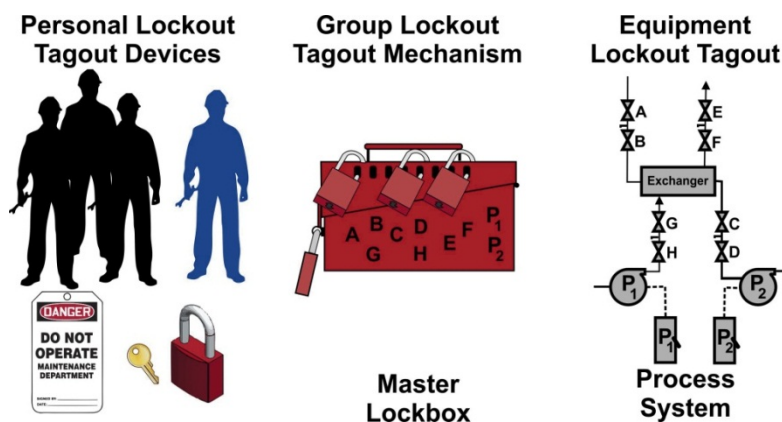
OHSMS-2.3 Control of Hazardous Energy Program (Lockout/Tagout)

9.2 Figure 3 – Small Group LOTO Procedure



9.3 Master Lockbox – Large Group. Under a lockbox procedure, a job lock is placed on each energy isolation device after de-energization by the servicing/maintenance group lead authorized employee. The key(s) are then placed into a lock-box. Each authorized employee assigned to the job then affixes his/her personal lock and tag to the lockbox. As a member of a group, each assigned authorized employee verifies that all hazardous energy has been rendered safe. The LOTO devices cannot be removed or the energy isolating device turned on until each individual employee removes their personal lock and tag from the lockbox. Then each appropriate key is used to remove each LOTO device, and the machinery/equipment can be re-energized.

9.4 Figure 4 – Master Lockbox LOTO Procedure

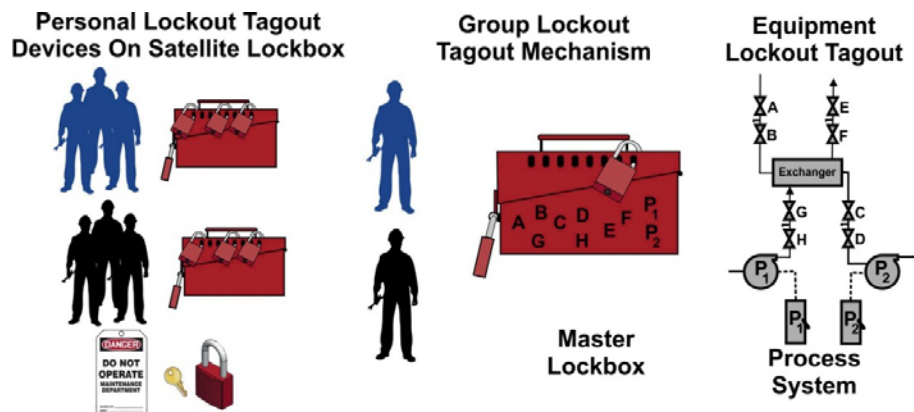


Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 09/2020		BH 09/2020	09/2020

OHSMS-2.3 Control of Hazardous Energy Program (Lockout/Tagout)

9.5 Satellite Lockbox – Multiple Groups. After each energy isolating device is locked/tagged out and the keys placed into a master lockbox, each servicing/maintenance group principal authorized employee places his personal lock or tag on the master lockbox. Then each principal authorized employee (Crew Leader) inserts his key into a satellite lockbox to which each authorized employee in that specific group affixes his personal lock and tag. Each authorized employee verifies that all hazardous energy has been rendered safe. Only after the servicing/maintenance functions of the specific subgroup have been concluded and the personal locks and tags of the respective employees within the group have been removed from the satellite lock-box can the principal authorized employee remove his key from the satellite box and remove his lock from the master lock-box. A primary responsibility is vested in an authorized employee for a set number of employees working under the protection of a group lockout or tagout device.

9.6 Figure 5 – Satellite Lockbox LOTO Procedure



10.0 CONTRACTOR/THIRD-PARTY PERSONNEL

10.1 Whenever contractor/third-party servicing personnel are to be engaged in activities covered by the scope and application of this program, they shall be required to abide by the standards which are most protective of human health and safety, whether those be the standards defined in this program or those set forth in the contracting company's internal program. Prior to the start of work, AlexRenew's safety department and/or maintenance department and the outside employer will meet to discuss expectations in regards to LOTO.

10.2 AlexRenew employees who will be engaged in the work to be conducted by the contractors/third parties shall be expected to understand and comply with the restrictions



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 09/2020		BH 09/2020	09/2020

OHSMS-2.3 Control of Hazardous Energy Program (Lockout/Tagout)

and prohibitions of both AlexRenew and the outside employer's energy control programs.

- 10.3** Prior to the commencement any work on site which will require the use of LOTO, the contracting company or their AlexRenew point of contact must complete and submit a Process Shutdown or Equipment Removal from Service Notice (Appendix C). The AlexRenew point of contact will determine the appropriate amount of time needed for the notice based on the equipment/process requiring shut down. Notices will be reviewed and approved prior to the commencement of work.
- 10.4** An AlexRenew Supervisor or their designee will conduct a system walk down with contractor personnel for work on any system requiring lockout tagout on AlexRenew property. The AlexRenew point of contact and all contractor personnel will apply LOTO devices utilizing the group lockout tagout procedures outlined above. Prior to beginning work, the AlexRenew Supervisor or designee and all contractor personnel will verify the isolation of all sources of hazardous energy.
- 10.5** Contractor lockout tagout devices must have the word "Contractor" and the company's name and phone number either on the tag or on an attached tag or label. The phone number must be a number that is monitored as long as the tags are hanging.
- 10.6** Removal of a contractor's LOTO device will be conducted in accordance with the procedures outlined in section 9.0. In addition to contacting the contracted worker who owns the lock, however, the contractor's supervisor will also be contacted prior to lock removal and prior to return to their return to the work site.

11.0 EMPLOYEE TRAINING AND COMMUNICATION

- 11.1** Training will be provided to ensure that the purpose and function of the energy control program are understood by employees and that the knowledge and skills required for the safe application, usage, and removal of the energy controls are acquired by employees. The training will include the following components described below.
- 11.2** Authorized Employee Training
- 11.2.1** Authorized employee training consists of both a classroom session and a practical "hands-on" training session.
- 11.2.2** The classroom portion of the training includes: the recognition of applicable hazardous energy sources, the type and magnitude of the energy available in the



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 09/2020		BH 09/2020	09/2020

OHSMS-2.3 Control of Hazardous Energy Program (Lockout/Tagout)

workplace, and the methods and means necessary for energy isolation and control, ways to verify that energy isolation is effective; and the purpose of the procedures to be used. At the completion of the classroom training session, participants will be given a written test to assess their comprehension of the material presented.

11.2.3 The “hands-on” training session will consist of two parts:

11.2.3.1 An Authorized LOTO trainer will walk the participants through the proper isolation, lockout, and verification of a piece of equipment currently not in use.

11.2.3.2 In pairs, participants will be tasked with applying the proper lockout tagout procedures to another piece of equipment currently not in use (separate from the practice equipment locked out earlier). Verification that the procedures have been followed will be conducted by a Supervisor who will assign either a passing or failing grade to the pair.

11.2.3.2.1 Note: At any time during this examination, employees may ask the trainer questions, which the trainer will answer. The trainer, however, is expressly forbidden from offering assistance unless it is first sought by the employees.

11.2.4 Employees passing both portions of the authorized employee training will be issued a paper certificate of training. The certification will contain the employee's name and dates of training. The Safety Coordinator or HR Manager will maintain an electronic copy of the training certificate on file for their full term of employment plus 5 years.

11.2.5 Following successful completion of the training, authorized employees will be assigned by a Supervisor to work with a mentor until the employee has proven competency. The length of this mentoring period shall not be less than 60 days but may be as long as deemed necessary by the supervisor.

11.3 Affected Employee Training

11.3.1 Each affected employee will receive classroom training wherein they will be instructed in the purpose and use of the energy control procedure as well as the prohibition relating to attempts to restart or reenergize machines or equipment which are locked out or tagged out or the removal of locks or tags.



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 09/2020		BH 09/2020	09/2020

OHSMS-2.3 Control of Hazardous Energy Program (Lockout/Tagout)

11.3.2 At the completion of the classroom training session, participants will be given a written test to assess their comprehension of the material presented.

11.3.3 Employees who receive a passing grade will be issued a paper certificate of training. The certification will contain the employee's name and dates of training. The Safety Coordinator or HR Manager will maintain an electronic copy of the training certificate on file for the full term of employment plus 5 years.

11.4 Retraining

11.4.1 Refresher training will be provided for all authorized and affected employees whenever there is a change in their job assignments, a change in machines, equipment or processes that present a new hazard, when there is a change in the energy control procedures, or at a minimum, every two years.

11.4.2 Additional refresher training will also be conducted whenever an annual evaluation or periodic inspection reveals, or whenever there is reason to believe that there are deviations from or inadequacies in the employee's knowledge or use of the energy control procedures.

11.4.3 The refresher training shall reestablish employee proficiency and introduce new or revised control methods and procedures, as necessary based on changes to site conditions. Following the adequate completion of the retraining, the employee will be assigned a competent mentor by their supervisor to assess the employee's knowledge of appropriate LOTO procedures. The duration of this additional mentorship will be as long as deemed appropriate by the employee's supervisor and/or the Safety Coordinator.

12.0 PROGRAM REVIEW

12.1 This program will be reviewed regularly to identify and correct any deficiencies found. This review will be conducted immediately upon identification of a program deficiency or at least annually.

12.2 A periodic inspection/evaluation of the energy control procedure(s) will be conducted at least annually for each authorized employee to ensure that the requirements of the program and the standard are being followed to ensure full employee protection. The periodic inspection will be performed by the Supervisor and/or Safety Coordinator. The inspection will be conducted to identify any program inadequacies that need correcting. The



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 09/2020		BH 09/2020	09/2020

OHSMS-2.3 Control of Hazardous Energy Program (Lockout/Tagout)

inspection will review the employee's responsibilities under the procedure being inspected.

- 12.3** AlexRenew will provide certification that the inspection of a LOTO has been performed. The certification will identify the machine on which the lockout/tagout is being utilized, the date of the inspection, names of employees involved, and the name of the individual performing the inspection. These entries will be made on the Periodic Inspection/Evaluation Form (Appendix D). These forms are to be forwarded to the Safety Coordinator and kept on file for a period of time not less than 3 years.

13.0 DISCIPLINARY ACTION

- 13.1** Violation of any of the procedures implemented as a part of this program will be deemed to be a serious health and safety infraction and will result in immediate disciplinary action up to and including termination of employment in accordance with AlexRenew's Discipline Policy (HR-02).
- 13.2** If the employee violates one of these rules but was found to have made a good faith effort to abide by AlexRenew's procedures, the employee will be removed from the task until retraining can be provided and provided verbal counseling as defined in AlexRenew's Discipline Policy. The employee's supervisor will make a record of the event and forward that record to the HR manager. One retraining is allowed within a two-year period. Subsequent infractions within that time period will be considered to be a willful violation and will elicit further disciplinary actions as outlined below.
- 13.3** Should an employee be found to have knowingly and/or willingly violated any element of this program, they will be issued a Final Written Warning in congruence with AlexRenew's Discipline Policy, and a Performance Improvement Plan will be developed and implemented by the employee's supervisor. Should a second such event occur within a two year time period, the employee will be immediately discharged from duty.

14.0 REFERENCES / RELATED DOCUMENTS

- 14.1** Appendix A – Procedures for Equipment Requiring Specific LOTO Procedures
- 14.2** Appendix B – Approval to Cut/Remove LOTO Device(s) Form
- 14.3** Appendix C – Process Shutdown or Equipment Removal from Service Notice
- 14.4** Appendix D – Periodic Inspection/Evaluation Form



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 09/2020		BH 09/2020	09/2020

OHSMS-2.3 Control of Hazardous Energy Program (Lockout/Tagout)

14.5 Appendix E – Equipment LOTO Log Sheet

14.6 Appendix F – Group LOTO Device Checkout Sheet

14.7 HR-02 Discipline Policy

14.8 OSHA 29 CFR 1910.147 and 29 CFR 1910.333



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 12/2019			

OHSMS-2.3.A1 Procedures for Equipment Requiring Specific LOTO Procedures

Building	Equipment	Page
All	AUTOMATIC TRANSFER SWITCH	5
20	Air Handling Units AHU-20-1001	6
	Exhaust Fans EF-20-1001	6
	Air Handling Units AHU-20-1002	8
	Exhaust Fans EF-20-1002	8
	Air Handling Units AHU-20-1101	10
	Exhaust Fans EF-20-1101	10
	Air Handling Units AHU-20-1102	12
	Exhaust Fans EF-20-1102	12
	Air Handling Units AHU-20-1201	14
	Exhaust Fans EF-20-1201	14
	Air Handling Units AHU-20-1701	16
	Exhaust Fans EF-20-1701	16
	Air Handling Units AHU-20-1702	18
	Exhaust Fans EF-20-1702	18
	Air Handling Units AHU-20-1801	20
	Exhaust Fans	20

Print date:
12/12/2019

WARNING! This document is uncontrolled when printed.

Page 1 of 65

Verify current revisions using the Alexandria Renew Enterprises OHSMS web site.



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 12/2019			

OHSMS-2.3.A1 Procedures for Equipment Requiring Specific LOTO Procedures

Building	Equipment	Page
	EF-20-1801	
	Air Handling Units AHU-20-1802	22
	Exhaust Fans EF-20-1802	22
55	Air Handling Units AHU-55-1001,1002	24
	Exhaust Fans EF-55-1101,1102,1103, and 1104	24
A	Boiler # 1	26
	Boiler # 2	27
C	Air Handling Units AHU-C-100	28
	Exhaust Fans EF-C-100	28
	Air Handling Units AHU-C-200	30
	Exhaust Fans EF-C-200	30
	Boiler # 1	32
	Boiler # 2	33
F	Boiler # 1	34
	Boiler # 2	35
	Post Aeration Blower # 3	36
	W-3 Pump # 3	37
G	Air Handling Unit AHU-G1-2001	38
	Return Fan RF-G1-2001	38

Print date:
12/12/2019

WARNING! This document is uncontrolled when printed.

Page 2 of 65

Verify current revisions using the Alexandria Renew Enterprises OHSMS web site.



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 12/2019			

OHSMS-2.3.A1 Procedures for Equipment Requiring Specific LOTO Procedures

Building	Equipment	Page
	Air Handling Unit AHU-G1-6001	40
	Return Fan RF-G1-6001	40
	Boiler # 1	42
	Boiler # 2	43
J	Air Handling Unit AHU-J-2001	44
	Return Fans RF-J-2001	44
	Chiller Chiller #1	46
	Exhaust Fan EF-J1002, 1003	47
K	Air Handling Units AHU-K-1001,1002,2001,2002,3001,and 3002	49
	Exhaust Fans EF-K-1001A,1001B,3001,3002,7001 and 7002	49
	Supply Fans SF-K-1001A and 1001B	49
L	Air Handling Units AHU-L-1301	51
	Exhaust Fans EF-L-1301,1401,1501	51
	Air Handling Units AHU-L-1302	53
	Exhaust Fans EF-L-1302,1402,1502	53
	Air Handling Units AHU-L-1701	55
	Exhaust Fans	55

Print date:
12/12/2019

WARNING! This document is uncontrolled when printed.

Page 3 of 65

Verify current revisions using the Alexandria Renew Enterprises OHSMS web site.



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 12/2019			

OHSMS-2.3.A1 Procedures for Equipment Requiring Specific LOTO Procedures

Building	Equipment	Page
	EF-L-1701	
	Air Handling Units AHU-L-1901	57
	Exhaust Fans EF-L-1901	57
	Air Handling Units AHU-L-2301	59
	Exhaust Fans EF-L-2301	59
	Air Handling Units AHU-L-2801,2802	61
	Exhaust Fans EF-L-2801,2802	61
N	UV Influent Sluice Gates G37-1301, G37-1302	63
	Channel Sluice Gates G38-1501, G38-1502, G38-1503, G38-1504, G38-1505, G38-1506	63
	Ultraviolet Channels Channels 3 and 4 Electrical Panels	65

CAUTION

THIS EQUIPMENT IS POWERED BY MORE THAN ONE POWER SOURCE

LOCKOUT INSTRUCTIONS

AUTOMATIC TRANSFER SWITCHS

- 1) Notify all affected employees of the impending lockout.
- 2) Shut down equipment using normal procedures
- 3) Disconnect the unit at both motor control centers in this electrical room
- 4) Lockout the unit at both motor control centers in this electrical room



- 5) Check for voltage at Panel's main lugs.

-
- 6) Upon completion of the work:
 - A. Be sure the equipment is reassembled properly to include all covers.
 - B. Be sure all tools are stored properly
 - C. Notify all affected employees that the lockout is to be removed and the equipment is to be started.
 - 7) Unlock the equipment using the reverse sequence

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT

LOCKOUT INSTRUCTIONS

Building 20

Air Handling Units

AHU-20-1001

Exhaust Fans

EF-20-1001

TOOLS NEEDED:

- 2 Lockout Locks.
- 2 Lockout Tags.
- 2 Lockout Hasps.

CAUTION – ALL FANS MUST BE LOCKED OUT TO ACHIEVE A ZERO ENERGY STATE

SAFETY:

- Equipment Names: Air Handling Units, Exhaust Fans.
- Equipment Tag: AHU-20-1001 and EF-20-1001
- Perform LOTO at: MCC-20-1A in electrical room 20-101.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper Arc Flash PPE while opening or closing breakers.

LOTO PROCEDURE:

- 1) Notify all affected employees of the impending lockout.
- 2) Ensure fire alarm system has been called out of service.
- 3) Shut down all fans listed above using normal procedures.
- 4) Don Arc Flash PPE.
- 5) Set up Arc Flash protection boundary per the Arc Flash labels.
- 6) Disconnect both fans listed above at MCC-20-1A in electrical room 20-101.
- 7) Lockout and tagout both fans listed above at MCC-20-1A in electrical room 20-101.
- 8) Attempt to start all units at both the HCP and the remote station at the unit.
- 9) Return all start stations to the off position.



10) Upon completion of the work:

- A. Be sure all fans are reassembled properly to include all safety covers.
- B. Be sure all tools are stored properly.
- C. Notify all affected employees that the lockouts are to be removed and the equipment is to be started.

11) Unlock all fans using the reverse sequence.

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT

LOCKOUT INSTRUCTIONS

Building 20

Air Handling Units

AHU-20-1002

Exhaust Fans

EF-20-1002

TOOLS NEEDED:

- 2 Lockout Locks.
- 2 Lockout Tags.
- 2 Lockout Hasps.

CAUTION – ALL FANS MUST BE LOCKED OUT TO ACHIEVE A ZERO ENERGY STATE

SAFETY:

- Equipment Names: Air Handling Units, Exhaust Fans.
- Equipment Tag: AHU-20-1002 and EF-20-1002
- Perform LOTO at: MCC-20-1B in electrical room 20-101.
- Multiple Lock Out Points? YES
- Observe all safety rules. Use Proper Arc Flash PPE while opening or closing breakers.

LOTO PROCEDURE:

- 1) Notify all affected employees of the impending lockout.
- 2) Ensure fire alarm system has been called out of service.
- 3) Shut down all fans listed above using normal procedures.
- 4) Don Arc Flash PPE.
- 5) Set up Arc Flash protection boundary per the Arc Flash labels.
- 6) Disconnect both fans listed above at MCC-20-1B in electrical room 20-101.
- 7) Lockout and tagout both fans listed above at MCC-20-1B in electrical room 20-101.



- 8) **Attempt to start all units at both the HCP and the remote station at the unit.**
- 9) Return all start stations to the off position.

10) Upon completion of the work:

- A. Be sure all fans are reassembled properly to include all safety covers.
- B. Be sure all tools are stored properly.
- C. Notify all affected employees that the lockouts are to be removed and the equipment is to be started.

11) Unlock all fans using the reverse sequence.

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT LOCKOUT INSTRUCTIONS

Building 20

Air Handling Units

AHU-20-1101

Exhaust Fans

EF-20-1101

TOOLS NEEDED:

- 2 Lockout Locks.
- 2 Lockout Tags.
- 2 Lockout Hasps.

CAUTION – ALL FANS MUST BE LOCKED OUT TO ACHIEVE A ZERO ENERGY STATE

SAFETY:

- Equipment Names: Air Handling Units, Exhaust Fans.
- Equipment Tag: AHU-20-1101 and EF-20-1101
- Perform LOTO at: MCC-20-1A in electrical room 20-101.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper Arc Flash PPE while opening or closing breakers.

LOTO PROCEDURE:

- 1) Notify all affected employees of the impending lockout.
- 2) Ensure fire alarm system has been called out of service.
- 3) Shut down all fans listed above using normal procedures.
- 4) Don Arc Flash PPE.
- 5) Set up Arc Flash protection boundary per the Arc Flash labels.
- 6) Disconnect both fans listed above at MCC-20-1A in electrical room 20-101.
- 7) Lockout and tagout both fans listed above at MCC-20-1A in electrical room 20-101.
- 8) Attempt to start all units at both the HCP and the remote station at the unit.
- 9) Return all start stations to the off position.



- 10) Upon completion of the work:
 - A. Be sure all fans are reassembled properly to include all safety covers.
 - B. Be sure all tools are stored properly.
 - C. Notify all affected employees that the lockouts are to be removed and the equipment is to be started.
- 11) Unlock all fans using the reverse sequence.

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT LOCKOUT INSTRUCTIONS

Building 20

Air Handling Units

AHU-20-1102

Exhaust Fans

EF-20-1102

TOOLS NEEDED:

- 2 Lockout Locks.
- 2 Lockout Tags.
- 2 Lockout Hasps.

CAUTION – ALL FANS MUST BE LOCKED OUT TO ACHIEVE A ZERO ENERGY STATE

SAFETY:

- Equipment Names: Air Handling Units, Exhaust Fans.
- Equipment Tag: AHU-20-1102 and EF-20-1102
- Perform LOTO at: MCC-20-1B in electrical room 20-101.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper Arc Flash PPE while opening or closing breakers.

LOTO PROCEDURE:

- 1) Notify all affected employees of the impending lockout.
- 2) Ensure fire alarm system has been called out of service.
- 3) Shut down all fans listed above using normal procedures.
- 4) Don Arc Flash PPE.
- 5) Set up Arc Flash protection boundary per the Arc Flash labels.
- 6) Disconnect both fans listed above at MCC-20-1B in electrical room 20-101.
- 7) Lockout and tagout both fans listed above at MCC-20-1B in electrical room 20-101.
- 8) Attempt to start all units at both the HCP and the remote station at the unit.
- 9) Return all start stations to the off position.



10) Upon completion of the work:

- A. Be sure all fans are reassembled properly to include all safety covers.
- B. Be sure all tools are stored properly.
- C. Notify all affected employees that the lockouts are to be removed and the equipment is to be started.

11) Unlock all fans using the reverse sequence.

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT LOCKOUT INSTRUCTIONS

Building 20

Air Handling Units

AHU-20-1201

Exhaust Fans

EF-20-1201

TOOLS NEEDED:

- 2 Lockout Locks.
- 2 Lockout Tags.
- 2 Lockout Hasps.

CAUTION – ALL FANS MUST BE LOCKED OUT TO ACHIEVE A ZERO ENERGY STATE

SAFETY:

- Equipment Names: Air Handling Units, Exhaust Fans.
- Equipment Tag: AHU-20-1201 and EF-20-1201
- Perform LOTO at: MCC-20-1A in electrical room 20-101.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper Arc Flash PPE while opening or closing breakers.

LOTO PROCEDURE:

- 1) Notify all affected employees of the impending lockout.
- 2) Ensure fire alarm system has been called out of service.
- 3) Shut down all fans listed above using normal procedures.
- 4) Don Arc Flash PPE.
- 5) Set up Arc Flash protection boundary per the Arc Flash labels.
- 6) Disconnect both fans listed above at MCC-20-1A in electrical room 20-101.
- 7) Lockout and tagout both fans listed above at MCC-20-1A in electrical room 20-101.
- 8) Attempt to start all units at both the HCP and the remote station at the unit.
- 9) Return all start stations to the off position.



10) Upon completion of the work:

- A. Be sure all fans are reassembled properly to include all safety covers.
- B. Be sure all tools are stored properly.
- C. Notify all affected employees that the lockouts are to be removed and the equipment is to be started.

11) Unlock all fans using the reverse sequence.

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT LOCKOUT INSTRUCTIONS

Building 20

Air Handling Units

AHU-20-1701

Exhaust Fans

EF-20-1701

TOOLS NEEDED:

- 2 Lockout Locks.
- 2 Lockout Tags.
- 2 Lockout Hasps.

CAUTION – ALL FANS MUST BE LOCKED OUT TO ACHIEVE A ZERO ENERGY STATE

SAFETY:

- Equipment Names: Air Handling Units, Exhaust Fans.
- Equipment Tag: AHU-20-1701 and EF-20-1701
- Perform LOTO at: MCC-20-2B in electrical room 20-104.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper Arc Flash PPE while opening or closing breakers.

LOTO PROCEDURE:

- 1) Notify all affected employees of the impending lockout.
- 2) Ensure fire alarm system has been called out of service.
- 3) Shut down all fans listed above using normal procedures.
- 4) Don Arc Flash PPE.
- 5) Set up Arc Flash protection boundary per the Arc Flash labels.
- 6) Disconnect both fans listed above at MCC-20-2B in electrical room 20-104.
- 7) Lockout and tagout both fans listed above at MCC-20-2B in electrical room 20-104.
- 8) Attempt to start all units at both the HCP and the remote station at the unit.
- 9) Return all start stations to the off position.



10) Upon completion of the work:

- A. Be sure all fans are reassembled properly to include all safety covers.
- B. Be sure all tools are stored properly.
- C. Notify all affected employees that the lockouts are to be removed and the equipment is to be started.

11) Unlock all fans using the reverse sequence.

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT LOCKOUT INSTRUCTIONS

Building 20

Air Handling Units

AHU-20-1702

Exhaust Fans

EF-20-1702

TOOLS NEEDED:

- 2 Lockout Locks.
- 2 Lockout Tags.
- 2 Lockout Hasps.

CAUTION – ALL FANS MUST BE LOCKED OUT TO ACHIEVE A ZERO ENERGY STATE

SAFETY:

- Equipment Names: Air Handling Units, Exhaust Fans.
- Equipment Tag: AHU-20-1702 and EF-20-1702
- Perform LOTO at: MCC-20-2A in electrical room 20-104.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper Arc Flash PPE while opening or closing breakers.

LOTO PROCEDURE:

- 1) Notify all affected employees of the impending lockout.
- 2) Ensure fire alarm system has been called out of service.
- 3) Shut down all fans listed above using normal procedures.
- 4) Don Arc Flash PPE.
- 5) Set up Arc Flash protection boundary per the Arc Flash labels.
- 6) Disconnect both fans listed above at MCC-20-2A in electrical room 20-104.
- 7) Lockout and tagout both fans listed above at MCC-20-2A in electrical room 20-104.
- 8) Attempt to start all units at both the HCP and the remote station at the unit.
- 9) Return all start stations to the off position.



10) Upon completion of the work:

- A. Be sure all fans are reassembled properly to include all safety covers.
- B. Be sure all tools are stored properly.
- C. Notify all affected employees that the lockouts are to be removed and the equipment is to be started.

11) Unlock all fans using the reverse sequence.

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT LOCKOUT INSTRUCTIONS

Building 20

Air Handling Units

AHU-20-1801

Exhaust Fans

EF-20-1801

TOOLS NEEDED:

- 2 Lockout Locks.
- 2 Lockout Tags.
- 2 Lockout Hasps.

CAUTION – ALL FANS MUST BE LOCKED OUT TO ACHIEVE A ZERO ENERGY STATE

SAFETY:

- Equipment Names: Air Handling Units, Exhaust Fans.
- Equipment Tag AHU-20-1801 and EF-20-1801
- Perform LOTO at: MCC-20-2B in electrical room 20-104.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper Arc Flash PPE while opening or closing breakers.

LOTO PROCEDURE:

- 1) Notify all affected employees of the impending lockout.
- 2) Ensure fire alarm system has been called out of service.
- 3) Shut down all fans listed above using normal procedures.
- 4) Don Arc Flash PPE.
- 5) Set up Arc Flash protection boundary per the Arc Flash labels.
- 6) Disconnect both fans listed above at MCC-20-2B in electrical room 20-104.
- 7) Lockout and tagout both fans listed above at MCC-20-2B in electrical room 20-104.
- 8) Attempt to start all units at both the HCP and the remote station at the unit.
- 9) Return all start stations to the off position.



10) Upon completion of the work:

- A. Be sure all fans are reassembled properly to include all safety covers.
- B. Be sure all tools are stored properly.
- C. Notify all affected employees that the lockouts are to be removed and the equipment is to be started.

11) Unlock all fans using the reverse sequence.

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT LOCKOUT INSTRUCTIONS

Building 20

Air Handling Units AHU-20-1802

Exhaust Fans EF-20-1802

TOOLS NEEDED:

- 2 Lockout Locks.
- 2 Lockout Tags.
- 2 Lockout Hasps.

CAUTION – ALL FANS MUST BE LOCKED OUT TO ACHIEVE A ZERO ENERGY STATE

SAFETY:

- Equipment Names: Air Handling Units, Exhaust Fans.
- Equipment Tag: AHU-20-1802 and EF-20-1802
- Perform LOTO at: MCC-20-2A in electrical room 20-104.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper Arc Flash PPE while opening or closing breakers.

LOTO PROCEDURE:

- 1) Notify all affected employees of the impending lockout.
- 2) Ensure fire alarm system has been called out of service.
- 3) Shut down all fans listed above using normal procedures.
- 4) Don Arc Flash PPE.
- 5) Set up Arc Flash protection boundary per the Arc Flash labels.
- 6) Disconnect both fans listed above at MCC-20-2A in electrical room 20-104.
- 7) Lockout and tagout both fans listed above at MCC-20-2A in electrical room 20-104.
- 8) Attempt to start all units at both the HCP and the remote station at the unit.
- 9) Return all start stations to the off position.



10) Upon completion of the work:

- A. Be sure all fans are reassembled properly to include all safety covers.
- B. Be sure all tools are stored properly.
- C. Notify all affected employees that the lockouts are to be removed and the equipment is to be started.

11) Unlock all fans using the reverse sequence.

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT LOCKOUT INSTRUCTIONS

Building 55

Air Handling Units
AHU-55-1001, 1002

Exhaust Fans
EF-55-1101, 1102, 1103 and 1104

TOOLS NEEDED:

- 6 Lockout Locks.
- 6 Lockout Tags.
- 6 Lockout Hasps.

CAUTION – ALL FANS MUST BE LOCKED OUT TO ACHIEVE A ZERO ENERGY STATE

SAFETY:

- Equipment Names: Air Handling Units, and Exhaust Fans.
- Equipment Tag: AHU-55-1001, and 1002
EF-55-1101, 1102, 1103, and 1104
- Perform LOTO at: MCC-55-1A, 1B and MCC-55-1C in electrical room 55-103.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper Arc Flash PPE while opening or closing breakers.

LOTO PROCEDURE:

- 1) Notify all affected employees of the impending lockout.
- 2) Ensure fire alarm system has been called out of service.
- 3) Shut down all fans listed above using normal procedures.
- 4) Don Arc Flash PPE.
- 5) Set up Arc Flash protection boundary per the Arc Flash labels.
- 6) Disconnect all fans at MCC-55-1A, 1B and MCC-55-1C in electrical room 55-103.
- 7) Use team locks to lockout all 6 fans at MCC-55-1A, 1B and MCC-55-1C in electrical room 55-103. Then place each affected employee's lockout/tagout lock, hasp and lockout tag on the Team Lockout Box per AlexRenew's Control of Hazardous Energy (Lockout/tagout Program).



- 8) Attempt to start all units at both the HCP and the remote station at unit.
- 9) Return all start stations to the off position.

10) Upon completion of the work:

- A. Be sure all fans are reassembled properly to include all safety covers.
- B. Be sure all tools are stored properly.
- C. Notify all affected employees that the lockouts are to be removed and the equipment is to be started.

11) Unlock all fans using the reverse sequence.

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT

LOCKOUT INSTRUCTIONS

BUILDING A

Boiler # 1

TOOLS NEEDED:

6 Lock out locks
6 Lock out Tags
6 Lock out Hasps

SAFETY:

- Equipment Name: Boiler 200 hp
- Equipment Tag: M74-1101
- Perform LOTO at: Main MCC in Room A-106.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper PPE

LOTO PROCEDURE:

- 1) Notify all affected employees of the impending lockout.
- 2) Shut down equipment using normal procedures
- 3) Disconnect the unit at MCC-A-1A in electrical room (A-106)
- 4) Lockout the unit at MCC-A-1A in electrical room (A-106)
- 5) Close and lock out the natural gas valve (orange valve) under the boiler water feed line on the right side of the boiler.
- 6) Close and lock out the digester gas valve (yellow valve) on the left side to the rear of the boiler.
- 7) Close two steam valves: one on top of the boiler and one chain valve in front of the boiler.
- 8) Close and lockout the boiler feed water line on the right side of the Field Panel FP – 11-1101
- 9) Attempt to start the unit.



- 10) Upon completion of the work:
 - A. Be sure the equipment is reassembled properly to include all piping and covers or doors.
 - B. Be sure all tools are stored properly
 - C. Notify all affected employees that the lockout is to be removed and the equipment is to be started.
- 11) Unlock the equipment using the reverse sequence

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT

LOCKOUT INSTRUCTIONS

BUILDING A

Boiler # 2


TOOLS NEEDED:

6 Lock out locks
6 Lock out Tags
6 Lock out Hasps

SAFETY:

- Equipment Name: Boiler 200 hp
- Equipment Tag: M74-1102
- Perform LOTO at: Main MCC in Room A-106.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper PPE

LOTO PROCEDURE:

- 1) Notify all affected employees of the impending lockout.
- 2) Shut down equipment using normal procedures
- 3) Disconnect the unit at MCC-A-1B in electrical room (A-106)
- 4) Lockout the unit at MCC-A-1B in electrical room (A-106)
- 5) Close and lock out the natural gas valve (orange valve) under the boiler water feed line on the left side of the boiler.
- 6) Close and lock out the digester gas valve (yellow valve) on the right side and to the rear of the boiler.
-  7) Close two steam valves: one on top of the boiler and one chain valve in front of the boiler.
- 8) Close and lockout the boiler feed water line on the left side of the Field Panel FP-11-1102
- 9) Attempt to start the unit.
- 10) Upon completion of the work:
 - A. Be sure the equipment is reassembled properly to include all piping and covers or doors.
 - B. Be sure all tools are stored properly
 - C. Notify all affected employees that the lockout is to be removed and the equipment is to be started.
- 11) Unlock the equipment using the reverse sequence

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT

LOCKOUT INSTRUCTIONS

Building C

Air Handling Unit
AHU-C-100

Exhaust Fan
EF-C-100

TOOLS NEEDED:

- 2 Lockout Locks.
- 2 Lockout Tags.
- 2 Lockout Hasps.

CAUTION – ALL FANS MUST BE LOCKED OUT TO ACHIEVE A ZERO ENERGY STATE

SAFETY:

- Equipment Names: Air Handling Units, Exhaust Fans.
- Equipment Tag: AHU-C-100 and EF-C-100
- Perform LOTO at: MCC-MT-1 in electrical room C-108.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper Arc Flash PPE while opening or closing breakers.

LOTO PROCEDURES:

- 1) Notify all affected employees of the impending lockout.
- 2) Ensure fire alarm system has been called out of service.
- 3) Shut down all fans listed above using normal procedures.
- 4) Don Arc Flash PPE.
- 5) Set up Arc Flash protection boundary per the Arc Flash labels.
- 6) Disconnect both fans at MCC-MT-1 listed above in electrical room C-108.
- 7) Lockout and tagout both fans listed above at MCC-MT-1 in electrical room C-108.
- 8) Attempt to start all units at both the HCP and the remote station at the unit.
- 9) Return all start stations to the off position.



10) Upon completion of the work:

- A. Be sure all fans are reassembled properly to include all safety covers.
- B. Be sure all tools are stored properly.
- C. Notify all affected employees that the lockouts are to be removed and the equipment is to be started.

11) Unlock all fans using the reverse sequence.

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT

LOCKOUT INSTRUCTIONS

Building C

Air Handling Units

AHU-C-200

Exhaust Fans

EF-C-200

TOOLS NEEDED:

- 2 Lockout locks.
- 2 Lockout Tags.
- 2 Lockout Hasps.

CAUTION – ALL FANS MUST BE LOCKED OUT TO ACHIEVE A ZERO ENERGY STATE

SAFETY:

- Equipment Names: Air Handling Units, Exhaust Fans.
- Equipment Tag: AHU-C-200 and EF-C-200
- Perform LOTO at: MCC-MT-1 in electrical room C-108.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper Arc Flash PPE while opening or closing breakers.

LOTO PROCEDURE:

- 1) Notify all affected employees of the impending lockout.
- 2) Ensure fire alarm system has been called out of service.
- 3) Shut down all fans listed above using normal procedures.
- 4) Don Arc Flash PPE.
- 5) Set up Arc Flash protection boundary per the Arc Flash labels.
- 6) Disconnect both fans at MCC-MT-1 listed above in electrical room C-108.
- 7) Lockout and tagout both fans listed above at MCC-MT-1 in electrical room C-108.
- 8) Attempt to start all units at both the HCP and the remote station at the unit
- 9) Return all start stations to the off position.



10) Upon completion of the work:

- A. Be sure all fans are reassembled properly to include all safety covers.
- B. Be sure all tools are stored properly.
- C. Notify all affected employees that the lockouts are to be removed and the equipment is to be started.

11) Unlock all fans using the reverse sequence.

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT

LOCKOUT INSTRUCTIONS

Building C

Boiler # 1


TOOLS NEEDED:

6 Lockout Locks
6 Lockout Tags
6 Lockout Hasps

SAFETY:

- Equipment Name: Building C Boiler 1
- Equipment Tag:
- Perform LOTO at: Main MCC in Room A-106.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper PPE

LOTO PROCEDURE:

- 1) Notify all affected employees of the impending lockout.
- 2) Shut down equipment using normal procedures
- 3) Disconnect the unit at the disconnect to the right of the boiler next to the exhaust stack.
- 4) Lockout the unit at the disconnect to the right of the boiler next to the exhaust stack.
- 5) Close and lock out two natural gas valve (orange valve) on the left side and towards the rear of the boiler.
- 6) Close and lockout the steam valve with the chain valve between the two boilers
-  7) Close and lockout the boiler feed water line with two valves on the loop on the right side of the boiler.
- 8) Attempt to start the unit.
- 9) Upon completion of the work:
 - A. Be sure the equipment is reassembled properly to include all piping and covers or doors.
 - B. Be sure all tools are stored properly
 - C. Notify all affected employees that the lockout is to be removed and the equipment is to be started.
- 10) Unlock the equipment using the reverse sequence

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT

LOCKOUT INSTRUCTIONS

Building C

Boiler # 2


TOOLS NEEDED:

6 Lockout Locks
6 Lockout Tags
6 Lockout Hasps

SAFETY:

- Equipment Name: Boiler 300 hp
- Equipment Tag
- Perform LOTO at: Disconnect in the Boiler Room.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper PPE

LOTO PROCEDURES:

- 1) Notify all affected employees of the impending lockout.
- 2) Shut down equipment using normal procedures
- 3) Disconnect the unit at the disconnect on the wall to the right of the boiler.
- 4) Lockout the unit at the disconnect on the wall to the right of the boiler.
- 5) Close and lock out the two natural gas valve (orange valve) on the left side and towards the rear of the boiler.
- 6) Close and lockout the steam valve with the chain valve between the two boilers
-  7) Close and lockout 2 valves for the boiler feed water lines on the loop on the right side of the boiler
- 8) Attempt to start the unit.
- 9) Upon completion of the work:
 - A. Be sure the equipment is reassembled properly to include all piping and covers or doors.
 - B. Be sure all tools are stored properly
 - C. Notify all affected employees that the lockout is to be removed and the equipment is to be started.
- 10) Unlock the equipment using the reverse sequence

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT

LOCKOUT INSTRUCTIONS

Building F

Boiler # 1

TOOLS NEEDED:

- 4 Lock out locks
- 4 Lock out Tags
- 4 Lock out Hasps

SAFETY:

- Equipment Name:
- Equipment Tag
- Perform LOTO at: Main MCC in Room 28.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper PPE

LOTO PROCEDURE:

- 1) Notify all affected employees of the impending lockout.
- 2) Shut down equipment using normal procedures
- 3) Disconnect the unit at MC -2 on the right side of MCC in electrical room F-104
- 4) Lockout the unit at MC -2 on the right side of MCC in electrical room F-104
- 5) Close and lock out two natural gas valves (orange valves) on the left side the rear of the boiler.
- 6) Close two steam valves with the chain valves above the boiler



- 7) Close and lockout two valves for the boiler feed water lines on the loop on the left side and above the boiler
- 8) Attempt to start the unit.
- 9) Upon completion of the work:
 - A. Be sure the equipment is reassembled properly to include all piping and covers or doors.
 - B. Be sure all tools are stored properly
 - C. Notify all affected employees that the lockout is to be removed and the equipment is to be started.
- 10) Unlock the equipment using the reverse sequence

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT

LOCKOUT INSTRUCTIONS

Building F

Boiler # 2

TOOLS NEEDED:

- 4 Lockout Locks
- 4 Lockout Tags
- 4 Lockout Hasps

SAFETY:

- Equipment Name:
- Equipment Tag
- Perform LOTO at: Main MCC in Room 28.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper PPE

LOTO PROCEDURE:

- 1) Notify all affected employees of the impending lockout.
- 2) Shut down equipment using normal procedures
- 3) Disconnect the unit MC-2 Buss # 2 left side of the MCC in electrical room F-104
- 4) Lockout the unit MC-2 Buss # 2 left side of the MCC in electrical room F-104
- 5) Close and lock out two natural gas valves (orange valves) on the left side, towards the rear of the boiler.
- 6) Close the steam valve with the chain valve above the boiler



- 7) Close and lockout two valves for the boiler feed water lines on the loop on the right side and above the boiler
- 8) Attempt to start the unit.
- 9) Upon completion of the work:
 - A. Be sure the equipment is reassembled properly to include all piping and covers or doors.
 - B. Be sure all tools are stored properly
 - C. Notify all affected employees that the lockout is to be removed and the equipment is to be started.
- 10) Unlock the equipment using the reverse sequence

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT

LOCKOUT INSTRUCTIONS

Building F

Post Aeration Blower #3

TOOLS NEEDED:

2 Lockout Locks
2 Lockout Tags
2 Lockout Hasps

DRAWING INFORMATION:

- Contract # 1
- Sheet # 205

SAFETY:

- Equipment Name: POST AERATION BLOWER #3
- Equipment Tag: # B38-1003
- Perform LOTO at: Main MCC in Room F-104.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper PPE

LOTO PROCEDURE:

- 1) Notify all affected employees of the impending lockout.
- 2) Shut down equipment using normal procedures
- 3) Disconnect the unit at MCC-F-1A and MCC-F-1B electrical room (F-104)
- 4) Lockout the unit at MCC-F-1A and MCC-F-1B in elec. room (F-104)
- 5) When the (blower or piping) is to be opened, close and lockout/tagout both the inlet and discharge valves.



- 6) Attempt to start the unit at both the PLC and the remote station at the unit
- 7) Return both start stations to the off position.
- 8) Upon completion of the work:
 - A. Be sure the equipment is reassembled properly to include all covers.
 - B. Be sure all tools are stored properly
 - C. Notify all affected employees that the lockout is to be removed and the equipment is to be started.
- 9) Unlock the equipment using the reverse sequence

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT

LOCKOUT INSTRUCTIONS

Building F

W3 Pump #3

TOOLS NEEDED:

2 Lockout Locks
2 Lockout Tags
2 Lockout Hasps

DRAWING INFORMATION:

- Contract # 1
- Sheet # 205

SAFETY:

- Equipment Name: W3 PUMP #3
- Equipment Tag: # P55-1003
- Perform LOTO at: Main MCC in Room F-104.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper PPE

LOTO PROCEDURES:

- 1) Notify all affected employees of the impending lockout.
- 2) Shut down equipment using normal procedures
- 3) Disconnect the unit at MCC-F-1A and MCC-F-1B electrical room (F-104)
- 4) Lockout the unit at MCC-F-1A and MCC-F-1B in elec. room (F-104)
- 5) When the (pump or piping) is to be opened close and lockout/tagout both the inlet and discharge valves.



- 6) Attempt to start the unit at both the PLC and the remote station at the unit
- 7) Return both start stations to the off position.
- 8) Upon completion of the work:
 - A. Be sure the equipment is reassembled properly to include all covers.
 - B. Be sure all tools are stored properly
 - C. Notify all affected employees that the lockout is to be removed and the equipment is to be started.
- 9) Unlock the equipment using the reverse sequence

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT

LOCKOUT INSTRUCTIONS

Building G1

Air Handling Units

AHU-G1-2001

Return Fans

RF-G1-2001

TOOLS NEEDED:

- 2 Lockout Locks.
- 2 Lockout Tags.
- 2 Lockout Hasps.

CAUTION – ALL FANS MUST BE LOCKED OUT TO ACHIEVE A ZERO ENERGY STATE

SAFETY:

- Equipment Names: Air Handling Units, Return Fans.
- Equipment Tag: AHU-G1-2001, and RF-G1-2001
- Perform LOTO at: MCC-G1-1A and 1B in electrical room G1-B10.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper Arc Flash PPE while opening or closing breakers.

LOTO PROCEDURE:

- 1) Notify all affected employees of the impending lockout.
- 2) Ensure fire alarm system has been called out of service.
- 3) Shut down all fans listed above using normal procedures.
- 4) Don Arc Flash PPE.
- 5) Set up Arc Flash protection boundary per the Arc Flash labels.
- 6) Disconnect all both fans at MCC-G1-1A and 1B listed above in electrical room G1-B10.
- 7) Lockout and tagout both fans listed above at MCC-G1-1A and 1B in electrical room G1-B10.
- 8) Attempt to start all units at both the HCP and the remote station at the unit.
- 9) Return all start stations to the off position.



10) Upon completion of the work:

- A. Be sure all fans are reassembled properly to include all safety covers.
- B. Be sure all tools are stored properly.
- C. Notify all affected employees that the lockouts are to be removed and the equipment is to be started.

11) Unlock all fans using the reverse sequence.

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT

LOCKOUT INSTRUCTIONS

Building G1

Air Handling Units

AHU-G1-6001

Return Fans

RF-G1-6001

TOOLS NEEDED:

- 2 Lockout Locks.
- 2 Lockout Tags.
- 2 Lockout Hasps.

CAUTION – ALL FANS MUST BE LOCKED OUT TO ACHIEVE A ZERO ENERGY STATE

SAFETY:

- Equipment Names: Air Handling Units, Return Fans.
- Equipment Tag: AHU-G1-6001, and RF-G1-6001
- Perform LOTO at: MCC-G1-1A in electrical room G1-B10.
- Multiple Lock Out Points: YES
- Special Considerations: Use Proper Arc Flash PPE while opening or closing breakers.

LOTO PROCEDURES:

- 1) Notify all affected employees of the impending lockout.
- 2) Ensure fire alarm system has been called out of service.
- 3) Shut down all fans listed above using normal procedures.
- 4) Don Arc Flash PPE.
- 5) Set up Arc Flash protection boundary per the Arc Flash labels.
- 6) Disconnect both fans at MCC-G1-1A listed above in electrical room G1-B10.
- 7) Lockout and tagout both fans listed above at MCC-G1-1A in electrical room G1-B10.



- 8) Attempt to start all units at both the HCP and the remote station at the unit.
- 9) Return both start stations to the off position.

10) Upon completion of the work:

- A. Be sure all fans are reassembled properly to include all safety covers.
- B. Be sure all tools are stored properly.
- C. Notify all affected employees that the lockouts are to be removed and the equipment is to be started.

11) Unlock all fans using the reverse sequence.

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT

LOCKOUT INSTRUCTIONS

Building G

Boiler # 1

TOOLS NEEDED:

4 Lockout Locks
4 Lockout Tags
4 Lockout Hasps

SAFETY:

- Equipment Name: Boiler #1
- Equipment Tag:
- Perform LOTO at: Main MCC in Room 28.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper PPE

LOTO PROCEDURE:

- 1) Notify all affected employees of the impending lockout.
- 2) Shut down equipment using normal procedures
- 3) Disconnect the unit the MCC in room 28
- 4) Lockout the unit at MCC in room 28
- 5) Close and lock out two natural gas valves (2 orange valves) on the left side of the boiler.
- 6) Close the steam valve: one chain valve in front of and above the boiler.



- 7) Close and lockout the boiler feed water line on the right side the boiler.
- 8) Attempt to start the unit.
- 9) Upon completion of the work:
 - A. Be sure the equipment is reassembled properly to include all piping and covers or doors.
 - B. Be sure all tools are stored properly
 - C. Notify all affected employees that the lockout is to be removed and the equipment is to be started.
- 10) Unlock the equipment using the reverse sequence

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT

LOCKOUT INSTRUCTIONS

Building G

Boiler # 2


TOOLS NEEDED:

- 4 Lockout Locks
- 4 Lockout Tags
- 4 Lockout Hasps

SAFETY:

- Equipment Name: Boiler 200 hp
- Equipment Tag
- Perform LOTO at: MCC in Room 28.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper PPE

LOTO PROCEDURES:

- 1) Notify all affected employees of the impending lockout.
- 2) Shut down equipment using normal procedures
- 3) Disconnect the unit at MCC in room 28
- 4) Lockout the unit at MCC in room 28
- 5) Close and lock two natural gas valves (2 orange valves) on the left side of the boiler.
- 6) Close the steam valve: one chain valve in front of/ to the left of and above the boiler.
-  7) Close and lockout the boiler feed water line on the right side of the boiler.
- 8) Attempt to start the unit.
- 9) Upon completion of the work:
 - A. Be sure the equipment is reassembled properly to include all piping and covers or doors.
 - B. Be sure all tools are stored properly
 - C. Notify all affected employees that the lockout is to be removed and the equipment is to be started.
- 10) Unlock the equipment using the reverse sequence

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT

LOCKOUT INSTRUCTIONS

Building J

Air Handling Units

AHU-J-2001

Return Fans

RF-J-2001

TOOLS NEEDED:

- 2 Lockout Locks.
- 2 Lockout Tags.
- 2 Lockout Hasps.

CAUTION – ALL FANS MUST BE LOCKED OUT TO ACHIEVE A ZERO ENERGY STATE

SAFETY:

- Equipment Names: Air Handling Units, Return Fans.
- Equipment Tag: AHU-J-2001, and RF-J-2001
- Perform LOTO at: MCC-J-4C in electrical room J-B07.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper Arc Flash PPE while opening or closing breakers.

LOTO PROCEDURE:

- 1) Notify all affected employees of the impending lockout.
- 2) Ensure fire alarm system has been called out of service.
- 3) Shut down all fans listed above using normal procedures.
- 4) Don Arc Flash PPE.
- 5) Set up Arc Flash protection boundary per the Arc Flash labels.
- 6) Disconnect both fans listed above at MCC-J-4C in electrical room J-B07.
- 7) Lockout and tagout both fans listed above at MCC-J-4C in electrical room J-B07.



- 8) Attempt to start all units at both the HCP and the remote station at the unit.
- 9) Return all start stations to the off position.
- 10) Upon completion of the work:
 - A. Be sure all fans are reassembled properly to include all safety covers.

- B. Be sure all tools are stored properly.
 - C. Notify all affected employees that the lockouts are to be removed and the equipment is to be started.
- 11) Unlock all fans using the reverse sequence.

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT LOCKOUT INSTRUCTIONS

Building J

Chiller #1

TOOLS NEEDED:

- 2 Lockout Locks
- 2 Lockout Tags
- 2 Lockout Hasps

SAFETY:

- Equipment Name CHILLER #1
- Equipment Tag: # Ch-J-1001
- Perform LOTO at: Main MCC in J Building HVAC ROOM.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper PPE

LOTO PROCEDURE:

- 1) Notify all affected employees of the impending lockout.
- 2) Shut down equipment using normal procedures
- 3) Disconnect the unit at SWBD-J-1A and SWBD-J-1B in (HVAC EQUIPMENT ROOM)
- 4) Lockout the unit at SWBD-J-1A and SWBD-J-1B in (HVAC EQUIPMENT ROOM)
- 5) When the (compressor or piping) is to be opened, close and lockout/tag out both the inlet and discharge valves.



- 6) Attempt to start the unit at both the HVAC CONTROL PANEL and the remote station at the unit
- 7) Return both start stations to the off position.
- 8) Upon completion of the work:
 - A. Be sure the equipment is reassembled properly to include all covers.
 - B. Be sure all tools are stored properly
 - C. Notify all affected employees that the lockout is to be removed and the equipment is to be started.
- 9) Unlock the equipment using the reverse sequence

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT

LOCKOUT INSTRUCTIONS

Building J

Exhaust Fan

EF-J-1002, 1003

TOOLS NEEDED:

- 2 Lockout Locks.
- 2 Lockout Tags.
- 2 Lockout Hasps.

CAUTION – ALL FANS MUST BE LOCKED OUT TO ACHIEVE A ZERO ENERGY STATE

SAFETY:

- Equipment Names: Exhaust Fans
- Equipment Tag: Exhaust Fan, EF-J-1002,1003
- Perform LOTO at: MCC-J-4C in electrical room J-B07.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper Arc Flash PPE while opening or closing breakers.

LOTO PROCEDURE:

- 1) Notify all affected employees of the impending lockout.
- 2) Ensure fire alarm system has been called out of service.
- 3) Shut down all fans listed above using normal procedures.
- 4) Don Arc Flash PPE.
- 5) Set up Arc Flash protection boundary per the Arc Flash labels.
- 6) Disconnect both fans listed above at MCC-J-4C in electrical room J-B07.
- 7) Lockout and tagout both fans listed above at MCC-J-4C in electrical room J-B07.



- 8) Attempt to start all units at both the HCP and the remote station at the unit.
- 9) Return all start stations to the off position.

10) Upon completion of the work:

- A. Be sure all fans are reassembled properly to include all safety covers.
- B. Be sure all tools are stored properly.
- C. Notify all affected employees that the lockouts are to be removed and the equipment is to be started.

11) Unlock all fans using the reverse sequence.

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT

LOCKOUT INSTRUCTIONS

Building K

Air Handling Units

AHU-K: 1001, 1002, 2001, 2002 3001 and 3002

Exhaust Fans

EF-K-1001A, 1001B, 3001, 3002, 7001 and 7002

Supply Fans

SF-K-1001A and 1001B

TOOLS NEEDED:

- 14 Group lockout locks and team lockout/tagout lock box.
 - 1 Lockout Lock for each worker.
- 14 Lockout Tags.
 - 1 Lockout Tag for each worker.
- 1 9/16 Wrench or Socket and Ratchet.

CAUTION – ALL FANS MUST BE LOCKED OUT TO ACHIEVE A ZERO ENERGY STATE. EF-K 7001 AND 7002 MUST HAVE STOP PLATES LOWERED, SEE INSTRUCTIONS ON NEXT PAGE, LINE #10

SAFETY:

- Equipment Names: Air Handling Units, Exhaust Fans and Supply Fans.
- Equipment Tag: AHU-K-1001, 1002, 2001,2002 3001 and 3002
EF-K-1001A, 1001B 3001, 3002, 7001 and 7002
SF-K-1001A and 1001B
- Perform LOTO at: MCC-K-1A and MCC-K-1B in electrical room K-105.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper Arc Flash PPE while opening or closing breakers.

LOTO PROCEDURES:

- 1) Notify all affected employees of the impending lockout.
- 2) Ensure fire alarm system has been called out of service.
- 3) Shut down all fans listed above using normal procedures.
- 4) Don Arc Flash PPE.

- 5) Set up Arc Flash protection boundary per the Arc Flash labels.
- 6) Disconnect all fans listed above, at MCC-K-1A and MCC-K-1B in electrical room K-105.
- 7) Use team locks to lockout all 14 fans at MCC-K-1A and MCC-K-1B in electrical room K-105. Then place each affected employee's lockout/tagout lock, hasp and lockout tag on the Team Lockout/tagout Box per AlexRex's Control of Hazardous Energy (Lockout/tagout Program).



- 8) Attempt to start all units at both the HCP and the remote station at the unit.
 - 9) Return all start stations to the off position.
 - 10) To lower stop plate on units EF-K- 7001 and 7002, hold plate at the top loosen the two 3/8 bolts using a 9/16 wrench or socket and slide plate down into place.
- 11) Upon completion of the work:
- A. Be sure all fans are reassembled properly to include all safety covers.
 - B. Raise stop plates on units EF-K-7001 and 7002 and tighten both 3/8 bolts using the reverse sequence listed above in step 10.
 - C. Be sure all tools are stored properly.
 - D. Notify all affected employees that the lockouts are to be removed and the equipment is to be started.
- 12) Unlock all fans using the reverse sequence.

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT

LOCKOUT INSTRUCTIONS

Building L

Air Handling Units

AHU-L-1301

Exhaust Fans

EF-L-1301, 1401, 1501

TOOLS NEEDED:

- 4 Lockout Locks.
- 4 Lockout Tags.
- 4 Lockout Hasps.

CAUTION – ALL FANS MUST BE LOCKED OUT TO ACHIEVE A ZERO ENERGY STATE

SAFETY:

- Equipment Names: Air Handling Units, Exhaust Fans.
- Equipment Tag: AHU-L-1301 and EF-L- 1301, 1401, 1501
- Perform LOTO at: MCC-L-1B, 1C and MCC-L-1D in electrical room L-302.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper Arc Flash PPE while opening or closing breakers.

LOTO PROCEDURE:

- 1) Notify all affected employees of the impending lockout.
- 2) Ensure fire alarm system has been called out of service.
- 3) Shut down all fans listed above using normal procedures.
- 4) Don Arc Flash PPE.
- 5) Set up Arc Flash protection boundary per the Arc Flash labels.
- 6) Disconnect all fans listed above, at MCC-L-1B, 1C and MCC-L-1D in electrical room L-302.
- 7) Lockout and tagout all 4 fans listed above at MCC-L-1B, 1C and MCC-L-1D in electrical room L-302.
- 8) Attempt to start all units at both the HCP and the remote station at the unit.
- 9) Return all start stations to the off position.



10) Upon completion of the work:

- A. Be sure all fans are reassembled properly to include all safety covers.
- B. Be sure all tools are stored properly.
- C. Notify all affected employees that the lockouts are to be removed and the equipment is to be started.

11) Unlock all fans using the reverse sequence.

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT

LOCKOUT INSTRUCTIONS

Building L

Air Handling Units

AHU-L-1302

Exhaust Fans

EF-L-1302, 1402, 1502

TOOLS NEEDED:

- 4 Lockout Locks.
- 4 Lockout Tags.
- 4 Lockout Hasps.

CAUTION – ALL FANS MUST BE LOCKED OUT TO ACHIEVE A ZERO ENERGY STATE

SAFETY:

- Equipment Names: Air Handling Units, Exhaust Fans.
- Equipment Tag: AHU-L-1302 and EF-L- 1302, 1402, 1502
- Perform LOTO at: MCC-L-1B, 1C and MCC-L-1D in electrical room L-302.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper Arc Flash PPE while opening or closing breakers.

LOTO PROCEDURE:

- 1) Notify all affected employees of the impending lockout.
- 2) Ensure fire alarm system has been called out of service.
- 3) Shut down all fans listed above using normal procedures.
- 4) Don Arc Flash PPE.
- 5) Set up Arc Flash protection boundary per the Arc Flash labels.
- 6) Disconnect all fans listed above, at MCC-L-1B, 1C and MCC-L-D in electrical room L-302.
- 7) Lockout and tagout all 4 fans listed above at MCC-L-1B, 1C and MCC-L-1D in electrical room L-302.
- 8) Attempt to start all units at both the HCP and the remote station at the unit.
- 9) Return all start stations to the off position.



- 10) Upon completion of the work:
 - A. Be sure all fans are reassembled properly to include all safety covers.
 - B. Be sure all tools are stored properly.
 - C. Notify all affected employees that the lockouts are to be removed and the equipment is to be started.
- 11) Unlock all fans using the reverse sequence.

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT

LOCKOUT INSTRUCTIONS

Building L

Air Handling Units

AHU-L-1701

Exhaust Fans

EF-L-1701

TOOLS NEEDED:

- 2 Lockout Locks.
- 2 Lockout Tags.
- 2 Lockout Hasps.

CAUTION – ALL FANS MUST BE LOCKED OUT TO ACHIEVE A ZERO ENERGY STATE

SAFETY:

- Equipment Names: Air Handling Units, Exhaust Fans.
- Equipment Tag: AHU-L-1701 and EF-L-1701
- Perform LOTO at: MCC-L-1C in electrical room L-302.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper Arc Flash PPE while opening or closing breakers.

LOTO PROCEDURE:

- 1) Notify all affected employees of the impending lockout.
- 2) Ensure fire alarm system has been called out of service.
- 3) Shut down all fans listed above using normal procedures.
- 4) Don Arc Flash PPE.
- 5) Set up Arc Flash protection boundary per the Arc Flash labels.
- 6) Disconnect both fans listed above at MCC-L-1C in electrical room L-302.
- 7) Lockout and tagout both fans listed above at MCC-L-1C in electrical room L-302.



- 8) Attempt to start all units at both the HCP and the remote station at the unit.
- 9) Return all start stations to the off position.

10) Upon completion of the work:

- A. Be sure all fans are reassembled properly to include all safety covers.
- B. Be sure all tools are stored properly.
- C. Notify all affected employees that the lockouts are to be removed and the equipment is to be started.

11) Unlock all fans using the reverse sequence.

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT

LOCKOUT INSTRUCTIONS

Building L

Air Handling Units

AHU-L-1901

Exhaust Fans

EF-L-1901

TOOLS NEEDED:

- 2 Lockout Locks.
- 2 Lockout Tags.
- 2 Lockout Hasps.

CAUTION – ALL FANS MUST BE LOCKED OUT TO ACHIEVE A ZERO ENERGY STATE

SAFETY:

- Equipment Names: Air Handling Units, Exhaust Fans.
- Equipment Tag: AHU-L-1901 and EF-L-1901
- Perform LOTO at: MCC-L-1D in electrical room L-302.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper Arc Flash PPE while opening or closing breakers.

LOTO PROCEDURE:

- 1) Notify all affected employees of the impending lockout.
- 2) Ensure fire alarm system has been called out of service.
- 3) Shut down all fans listed above using normal procedures.
- 4) Don Arc Flash PPE.
- 5) Set up Arc Flash protection boundary per the Arc Flash labels.
- 6) Disconnect both fans listed above at MCC-L-1D in electrical room L-302.
- 7) Lockout and tagout both fans listed above at MCC-L-1D in electrical room L-302.



- 8) Attempt to start all units at both the HCP and the remote station at the unit.
- 9) Return all start stations to the off position.

- 10) Upon completion of the work:
 - A. Be sure all fans are reassembled properly to include all safety covers.
 - B. Be sure all tools are stored properly.
 - C. Notify all affected employees that the lockouts are to be removed and the equipment is to be started.
- 11) Unlock all fans using the reverse sequence.

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT

LOCKOUT INSTRUCTIONS

Building L

Air Handling Units

AHU-L-2301

Exhaust Fans

EF-L-2301

TOOLS NEEDED:

- 2 Lockout Locks.
- 2 Lockout Tags.
- 2 Lockout Hasps.

CAUTION – ALL FANS MUST BE LOCKED OUT TO ACHIEVE A ZERO ENERGY STATE

SAFETY:

- Equipment Names: Air Handling Units, Exhaust Fans.
- Equipment Tag: AHU-L-2301 and EF-L-2301
- Perform LOTO at: MCC-L-1C in electrical room L-302.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper Arc Flash PPE while opening or closing breakers.

LOTO PROCEDURE:

- 1) Notify all affected employees of the impending lockout.
- 2) Ensure fire alarm system has been called out of service.
- 3) Shut down all fans listed above using normal procedures.
- 4) Don Arc Flash PPE.
- 5) Set up Arc Flash protection boundary per the Arc Flash labels.
- 6) Disconnect both fans listed above at MCC-L-1C in electrical room L-302.
- 7) Lockout and tagout both fans listed above at MCC-L-1C in electrical room L-302.



- 8) Attempt to start all units at both the HCP and the remote station at the unit.
- 9) Return all start stations to the off position.

10) Upon completion of the work:

- A. Be sure all fans are reassembled properly to include all safety covers.
- B. Be sure all tools are stored properly.
- C. Notify all affected employees that the lockouts are to be removed and the equipment is to be started.

11) Unlock all fans using the reverse sequence.

CAUTION

**THIS EQUIPMENT REQUIRES MORE THAN ONE
LOCKOUT**

LOCKOUT INSTRUCTIONS

Building L

	Air	Handling	Units
AHU-L-2801, 2802			

Exhaust Fans
EF-L-2801, 2802

TOOLS NEEDED:

- 4 Lockout Locks.
- 4 Lockout Tags.
- 4 Lockout Hasps.

**CAUTION – ALL FANS MUST BE LOCKED OUT TO ACHIEVE A ZERO
ENERGY STATE**

SAFETY:

- Equipment Names: Air Handling Units, Exhaust Fans.
- Equipment Tag: AHU-L-2801, 2802, and EF-2801, 2802
- Perform LOTO at: MCC-L-1D in electrical room L-302.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper Arc Flash PPE while opening or closing breakers.

LOTO PROCEDURE:

- 1) Notify all affected employees of the impending lockout.
- 2) Ensure fire alarm system has been called out of service.
- 3) Shut down all fans listed above using normal procedures.
- 4) Don Arc Flash PPE.
- 5) Set up Arc Flash protection boundary per the Arc Flash labels.
- 6) Disconnect all fans listed above, at MCC-L-1D in electrical room L-302.
- 7) Lockout and tagout all 4 fans listed above at MCC-L-1D in electrical room L-302.



- 8) Attempt to start all units at both the HCP and the remote station at the unit.
- 9) Return all start stations to the off position.

- 10) Upon completion of the work:
 - A. Be sure all fans are reassembled properly to include all safety covers.
 - B. Be sure all tools are stored properly.
 - C. Notify all affected employees that the lockouts are to be removed and the equipment is to be started.
- 11) Unlock all fans using the reverse sequence.

CAUTION

**THIS EQUIPMENT REQUIRES MORE THAN ONE
LOCKOUT**

LOCKOUT INSTRUCTIONS

Building N

UV Influent Sluice Gates

G37-1301, G37-1302

Channel Sluice Gates

G38-1501, G38-1502, G38-1503,
G38-1504, G38-1505, G38-1506

TOOLS NEEDED:

2 Lockout Locks
2 Lockout Tags
2 Lockout Hasps

SAFETY:

- Equipment Name: UV Influent Sluice Gate #1, UV Influent Sluice Gate #2, Channel #1 Sluice Gate, Channel #2 Sluice Gate, Channel #3 Sluice Gate, Channel #4 Sluice Gate, Channel #5 Sluice Gate, Channel #6 Sluice Gate
- Equipment Tag Numbers: G37-1301, G37-1302, G38-1501, G38-1502, G38-1503, G38-1504, G38-1505, G38-1506
- Perform LOTO at: N-DP4 in Room N-102.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper PPE.

LOTO PROCEDURE:

- 1) Notify all affected employees of the impending lockout.
- 2) Shut down equipment using normal procedures
- 3) Disconnect the unit at N-DP4 in electrical room N-102
- 4) Lockout/tagout the unit at the disconnect at N-DP4
- 5) Attempt to start the unit at both the PLC and the remote station at the gate.
- 6) Return both start stations to the off position
- 7) Move the declutching lever to the motor position.
- 8) Lockout/tagout the declutching lever.





- 9) Attempt to move the gate up or down by turning the manual wheel. (It should not move)

10) Upon completion of the work:

- A. Be sure the equipment is reassembled properly to include all covers.
- B. Be sure all tools are stored properly
- C. Notify all affected employees that the lockout is to be removed and the equipment is to be started.

11) Unlock the equipment using the reverse sequence

CAUTION

THIS EQUIPMENT REQUIRES MORE THAN ONE LOCKOUT LOCKOUT INSTRUCTIONS

Building N

Ultraviolet Channel 3 and 4 Electric Panel

TOOLS NEEDED:

- 2 Lockout Locks
- 2 Lockout Tags
- 2 Lockout Hasps

DRAWING INFORMATION

- Contract # 1
- Sheet # 506

SAFETY:

- Equipment Name: Ultraviolet Channel 3 and 4 Electric Panel
- Equipment Tag: N-DP3
- Perform LOTO at: Main MCC in Room N-102.
- Multiple Lock Out Points? YES
- Special Considerations: Use Proper PPE

LOTO PROCEDURE:

- 1) Notify all affected employees of the impending lockout.
- 2) Shut down equipment using normal procedures
- 3) Disconnect the unit at MCC-N-1A and MCC-N-1B electrical room (N-102)
- 4) Lockout the unit at MCC-N-1A and MCC-N-1B in electrical room (N-102)



- 5) Check for voltage at Panel's main lugs.

- 6) Upon completion of the work:
 - A. Be sure the equipment is reassembled properly to include all covers.
 - B. Be sure all tools are stored properly
 - C. Notify all affected employees that the lockout is to be removed and the equipment is to be started.
- 7) Unlock the equipment using the reverse sequence



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 7/2020			

OHSMS-2.3.B Approval to Cut/Remove LOTO Devices

The following information and approval is required prior to cutting/removing any LOTO device(s) by anyone other than the authorized employee who applied them.

Name of Authorized Employee whose LOTO Device(s) needs to be removed:		Date:	
Equipment/Machined locked out:		Number of energy isolating devices with LOTO devices installed that need removal:	
Reason for cutting or removing the LOTO devices:			
Verification			
Describe means of verifying that employee is no longer at the site:			
Name of individual performing verification:		Signature of person who conducted verification:	
Date/Time verification completed:			
Notification			
Was employee contacted and informed of the need to remove their LOTO device(s)?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
If No describe how the employee will be prevented from reentering the work area until he has been notified of their removal:			
Authorized Employee Signature (On Return):		Date and Time:	
Approval:			
Designated Management*:		Signature:	
Removal			
Date and Time Removal Completed:		Completed By**:	

NOTES:

*Need to designate who is the designated management who must give final approval to cut/remove the LOTO device.

**Need to identify person or job title of person who can cut/remove the LOTO device. This person must be a supervisor or manager.



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 07/2020			

OHSMS-2.3.C Process Shutdown/Equipment Removal from Service Notice

Requester Name: _____ Company: _____

☐ Process Shutdown ☐ Equipment Removal

1. What Processes/Equipment will be shut down? _____

2. Date and time for shutdown: _____
3. Anticipated duration: _____
4. Detailed Reason for shutdown: _____

5. Are all tools and materials needed to perform this work on site? ☐ Yes ☐ No
6. Will this shutdown affect the final effluent or biosolids quality? ☐ Yes ☐ No
 - a. If so, how? _____

7. Shift Leader Shutdown Discussion meeting date/time: _____
8. Is a process plan or SOP needed? ☐ Yes ☐ No
 - a. If so, list: _____
9. How could adverse weather (rain, snow, wind, cold, heat) affect this shutdown?

10. List any concerns: _____

SHIFT LEADER, VERIFY PLANT IS NOT IN DANGER OF EXCEEDING 90% THRESHOLD

Requester Signature: _____ Date: _____

Shift Leader Signature: _____ Date: _____

Operations Superintendent Signature: _____ Date: _____



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 07/2020			

OHSMS-2.3.D Periodic Inspection/Evaluation

The following checklist is to be completed by a supervisor at least annually for each authorized employee engaged in the control of hazardous energy.

Completed evaluations must be forwarded to the Safety Coordinator for filing.

Name of Authorized Employee:		Date:	
Equipment/Machined locked out:		Supervisor:	
Type of Energy Sources: <input type="checkbox"/> Electrical <input type="checkbox"/> Mechanical <input type="checkbox"/> Hydraulic <input type="checkbox"/> Stored <input type="checkbox"/> Pneumatic <input type="checkbox"/> Chemical <input type="checkbox"/> Thermal <input type="checkbox"/> Other			
Is there an energy control procedure for this equipment?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	
If yes, was the employee provided with a copy of the procedure?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	
Was the control room notified prior to the start of work?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	
Were all energy sources verified?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	
If No, which one(s) were not verified?			
Has the equipment been shut down?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	
Did the employee apply their LOTO devices properly?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	
Did the employee verify that the equipment was completely deenergized?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	
Was the control room contacted to attempt to start the equipment remotely?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	
Did the employee attempt to start the equipment manually?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	
Did the employee use a voltage meter or similar device been used to ensure all electrical circuits are de-energized?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	
Did the employee block or disconnect all pressurized lines and bleed off all pressure?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	
Did the employee remove or block the potential for stored energy?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	
If group LOTO has been conducted, are all employees' locks placed such that the equipment cannot be reenergized until all employees LOTO devices are removed?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	
Were tags filled out appropriately and placed alongside locking devices?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	



Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 07/2020			

OHSMS-2.3.D Periodic Inspection/Evaluation

If lockout is not possible for this device, did the employee tag out the equipment AND use at least one additional safety measure to prevent re-energization of the equipment?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Did the employee inspect the area prior to removing LOTO devices to ensure no employees or unnecessary materials were left in the operating area of the equipment?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Were all LOTO devices removed after equipment repair was completed?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Was the equipment walked down with an operator to ensure the equipment can be returned to service safely?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA
Supervisor Comments: <hr/> <hr/> <hr/> <hr/> <hr/>	
Employee Comments: <hr/> <hr/> <hr/> <hr/> <hr/>	
Supervisors Evaluation: <input type="checkbox"/> Employee understands and correctly applies AlexRenew's control of hazardous energy procedure <input type="checkbox"/> Employee requires additional re-training in the proper control of hazardous energy.	
Employee Signature: _____ Supervisor Signature: _____	

Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 07/2020			

OHSMS-2.3.E Equipment LOTO Log Sheet

Date	Equipment Name/ID	Authorized Employee:	Time LOTO Began:	Remote Isolation Verification Conducted By:	Date/Time LOTO was removed:	Verification of Equipment Status Conducted By:

Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 07/2020			

OHSMS-2.3.E Equipment LOTO Log Sheet

Date	Equipment Name/ID	Authorized Employee:	Time LOTO Began:	Remote Isolation Verification Conducted By:	Date/Time LOTO was removed:	Verification of Equipment Status Conducted By:

Instructions:

Date: Enter the date the lockout tagout notification was made

Equipment Name/ID: Enter the name of the equipment and it's identification number

Authorized Employee: Enter the name of the employee conducting the LOTO

Time LOTO Began: Enter the time the equipment was reported as locked and tagged out of service

Remote Isolation Verification Conducted By: Enter the name of the operator that verified that the equipment can not be started remotely

Date/Time LOTO was removed: Enter the date and time that the authorized employee completed and removed their LOTO devices

Verification of Equipment Status Conducted By: Enter the name of the operator that walked down the equipment and returned it back into to service

***NOTE:** If the equipment will be locked out of service for longer than the duration of a single shift, that information must be communicated to the oncoming shift.

Verification	Originator	Revised	Approved	Current Effective Date
Initials Date	AR 07/2020			

OHSMS-2.3.F Group LOTO Device Checkout Sheet

Group LOTO Device ID #:	# of LOTO Devices Issued	Authorized Employee (Print Name):	Time/Date Out:	Signature:	Time/Date In:	Signature:

Print date:
7/27/2020

WARNING! This document is uncontrolled when printed.

Page 1 of 1

Verify current revisions using the Alexandria Renew Enterprises OHSMS web site.

ELECTRICAL / ARC FLASH SAFETY PROGRAM
(NFPA 70E)



ALEXANDRIA RENEW ENTERPRISES

**Safety Standard Operating Procedures
Alexandria Renew Enterprises (AlexRenew)**

1. PURPOSE

The electrical safety standard operating procedures (SOPs) are intended to ensure electrical safety of qualified and authorized employees working on or near energized live parts of electrical equipment at Alexandria Renew Enterprises (AlexRenew).

2. SCOPE

This document establishes specific minimum requirements for working on or near live parts during operation and maintenance of the following electrical equipment:

1. Panelboards Rated 240 Volts and below
2. Panelboards or Switchboards Rated between 240 Volts and 600 Volts (with molded case or insulated case breakers)
3. Motor Control Centers Rated 600 Volts and below
4. Switchgear Rated 600 Volts and below (with power circuit breakers and fused switches)
5. Other 600 Volt Class Equipment (277 Volts through 600 Volts, Nominal)
6. Motor Starters (2.3kV through 7.2kV NEMA E2 fused contactors)
7. Metal Clad Switchgear (1kV and above)
8. Other Equipment Rated 1kV and above

3. DEFINITIONS

To aid AlexRenew personnel in understanding commonly used terms when discussing electrical hazards in this SOP, the following is a partial listing of definitions defined by NFPA 70E.

Accessible (as applied to equipment). Admitting close approach; not guarded by locked doors, elevation, or other effective means.

**Safety Standard Operating Procedures
Alexandria Renew Enterprises (AlexRenew)**

Accessible (as applied to wiring methods). Capable of being removed or exposed without damaging the building structure or finish or not permanently closed in by the structure or finish of the building.

Accessible, Readily (Readily Accessible). Capable of being reached quickly for operation, renewal, or inspections without requiring those to whom ready access is requisite to climb over or remove obstacles or to resort to portable ladders, and so forth.

Ampacity. The current, in amperes, that a conductor can carry continuously under the conditions of use without exceeding its temperature rating.

Appliance. Utilization equipment, generally other than industrial, that is normally built in standardized sizes or types and is installed or connected as a unit to perform one or more functions such as clothes washing, air conditioning, food mixing, deep frying, and so forth.

Approved. Acceptable to the authority having jurisdiction.

Arc Rating. The maximum incident energy resistance demonstrated by a material (or a layered system of materials) prior to breakopen or at the onset of a second-degree skin burn. Arc rating is normally expressed in cal/cm².

Authorized Employee. A qualified person performing operation, servicing, and maintenance covered in this document.

Automatic. Self-acting, operating by its own mechanism when actuated by some impersonal influence, as, for example, a change in current, pressure, temperature, or mechanical configuration.

Safety Standard Operating Procedures
Alexandria Renew Enterprises (AlexRenew)

Bare Hand Work. A technique of performing work on live parts, after the employee has been raised to the potential of the live part.

Barricade. A physical obstruction such as tapes, cones, or A-frame-type wood or metal structures intended to provide a warning about and to limit access to a hazardous area.

Barrier. A physical obstruction that is intended to prevent contact with equipment or live parts or to prevent unauthorized access to a work area.

Bonding (Bonded). The permanent joining of metallic parts to form an electrically conductive path that ensures electrical continuity and the capacity to conduct safely any current likely to be imposed.

Bonding Jumper. A reliable conductor to ensure the required electrical conductivity between metal parts required to be electrically connected.

Branch Circuit. The circuit conductors between the final overcurrent device protecting the circuit and the outlet(s).

Cabinet. An enclosure that is designed for either surface mounting or flush mounting and is provided with a frame, mat, or trim in which a swinging door or doors are or can be hung.

Circuit Breaker. A device designed to open and close a circuit by nonautomatic means and to open the circuit automatically on a predetermined overcurrent without damage to itself when properly applied within its rating.

**Safety Standard Operating Procedures
Alexandria Renew Enterprises (AlexRenew)**

Deenergized. Free from any electrical connection to a source of potential difference and from electrical charge; not having a potential different from that of the earth.

Device. A unit of an electrical system that is intended to carry but not utilize electric energy.

Disconnecting Means. A device, or group of devices, or other means by which the conductors of a circuit can be disconnected from their source of supply.

Effective Ground-Fault Current Path. An intentionally constructed, permanent, low-impedance electrically conductive path designed and intended to carry current under ground-fault conditions from the point of a ground-fault on a wiring system to the electrical supply source.

Electric Sign. A fixed, stationary, or portable self-contained, electrically illuminated utilization equipment with words or symbols designed to convey information or attract attention.

Electrical Hazard. A dangerous condition such that contact or equipment failure can result in electric shock, arc flash burn, thermal burn, or blast.

Electrical Safety. Recognizing hazards associated with the use of electrical energy and taking precautions so that hazards do not cause injury or death.

Electrically Safe Work Condition. A state in which the conductor or circuit part to be worked on or near has been disconnected from energized parts, locked/tagged in accordance with established standards, tested to ensure the absence of voltage, and grounded if determined necessary.

**Safety Standard Operating Procedures
Alexandria Renew Enterprises (AlexRenew)**

Enclosed. Surrounded by a case, housing, fence, or wall(s) that prevents persons from accidentally contacting energized parts.

Enclosure. The case or housing of apparatus, or the fence or walls surrounding an installation to prevent personnel from accidentally contacting energized parts, or to protect the equipment from physical damage.

Energized. Electrically connected to or having a source of voltage.

Equipment. A general term including material, fittings, devices, appliances, luminaries (fixtures), apparatus, and the like used as a part of, or in connection with, an electrical installation.

Explosion Proof Apparatus. Apparatus enclosed in a case that is capable of withstanding an explosion of a specified gas or vapor that may occur within it and of preventing the ignition of a specified gas or vapor surrounding the enclosure by sparks, flashes, or explosion of the gas or vapor within, and that operates at such an external temperature that a surrounding flammable atmosphere will not be ignited nearby.

Exposed (as applied to live parts). Capable of being inadvertently touched or approached nearer than a safe distance by a person. It is applied to parts that are not suitably guarded, isolated, or insulated.

Exposed (as applied to wiring methods). On or attached to the surface or behind panels designed to allow access.

**Safety Standard Operating Procedures
Alexandria Renew Enterprises (AlexRenew)**

Exposed. For the purposes of this document, the word *exposed* means that the circuit is in such a position that, in case of failure of supports or insulation, contact with another circuit may result.

Externally Operable. Capable of being operated without exposing the operator to contact with live parts.

Feeder. All circuit conductors between the service equipment, the source of a separately derived system, or other power supply source and the final branch-circuit overcurrent device.

Fitting. An accessory such as a locknut, bushing, or other part of a wiring system that is intended primarily to perform a mechanical rather than an electrical function.

Flame-Resistant (FR). The property of a material whereby combustion is prevented, terminated, or inhibited following the application of a flaming or non-flaming source of ignition, with or without subsequent removal of the ignition source.

FPN: Flame resistance can be an inherent property of a material, or it can be imparted by a specific treatment applied to the material.

Flash Hazard. A dangerous condition associated with the release of energy caused by an electric arc.

Flash Hazard Analysis. A study investigating a worker's potential exposure to arc-flash energy, conducted for the purpose of injury prevention and the determination of safe work practices and the appropriate levels of PPE.

**Safety Standard Operating Procedures
Alexandria Renew Enterprises (AlexRenew)**

Flash Protection Boundary. An approach limit at a distance from exposed live parts within which a person could receive a second degree burn if an electrical arc flash were to occur.

Flash Suit. A complete FR clothing and equipment system that covers the entire body, except for the hands and feet. This includes pants, jacket, and bee-keeper-type hood fitted with a face shield.

Fuse. An overcurrent protective device with a circuit-opening fusible part that is heated and severed by the passage of overcurrent through it.

Ground. A conducting connection, whether intentional or accidental, between an electrical circuit or equipment and the earth or to some conducting body that serves in place of the earth.

Grounded. Connected to earth or to some conducting body that serves in place of the earth.

Grounded Conductor. A system or circuit conductor that is intentionally grounded.

Grounded, Effectively. Intentionally connected to earth through a ground connection or connections of sufficiently low impedance and having sufficient current-carrying capacity to prevent the buildup of voltages that may result in undue hazards to connected equipment or to persons.

Grounding Conductor. A conductor used to connect equipment or the grounded circuit of a wiring system to a grounding electrode or electrodes.

**Safety Standard Operating Procedures
Alexandria Renew Enterprises (AlexRenew)**

Grounding Conductor, Equipment. The conductor used to connect the non-current-carrying metal parts of equipment, raceways and other enclosures to the system grounded conductor, the grounding electrode conductor, or both, at the service equipment or at the source of a separately derived system.

Grounding Electrode Conductor. The conductor used to connect the grounding electrode(s) to the equipment grounding conductor, to the grounded conductor, or to both, at each service, at each building or structure where supplied from a common service, or at the source of a separately derived system.

Ground Fault. An unintentional, electrically conduction connection between an ungrounded conductor of an electrical circuit and the normally non-current-carrying conductors, metallic enclosures, metallic raceways, metallic equipment, or earth.

Ground-Fault Circuit-Interrupter. A device intended for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a current to ground exceeds the values established for a Class A device.

FPN: Class A ground-fault circuit-interrupter trips when the current to ground has a value in the range of 4 mA to 6 mA. For further information, see UL 943, *Standard for Ground-Fault Circuit Interrupters*.

Ground-Fault Current Path. An electrically conductive path from the point of a ground fault on a wiring system through normally non-current-carrying conductors, equipment, or the earth to the electrical supply source.

Guarded. Covered, shielded, fenced, enclosed, or otherwise protected by means of suitable covers, casings, barriers, rails, screens, mats, or platforms to remove the likelihood of approach or contact by persons or objects to a point of danger.

**Safety Standard Operating Procedures
Alexandria Renew Enterprises (AlexRenew)**

Incident Energy. The amount of energy impressed on a surface, a certain distance from the source, generated during an electrical arc event. One of the units used to measure incident energy is calories per centimeter squared (cal/cm²).

Insulated. Separated from other conducting surfaces by a dielectric (including air space) offering a high resistance to the passage of a current.

Isolated (as applied to location). Not readily accessible to persons unless special means for access are used.

Labeled. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by who's labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

Limited Approach Boundary. An approach limit at a distance from an exposed live part within which a shock hazard exists.

Live Parts. Energized conductive components.

Motor Control Center. An assembly of one or more enclosed sections having a common power bus and principally containing motor control units.

NEC, National Electrical Code NFPA 70E. National Fire Protection Association, "Standard for Electrical Safety in the Workplace."

**Safety Standard Operating Procedures
Alexandria Renew Enterprises (AlexRenew)**

Open Wiring on Insulators. An exposed wiring method using cleats, knobs, tubes, and flexible tubing for the protection and support of single insulated conductors run in or on buildings.

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

Overcurrent. Any current in excess of the rated current of equipment or the ampacity of a conductor. It may result from overload, short circuit, or ground fault.

Overload. Operation of equipment in excess of normal, full-load rating, or of a conductor in excess of rated ampacity that, when it persists for a sufficient length of time, would cause damage or dangerous overheating. A fault, such as a short circuit or ground fault, is not an overload.

Panelboard. A single panel or group of panel units designed for assembly in the form of a single panel, including buses and automatic overcurrent devices, and equipped with or without switches for the control of light, heat, or power circuits; designed to be placed in a cabinet or cutout box placed in or against a wall, partition, or other support; and accessible only from the front.

PPE. Personal Protective Equipment.

Premises Wiring (System). That interior and exterior wiring, including power, lighting, control, and signal circuit wiring together with all their associated hardware, fittings, and wiring devices, both permanently and temporarily installed, that extends from the service point or source of power, such as a battery, a solar photovoltaic system, or a generator, transformer, or converter windings, to the outlet(s). Such wiring does not include wiring

Safety Standard Operating Procedures
Alexandria Renew Enterprises (AlexRenew)

internal to appliances, luminaires (fixtures), motors, controllers, motor control centers, and similar equipment.

Prohibited Approach Boundary. An approach limit at a distance from an exposed live part within which work is considered the same as making contact with the live part.

Qualified Person. One who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training on the hazards involved.

Raceway. An enclosed channel of metal or nonmetallic materials designed expressly for holding wires, cables, or busbars, with additional functions as permitted in this standard. Raceways include, but are not limited to, rigid metal conduit, rigid nonmetallic conduit, intermediate metal conduit, liquidtight flexible conduit, flexible metallic tubing, flexible metal conduit, electrical metallic tubing, electrical nonmetallic tubing, underfloor raceways, cellular concrete floor raceways, cellular metal floor raceways, surface raceways, wireways, and busways.

Restricted Approach Boundary. An approach limit at a distance from an exposed live part within which there is an increased risk of shock, due to electrical arc over combined with inadvertent movement, for personnel working in close proximity to the live part.

Shock Hazard. A dangerous condition associated with the possible release of energy caused by contact or approach to live parts.

Switch, Isolating. A switch intended for isolating an electric circuit from the source of power. It has no interrupting rating, and it is intended to be operated only after the circuit has been opened by some other means.

**Safety Standard Operating Procedures
Alexandria Renew Enterprises (AlexRenew)**

Switch, Motor Circuit. A switch rated in horsepower that is capable of interrupting the maximum operating overload current of a motor of the same horsepower rating as the switch at the rated voltage.

Switchboard. A large single panel, frame, or assembly of panels on which are mounted on the face, back, or both, switches, overcurrent and other protective devices, buses, and usually instruments. Switchboards are generally accessible from the rear as well as from the front and are not intended to be installed in cabinets.

Switching Device. A device designed to close, open, or both, one or more electric circuits.

Circuit Breaker. A switching device capable of making, carrying, and interrupting currents under normal circuit conditions, and also making, carrying for a specified time, and interrupting currents under specified abnormal circuit conditions, such as those of short circuit.

Cutout. An assembly of a fuse support with either a fuseholder, fuse carrier, or disconnecting blade. The fuseholder or fuse carrier may include a conducting element (fuse link), or may act as the disconnecting blade by the inclusion of a non-fusible member.

Disconnecting (or Isolating) Switch (Disconnecter, Isolator). A mechanical switching device used for isolating a circuit or equipment from a source of power.

Disconnecting Means. A device, group of devices, or other means whereby the conductors of a circuit can be disconnected from their source of supply.

Interrupter Switch. A switch capable of making, carrying, and interrupting specified currents.

Unqualified person. A person who is not a qualified person. (See qualified person)

**Safety Standard Operating Procedures
Alexandria Renew Enterprises (AlexRenew)**

Voltage (of a Circuit). The greatest root-mean-square (rms) (effective) difference of potential between any two conductors of the circuit concerned.

Voltage, Nominal. A nominal value assigned to a circuit or system for the purpose of conveniently designating its voltage class (e.g., 120/140 volts, 480Y/277 volts, 600 volts). The actual voltage at which a circuit operates can vary from the nominal within a range that permits satisfactory operation of equipment.

Voltage to Ground. For grounded circuits, the voltage between the given conductor and that point or conductor of the circuit that is grounded; for ungrounded circuits, the greatest voltage between the given conductor and any other conductor of the circuit.

Working Near (live parts). Any activity inside a Limited Approach Boundary.

Working On (live parts). Coming in contact with live parts with the hands, feet, or other body parts, with tools, probes, or with test equipment, regardless of the personal protective equipment a person is wearing.

4. RESPONSIBILITIES

1. Management:

It is the responsibility of AlexRenew's management to protect all AlexRenew staff. AlexRenew will require all outside contractors to comply with the requirements of the NEC, NFPA 70E, all applicable OSHA and any other state or federal safety standards, laws or requirements while working for AlexRenew. AlexRenew's Electrical Safety Standing Operation Procedures should also be used as a general guide.

**Safety Standard Operating Procedures
Alexandria Renew Enterprises (AlexRenew)**

- (a). Provide electrical safety related SOPs to qualified and authorized employees.
- (b). Require qualified employees to receive electrical safety training, which shall include use of Personal Protective Equipment (PPE) to protect against arc flash hazards.
- (c). Evaluate experience and capability of qualified workers for authorizing them to work on or near energized live parts.
- (d). Evaluate the workplace to determine which live parts of the equipment are not placed in electrically safe work condition and require an energized electrical work permit, as given in Exhibit B.

2. Safety Coordinator

AlexRenew's Safety Coordinator is responsible for this program and has authority to make decisions to ensure the success of this program. Specifically, AlexRenew's Safety Coordinator will:

- (a). Provide copies of the SOPs to the qualified and authorized personnel.
- (b). Assist AlexRenew Management in evaluating experience of qualified personnel for authorization to work on or near energized parts.
- (c). Review electrical accidents every year and revise the program as necessary.
- (d). Recommend AlexRenew Management revise the program if he/she determines that the program does not incorporate federal/state safety regulations.

3. Team Leader

- (a) Insures all electrical test equipment and PPE covered under this program are listed in AlexRenew's Computerized Maintenance Management System

Safety Standard Operating Procedures Alexandria Renew Enterprises (AlexRenew)

(CMMS) to include preventive maintenance procedures and frequencies per the manufacturer's recommendations.

- (b) Insures all electrical test equipment and PPE covered under this program are inspected as per the AlexRenew CMMS.
- (c) Inspects and documents the condition of PPE every year, and if found questionable, requires testing before authorizing subsequent use.
- (d) Enforces electrical safety requirements in the workplace.

4. Employees

- (a) Qualified and authorized employees shall use all applicable SOPs while working on or near energized live parts.
- (b) Comply with instructions on the Arc Flash Hazard and Shock Hazard Label attached to equipment.

5. Identification of Arc Flash Hazards

Visible warning labels shall be placed on the equipment to warn the employees of arc flash hazards and inform them of the required PPE to protect against arc flash hazards. The warning labels shall contain a warning for each arc flash Category, similar to the one shown below:

⚠ DANGER	
Arc-Flash Hazard and Shock Hazard	
7'-1" – Arc-Flash Protection Boundary 6.2 cal/cm ² – Incident Energy Flash Hazard at 24"	CATEGORY 2 Arc-Flash Hazard Risk Category
Appropriate PPE required for both Arc-Flash and Shock Hazards: Safety Glasses/Goggles, Hard Hat, Flash Suit Hood, Hearing Protection, Voltage Rated Gloves, Leather Gloves/Protectors, Voltage Rated Tools, Leather Shoes, Cotton Underwear, FR Long Sleeve Shirt, FR Long Pants.	
480V – Shock Hazard with covers/doors open 3'-6" – Limited Approach Boundary 1'-0" – Restricted Approach Boundary 0'-1" – Prohibited Approach Boundary	Shock Hazard
Location: Building A, Switchgear A-1A, Main Breaker Cubicle	

⚠ DANGER	
Arc-Flash Hazard and Shock Hazard	
1'-9" – Arc-Flash Protection Boundary 3.4 cal/cm ² – Incident Energy Flash Hazard at 24"	CATEGORY 1 Arc-Flash Hazard Risk Category
Appropriate PPE required for both Arc-Flash and Shock Hazards: Safety Glasses/Goggles, Hard Hat, Voltage Rated Gloves, Leather Gloves/Protectors, Voltage Rated Tools, Leather Shoes, Cotton Underwear, FR Long Sleeve Shirt, FR Long Pants	
480V – Shock Hazard with covers/doors open 3'-6" – Limited Approach Boundary 1'-0" – Restricted Approach Boundary 0'-1" – Prohibited Approach Boundary	Shock Hazard
Location: Building 4, Switchgear 23A Main Breaker Cubicle	

July 18, 2008

WARNING! T

Verify current revisions using

⚠ DANGER	
Arc-Flash Hazard and Shock Hazard	
1'-5" – Arc-Flash Protection Boundary 1.1 cal/cm ² – Incident Energy Flash Hazard at 18"	CATEGORY 0 Arc-Flash Hazard Risk Category
Appropriate PPE required for both Arc-Flash and Shock Hazards: Safety Glasses/Goggles, Voltage Rated Gloves, Leather Gloves/Protectors, Voltage Rated Tools, Cotton Underwear, Long Sleeve Shirt (Non-melting or untreated natural fiber), Long Pants (Non-melting or untreated natural fiber)	
480V – Shock Hazard with covers/doors open 3'-6" – Limited Approach Boundary 1'-0" – Restricted Approach Boundary 0'-1" – Prohibited Approach Boundary	Shock Hazard
Location: Building 5, MCC 23-3A Main Breaker Cubicle	

ted.

afety Coordinator

5. APPLICATION AND COMPLIANCE

A. General Requirements

CAUTION

AlexRenew's preferred method of performing service or maintenance on or near any electrical equipment is to do so with the equipment de-energized; employing Lockout/Tagout devices in accordance with AlexRenew's established Control of Hazardous Energy (Lockout/Tagout) SOP. If de-energization is not possible, follow the instructions in this SOP.

1. Before starting each job, the employee in charge shall conduct a job briefing with the employees involved.
2. AlexRenew will require all outside contractors to comply with the requirements of the NEC, NFPA 70E, all applicable OSHA and any other state or federal safety standards, laws or requirements while working for AlexRenew.
3. Qualified and authorized employees shall be trained in methods of release of victims from contact with exposed energized live parts.
4. Qualified and authorized employees shall receive arc flash hazard training including working on or near live parts while wearing PPE appropriate to the hazard/risk category (HRC).
5. Any work performed on or near live electrical parts will require a written and approved Energized Electrical Work Permit. (See Exhibit B).

**Safety Standard Operating Procedures
Alexandria Renew Enterprises (AlexRenew)**

B. Job Briefing and Planning

When an electrical task is assigned, the Team Leader and Team Electrician and all qualified staff, assigned to the job, will include in their planning discussion items identified in Exhibit A.

C. Establishing an Electrically Safe Work Condition

AlexRenew employees shall achieve an electrically safe work condition by utilizing the following process:

1. Determine all possible sources of electrical supply to the specific equipment. Check applicable up-to-date drawings, diagrams, and identification tags.
2. After properly interrupting the load current, open the disconnecting device(s) for each source.
3. Wherever possible, visually verify that all blades of the disconnecting devices are fully open or that drawout-type circuit breakers are withdrawn to the fully disconnected position.
4. Apply lockout/tagout devices in accordance with the AlexRenew's documented and established Lockout/Tagout program.
5. Use an adequately rated voltage detector to test each phase conductor or circuit part to verify they are deenergized. Test each phase conductor or circuit part both phase-to-phase and phase-to-ground. Before and after each test, determine that the voltage detector is operating satisfactorily.
6. Where the possibility of induced voltages or stored electrical energy (for example in capacitors, de-energized medium voltage lines, and Robicon VFD drives) exists, ground the phase conductors or circuit parts before touching them.

**Safety Standard Operating Procedures
Alexandria Renew Enterprises (AlexRenew)**

7. Where it could be reasonably anticipated that the conductors or circuit parts being deenergized could contact other exposed energized conductors or circuit parts, apply ground connecting devices rated for the available fault duty.

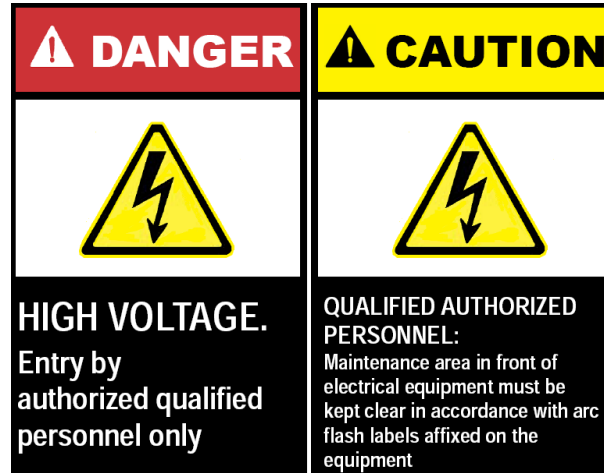
D. Working On or Near Live Parts

1. Qualified persons shall work on or near live parts after obtaining approval of the “Energized Electrical Work Permit” given in Exhibit B.
2. Protective clothing and personal protective equipment (PPE) required for the HRC shown on the warning label affixed on the equipment, and equipment voltage rated gloves, and tools (including measurement tools), shall be utilized until work is complete and live parts are enclosed.
3. Qualified persons shall inspect and use protective clothing, PPE, and other protective equipment in accordance with the following instructions:
 - (a) Protective clothing and PPE for each HRC shall be as shown in Exhibit C.
 - (b) Protective clothing characteristics shall be as shown in Exhibit D.
 - (c) Care and maintenance of Fire Resistant (FR) clothing and fire resistant suits:
 - (i) **Inspection.** FR apparel shall be inspected before each use. Work clothing or flash suits that are contaminated, or damaged to the extent their protective qualities are impaired, shall not be used. Protective items that become contaminated with grease, oil, or flammable liquids or combustible materials shall not be used.
 - (ii) **Manufacturer’s Instructions.** The garment manufacturer’s instructions for care and maintenance of FR apparel shall be followed.

**Safety Standard Operating Procedures
Alexandria Renew Enterprises (AlexRenew)**

- (d) Qualified employees shall use insulated tools (including measurement tools) and/or handling equipment when working inside the Limited Approach Boundary shown on the warning label of exposed live parts where tools or handling equipment might make accidental contact. Insulated tools shall be protected from damage to the insulating material. Insulated tools shall be rated for the voltages on which they are used.
- (e) Portable ladders shall have nonconductive side rails if they are used where the employee or ladder could contact exposed live parts operating at 50 volts or more or where an electrical hazard exists.
- (f) Protective shields, protective barriers, or insulating materials shall be used to protect each employee from shock, burns, or other electrically related injuries while that employee is working on or near live parts that might be accidentally contacted or where dangerous electric heating or arcing may occur.
- (g) Safety signs, safety symbols, or accident prevention tags shall be used where necessary to warn employees about electrical hazards that may endanger themselves or nearby personnel.

**Safety Standard Operating Procedures
Alexandria Renew Enterprises (AlexRenew)**



- (h) Barricades shall be used in conjunction with safety signs where it is necessary to prevent or limit employee access to work areas containing live parts. Conductive barricades shall not be used where it might cause an electrical hazard. Barricades shall be placed no closer than the Limited Approach Boundary given in warning labels affixed on the equipment.
4. Perform each of the tasks associated with the following equipment in accordance with the HRC, identified on the arc flash warning label, as given in Exhibit E.
1. Panelboards Rated 240 Volts and below
 2. Panelboards or Switchboards Rated between 240 Volts and 600 Volts (with molded case or insulated case breakers)
 3. Motor Control Centers Rated 600 Volts and below
 4. Switchgear Rated 600 Volts and below (with power circuit breakers and fused switches)
 5. Other 600 Volt Class Equipment (277 Volts through 600 Volts, Nominal)
 6. Motor Starters (2.3kV through 7.2kV NEMA E2 fused contactors)

Safety Standard Operating Procedures
Alexandria Renew Enterprises (AlexRenew)

7. Metal Clad Switchgear (1kV and above)
8. Other Equipment Rated 1kV and above

Evacuation Plan

Evacuation may be required if there is an explosion, fire in a building or other hazard. Evacuation route maps are posted in each work area. The maps identify exits, primary and secondary evacuation routes, locations of fire extinguishers, fire alarm pull station locations, and assembly points.

Notification Procedures

In the event of an emergency, visual and audible alarms will activate. A programmed recording instructs occupants to evacuate the building. Notification to employees can be done using one of two systems. (1) The fire alarm can be activated by using an alarm pull station or (2) the employee notification system can be utilized. The employee notification system can send out a pre-recorded message or the speaker can be used to issue a custom message. In the event that a specific message needs to be conveyed (i.e. secondary assembly point) the employee notification system will override the alarm system. If the fire alarm system is activated a signal will be sent to Simplex (alarm monitoring company). Simplex will directly notify the fire department with the information provided.

Call 9-911 to report the emergency. Give the type of emergency and the plant address and building.

Plant Address and Building Name: 1800 Limerick Street Building J

Contact the Shift Leader and advise him of the situation. Confirm that he will have someone meet the responding units at both S. Payne Street and Eisenhower Ave gates.

Contact Security to notify them of the emergency.

The severity of the emergency will determine which buildings should be evacuated. If an alarm is made within any building on the main campus then all employees should be notified to move to the primary assembly point so that all employees can be accounted for. Each department is responsible to assist those that are handicapped or for some other reason cannot evacuate the area on their own. Critical plant operations can be run from remote locations therefore all employees are expected to evacuate immediately.

Based on the emergency it may be necessary to activate the Incident Command Center or notify additional outside agencies. See the contact sheet for a list of agency contacts.

Accounting for Employees

To account for employees during an emergency, AlexRenew employees are divided into the following groups; Operations, Maintenance (Electrical), Maintenance (Mechanical), EC staff (divided by floor) and Laboratory. Contractors and visitors will be accounted for by their AlexRenew point of contact. Each group will have an assembly area Monitor to account for evacuees at the assembly area and inform the Incident Commander if anyone is missing or injured. An employee rooster is used to account for employees within each group.

Each employee is responsible for contacting their supervisor during a declared emergency. All employees are responsible for reporting to their designated reporting area, if the incident warrants, and will remain there until the all clear sounds or a member of leadership directs them to do so. The highest level of leadership or his/her designee will coordinate to identify for any unaccounted for personnel, contractors or visitors.

Assembly Points

The evacuation point for the Environmental Center is at the back of the EC garage by Holland Lane. The evacuation assembly areas for the main plant is Payne Street gate near Building A and J building gate crossing to the EC. Building floor plans, keys and other assistance as requested will be provided to the fire department.

Evacuation Follow-up and Drills

Incidents, drills and exercises should be documented on an Evacuation Report form. A critique of the evacuation should be done within 24-hours of the drills and/or incidents to identify lessons learned and action items to improve. The critique shall be performed by the Safety Manager with others participating as needed. Items to consider when conducting the review.

- Effectiveness of evacuation – did personnel evacuate? Were proper evacuation routes used? Do the designated routes work for you? Were evacuation routes posted, egress properly indicated?
- Alarm effectiveness – was it heard/seen – was it understood?
- Was the correct assembly area used? – Does the location of the assembly areas make sense based on hazards, wind direction, etc.?
- How were off-site personnel accounted for?
- Did personnel report-in properly?
- How effective was the sign-in sheet to account for personnel?
- Evaluate duties and performance of those operating critical equipment.
- Evaluate communication.

Emergency Evacuation Sheet

**SAFETY STANDARD OPERATING PROCEDURES
ALEXANDRIA RENEW ENTERPRISES (AlexRenew)**

Mosquito Control Program



ALEXANDRIA RENEW ENTERPRISES

7/27/2021

WARNING! This document is uncontrolled when printed.

1

Verify current revisions using the AlexRenew EMS web site or the Safety Coordinator

SAFETY STANDARD OPERATING PROCEDURES ALEXANDRIA RENEW ENTERPRISES (AlexRenew)

I. Background

Mosquito Biology

Mosquitoes are of the order Diptera, or flies. They are found worldwide from the tropics to the Arctic. Mosquitoes undergo complete metamorphosis, egg, larvae, pupae, and adult. They are important to humans in the adult stage, all other stages occur in water. There are about three thousand species of mosquitoes worldwide, approximately 170 species in North America. Breeding sites, biting preferences, time of day they bite, and ability to transmit diseases, vary with the species.

Breeding occurs in any area there is standing water such as stagnant ponds, discarded tires, tree stumps, etc. The more rainfall per season, the more numerous the mosquitoes. With mild winters and excessive rainfalls, the possibility of a troublesome mosquito season is more likely. This will create a higher possibility of disease carrying mosquitoes. The Alexandria City Health Department has announced in July 2006 that trapped mosquitoes in the 4200 block of Eisenhower Ave. tested positive for West Nile Virus.

West Nile Virus

There are several species of mosquitoes that can carry the disease, not the least of which is the *Culex pipiens*, a common mosquito in the United States. This disease was first isolated in 1937 in a woman's blood in the West Nile province of Uganda. Since then there have been outbreaks of epidemic proportions in Israel in the 50's, France in the 60's, thousands of cases in South Africa in the 70's, New York City in the 90's and 2000 and now in the City of Alexandria.

Wild and domestic birds are the most common vertebrate hosts for the West Nile virus, thus making the disease extremely mobile. Crows, chickens, pigeons, and hawks are among those carriers of the virus which once infected and cross state lines, are bitten by a local mosquito which bites and infects a local crow. As you can see it's movement is rapid. Quarantine is next to impossible.

What can be done? The City of Alexandria's Health Department has AlexRenew on its list of sites to insure compliance with the city's mosquito control plan. The Health Department performs periodic surveillance and treatment at the Authority. The City Health Department will carefully monitor and report newly discovered outbreaks within the city and on the plant. Treatments to standing water at AlexRenew will be made as deemed necessary by the Health Department and AlexRenew staff. As a facility within the city, AlexRenew is committed to being proactive in the control of mosquitoes. Every employee must do their part in controlling the population of mosquitoes on the facility.

7/27/2021

2

WARNING! This document is uncontrolled when printed.

Verify current revisions using the AlexRenew EMS web site or the Safety Coordinator

**SAFETY STANDARD OPERATING PROCEDURES
ALEXANDRIA RENEW ENTERPRISES (AlexRenew)**

II. RESPONSIBILITIES

- A. Department Directors will be responsible for implementing and ensuring compliance with AlexRenew's mosquito control program within their department.

- B. The AlexRenew Safety Coordinator has the following responsibilities under AlexRenew's mosquito control program:
 - 1. To continue to build and develop, AlexRenew's mosquito control program.
 - 2. Coordinate with the Alexandria Health Department, as necessary, for any treatment or surveillance needs that would be in addition to what is automatically in place.
 - 3. Respond to all AlexRenew related concerns dealing with mosquito infestation on Authority property.
 - 9. Ensure outside contractors hired to perform work at AlexRenew facilities are aware of the Authority Mosquito Control Plan.

- C. Contract Specialist
 - 1 Is AlexRenew's contact with the City Health Department for inspections and treatment.
 - 2. The Contract Specialist will accompany the Health Department inspectors while they are on Authority property.
 - 3. Immediately notify Team, Shift Leaders or the Engineer Assistant of any areas where larva may develop and actions needed to be taken to reduce the risk of infestation.
 - 2. Document inspections and treatment.
 - 3. Contacting the Safety Coordinator whenever major problems develop pertaining to the Authority Mosquito Control Program.

- D. AlexRenew Team/ Shift Leaders and other Supervisors have the following responsibilities under AlexRenew's Mosquito Control Program
 - 1. Clean and maintain catch basins that show evidence of holding water both in and outside of buildings and tunnels.

7/27/2021

3

WARNING! This document is uncontrolled when printed.

Verify current revisions using the AlexRenew EMS web site or the Safety Coordinator

SAFETY STANDARD OPERATING PROCEDURES ALEXANDRIA RENEW ENTERPRISES (AlexRenew)

2. Collect and properly discard all useless artificial containers that water may collect in such as cans, bottles, buckets, 55 gallon drums, old machinery, valves, pipes, pumps ext.
3. Cover or turn over items that will collect water that can not be disposed of immediately.
4. Inspect and clean rain gutters and down spouts regularly.
5. Inspect and dewater areas such as secondary containment tanks and air plenums after rain events.
6. Fill or drain low places where water may accumulate and stand for more than a week.
7. Properly maintain the fish pond above building E.

If drainage is a major problem or if drainage ditches remain damp, use a larvicide, (mosquito dunks or Altosid). These are biological or growth regulators and are not harmful to fish, humans or other animals. The two pictures below are ideal situations for larvicides.



E. Warehouse:

1. Maintain an adequate supply of larvicide on hand at all times during summer months to issue to teams and shifts as needed.
2. Maintain an adequate supply of insect repellent in both spray and towelette form.
3. Maintain an adequate supply of insecticide in both individual sprays and spray containers for large areas.

F. Technical Services:

1. Assist AlexRenew Team Leaders when requested to resolve drainage issues.
2. Ensure outside contractors hired to perform work at AlexRenew facilities comply with the Authority's Mosquito Control Plan.

G. All AlexRenew employees will be responsible for:

7/27/2021

4

WARNING! This document is uncontrolled when printed.

Verify current revisions using the AlexRenew EMS web site or the Safety Coordinator

**SAFETY STANDARD OPERATING PROCEDURES
ALEXANDRIA RENEW ENTERPRISES (AlexRenew)**

1. Become familiar with and complying with AlexRenew's mosquito control program.
2. Notifying their supervisor when they notice areas at AlexRenew that need attention to reduce or eliminate standing water.
3. Properly discard all useless artificial containers that water may collect in such as cans, bottles, buckets, 55 gallon drums, old machinery, valves, pipes, pumps or other items that will collect water after a rain event.
4. Cover or turn over items that will collect water that cannot be disposed of immediately.
5. Inspect and clean rain gutters and down spouts regularly.
6. Inspect and dewater areas such as secondary containment tanks and air plenums after rain events.
7. Fill or drain low places where water may accumulate and stand for more than a week.

THIS PAGE INTENTIONALLY BLANK

HOT WORK PERMIT PROGRAM

PURPOSE:

The purpose of this procedure is to ensure that our employees, contractors and company property are properly protected against fire, explosion, and other dangers resulting from hot work (cutting and welding).

SCOPE:

The procedure covers any oxygen fuel gas and electric arc cutting and welding operation that could become a source of ignition in a hazardous area. The procedure applies to all employees and contractors working in this facility. Should hot work include hot tapping, the procedures and precautions are to be expanded as outlined in API 2201 referenced below.

REFERENCE:

- A) 29 CFR 1910.119 Process Safety Management of Highly Hazardous Chemicals, paragraph (k).
- B) 29 CFR 1910.252 (a) Welding, Cutting & Brazing--General Requirements.
- C) NFPA 51, Standard for the Design and Installation of Oxygen Fuel Gas Systems for Welding, Cutting and Allied Processes.
- D) NFPA 51B, Standard for Fire Prevention in Use of Cutting and Welding Processes.
- E) ANSI Z491, American National Standard Safety in Welding and Cutting.
- F) API 2201, Procedures for Welding or Hot Tapping on Equipment Containing Flammables.

DEFINITIONS:

The following is an alphabetical listing defining terms and abbreviations as used throughout this document with which a user of this procedure should be familiar. Where applicable, examples are given in order to provide clarification. These examples are intended to show typical issues which may arise when following the hot work permit procedure. These issues are not intended to be an

all encompassing list within the scope of this procedure. Rather, it is intended to provide guidance when issuing the hot work permits.

If in doubt whether to issue a hot work permit, it is recommended that a permit be issued subject to the provisions of this procedure.

Catastrophic Release:

A major release of ammonia or other hazardous chemicals resulting from uncontrolled developments which leads to, or could have led to, serious danger to persons both within and outside the work place.

Combustible:

Any and all materials that could ignite. Common examples include but are not limited to plastics (belts, tray/cups, gears, chains, etc), paper products, wood, etc.

Cutter/Welder:

The individual performing the hot work operations.

Fire Watch:

A fire watch is required during all hot work outside the designated engineering welding station. The fire watch shares the responsibility for fire/safety with the cutter/welder. The fire watch should maintain a constant vigil during the operation (including lunch and coffee breaks) to watch for stray sparks, ignition sources, or other fire hazards. This individual should be specifically trained in the use of a fire extinguisher, small hose and/or bucket of sand and should stay with this equipment. He/she should be familiar with the facilities and also know how to sound the fire alarm.

Hazard:

A potential for an accident with undesirable consequences, usually involving a loss of containment of flammable, combustible, highly toxic (i.e., ammonia) or reactive materials.

Hazardous Location:

A hazardous location is one where flammable gases, vapors, or combustible dust are (or may be) present in the air in sufficient quantities to provide a fire or explosion.

Hot Work Operations:

Any operation that could cause a source of ignition in a hazardous area. A hot work permit is required for any hot work operations.

Process:

All activities that involve the receipt, storage, handling, compression, or movement of ammonia, including utility systems, required for the safe operation of the ammonia facility.

Source of Ignition:

A source of ignition is a flame, tool spark, static electric charge, or electric spark that would cause a fire or explosion.

Example:

- Welding, burning, brazing, soldering, or any use of an open flame;
- Metal removing such as drilling, chipping, abrasive cutting, milling, grinding, etc.;
- Internal combustion engines;
- Explosive-actuated fastening tools;
- Cutting or chipping concrete with or without reinforcements:
- Operating non-explosion-proof equipment and tools in an explosion-proof area. Includes battery powered equipment and tools;
- Operating any cleaning device utilizing a metal or any other material contact that can produce sparks; and,
- Work on live electrical circuits of any voltage in hazardous locations.

PROCEDURES:

The hot work permit procedures that should be followed can be outlined by the following major steps:

- 1) Initiating a Hot Work Permit
- 2) Issuing a Hot Work Permit
- 3) Performing Hot Work
- 4) Completing the Hot Work Permit Procedure

Several different persons and departments may also be involved. The following information describes the responsibilities at various levels in the organization for the major steps in the hot work permit procedure.

1.0 INITIATING A HOT WORK PERMIT

- 1.1 The first step in the hot work permit procedure is the identification of the need for a hot work permit. The request for a hot work permit may be made by any facility Maintenance employee or by any

outside contractor completing hot work outside the designated hot work area located in the engineering department. The request for a hot work permit should be submitted prior to work beginning (verbally or in writing) to the EHS Manager, Maintenance Supervisor or designee on the day that the hot work is to be performed.

2.0 ISSUING A HOT WORK PERMIT

- 2.1 EHS, Maintenance Supervisor, or designee has the responsibility to fill out the hot work permit (see *Form*) once a request for a hot work permit is made. The permit should be filled out before the hot work is started. EHS, Maintenance employee, or designee should inspect the work area before filling out the hot work permit.
- 2.2 Section 1 of the hot work permit should show the date and time that the work will be performed, the location, a short description of the work to be performed, the name of the cutter/welder, and the name of the fire watch. A fire watch is required for all hot work performed outside the engineering shop designated area. The hot work permit is valid only for the job and the time listed in this section no longer than one shift or 8 hours.
- 2.3 The next step is for the EHS, Maintenance Supervisor, or designee to review the list of hot work precautions with the cutter/welder and with the fire watch (see *Form*). These precautions are summarized in checklist form on the hot work permit (see Section 2 of *Form*), posted in the engineering shop, and to be posted on the equipment where the work is to be performed. Note that the hot work precautions outlined in Section 2 of the form are minimum precautions; additional measures for safety of personnel or property may be taken as deemed necessary.
- 2.4 EHS, Maintenance Supervisor, or designee **assures all necessary hot work precautions have been taken, he/she should initial each item in Section 2 of the permit, sign the permit, and then issue it to the cutter/welder.** The cutter/welder and the fire watch should sign Section 1 indicating that they have reviewed the hot work precautions with the supervisor and understand their responsibilities. EHS, Maintenance Supervisor, or designee, should make and keep a copy of the permit.

3.0 PERFORMING HOT WORK

- 3.1 The cutter/welder should affix the hot work permit and the hot work precautions to a visible place in the work area. The permit should remain in this place until the hot work is completed. The cutter/welder is responsible for conducting the hot work within the authorized parameters and time limit set by the permit. Hot work may continue as long as conditions remain safe and no new hazards have been introduced.
- 3.2 The following precautions should be taken when performing any hot work operations at the facility:
- Perform hot work in the engineering shop except when the job cannot be moved to the shop.

- Use only equipment that is in good condition. Valves, regulators, hoses and torches should be thoroughly checked.
- Do not perform portable welding, cutting, or other hot work in a building where sprinklers are out of service.
- Move combustibles at least 35 feet from hot work operations. If combustibles cannot be moved, they should be protected by flame proof curtains or covers.
- Do not perform hot work in or on any vessels containing flammable or combustible materials including residues, until they have been disconnected or blanked, completely cleaned out, and purged. Safe Work Practices for Opening of System should be adhered to.
- Check the atmosphere for combustible gases or vapors, where necessary, using reliable combustible gas detection equipment. If there is a chance of gas release during hot work operations, continuous-duty portable combustible gas detectors should be used to continuously monitor the area.
- Ensure that a fire extinguisher, a small hose and/or bucket of sand are readily available for instant use in the area.
- Do not perform hot work until surrounding floors have been swept clean, and, if combustible, wet down with water.
- Do not perform hot work until all wall and floor openings within 35 feet of the operations have been tightly covered or otherwise protected with metal guards or flame proofed tarps.
- Do not perform hot work until a fire watch has been assigned to watch for dangerous sparks in the area and on floors above and below the operation.
- Secure gas cutting and welding cylinders so they will not be damaged and replace protective caps (and close gas supply valves) on all cylinders not actually in use.
- Carefully and securely connect the ground clamp when using electrical arc welding equipment. Since improperly made ground can be a source of ignition, the ground clamp should be connected as close to the work as possible so that it may easily be observed.
- Use portable stands to elevate welding hose or cable off floor areas to avoid damage to the hose or cable.
- Ensure adequate ventilation is maintained during hot work operations to assure that personnel are not exposed to harmful fumes. This may include positioning of an exhaust blower close to the point of the exhaust fumes. Respiratory protection should also be considered.

- Remove all electrodes from the holders, carefully locate them so that accidental contact cannot occur, and disconnect the welding machine from the power source if hot work is to be suspended for any substantial period (e.g., lunch or overnight).

- 3.3 The fire watch shares the responsibility for fire/safety with the cutter/welder. The fire watch should maintain a constant vigil during the operation (including lunch and coffee breaks) to watch for stray sparks, ignition sources, or other fire hazards. This individual should be specifically trained in the use of a fire extinguisher, small hose and/or bucket of sand and should stay with this equipment. He/she should be familiar with the facilities and also know how to sound the fire alarm. It is the fire watch's responsibility to try to extinguish any fires if they occur, as long as they are within the capacity of the equipment available, or otherwise sound the fire alarm.

The EHS, Maintenance Supervisor, or designee, should inspect the work area during the hot work operations to ensure that the conditions of the hot work permit are being fulfilled.

4.0 **COMPLETING THE HOT WORK PERMIT PROCEDURE**

- 4.1 When the hot work is completed, the cutter/welder and the fire watch should remain for at least another 30 minutes, carefully inspecting the work area and adjacent areas for the possibility of any smoldering fires. This inspection extends to floors above and below the work area and to adjacent rooms.
- 4.2 Barring any fires, the cutter/welder then removes the hot work permit. The cutter/welder should sign Section 3 of the permit, write the completed time and then return the permit to the EHS, Maintenance Supervisor, or designee.
- 4.3 The EHS, Maintenance Supervisor, or designee, the cutter/welder, or the fire watch should return to the area two to four hours later; smoldering fires may take that long to become apparent. After this final inspection, the EHS, Maintenance Supervisor, or designee, should sign Section 3 of the hot work permit, write the time the system was inspected, and retain the permit in the maintenance files as a record of the work.

5.0 **PERSONNEL RESPONSIBILITIES**

- 5.1 The following describes the various persons/departments who may be involved in the hot work permit procedure, and summarizes their responsibilities.

A. Originator

- Identifies the need for a hot work permit if outside the designated area located in the engineering shop;
- Submits hot work permit request (verbally or in writing) to the EHS, Maintenance Supervisor, or designee, and

- Works with other departments, as assigned, during the implementation of the hot work permit procedure.

B.

- Has overall responsibility for ensuring that the hot work permit procedure is followed at the facility.
- Inspects the work area before filling out the hot work permit;
- Assigns a fire watch;
- Completes Sections 1 and 2 of the hot work permit after completing inspection of work area;
- Reviews the list of hot work precautions with the cutter/welder and the fire watch;
- Specifies any additional precautions which may be necessary for the hot work permit;
- Signs the hot work permit and issues it to the cutter/welder when assured that all necessary hot work precautions have been taken;
- Inspects the work area during the hot work operations to ensure that the conditions of the hot work permit are being fulfilled;
- Returns to the hot work area (or direct cutter/welder or fire watch to return to the area) two to four hours later to inspect for smoldering fires; and,
- Signs Section 3 and file the hot work permit after the final site inspection has been completed.

C. Cutter/Welder

Supervisor, or designee,

- Reviews the list of hot work precautions with the EHS Manager , Maintenance and signs Section 1 of the permit;
- Affixes the hot work permit and the hot work precautions to a visible place in the work area;
- Conducts the hot work operations within the authorized parameters and time limit set by the hot work permit;
- Stops hot work operations if any new hazards are introduced to the process;

- Returns to hot work area two to four hours later to inspect for smoldering fires if instructed to do so by the EHS Manager, Maintenance Supervisor, or designee.

D. Fire Watch

- Supervisor, or designee,
- Reviews the list of hot work precautions with the EHS Manager, Maintenance Supervisor, or designee, and signs Section 1 of the permit;
 - Maintains a constant vigil during the hot work operations (including lunch and coffee breaks) to watch for stray sparks, ignition sources, or other fire hazards;
 - Ensures that a fire extinguisher, a small hose and/or bucket of sand are readily available for instant use in the area;
 - Stops hot work operations if any new hazards are introduced to the process;
 - Extinguishes any fires if they occur as long as they are within the capacity of the equipment available, or otherwise sounds the fire alarm;
 - Remains in the area for at least 30 minutes after work is completed, carefully inspecting the work area and adjacent areas for any smoldering fires; and,
 - Returns to hot work area two to four hours later to inspect for smoldering fires if instructed to do so by the EHS Manager, Maintenance Supervisor, or designee.

6.0 PERSONNEL

- 6.1 The EHS Manager has the ultimate responsibility for the hot work permit process. He/she may designate other individuals to be able to authorize hot work.
- 6.2 The following personnel have been trained and are qualified to serve in the role of Fire Watcher when hot work is being performed:

NamePosition/CompanyPhone Number

7.0 DOCUMENT MANAGEMENT

- 7.1 The only document associated with hot work permit procedures is the permit itself. Documentation should be managed as follows:

- 7.2 Hot Work Permit

EHS Manager, Maintenance Supervisor, or designee retains the supply of blank permits. Upon request he/she fills out Sections 1 and 2 of the permit and signs it to authorize the work. The permit may then be signed by the cutter/welder and one copy of both sides of the permit is made. EHS Manager, Maintenance Supervisor, or designee retains the copy and cutter/welder takes the original to the job site where it is posted. Upon successful completion of the work the Supervisor or Fire Watcher signs Section 3 of the permit. The completed permit is then filed as follows:

Original – Welding Program Binder

8.0 FORMS

A two-sided hot work permit consisting of three sections has been prepared and is included herein.

HOT WORK PERMIT FORM

(Yellow Card Stock Sample If Used)

HOT WORK PERMIT FOR CUTTING AND WELDING WITH PORTABLE GAS OR ARC EQUIPMENT

SECTION 1			or designee:	
	Date:			Permit Expires date/time:
	Building:			Work Date:
	Dept.:			Floor:
Type of Stainless Steel:			Actual Burn Time:	
Type of Equipment:			_____ Seconds and/or _____ Minutes	

Work to be Done:	
Type of Work: <input type="checkbox"/> Cutting <input type="checkbox"/> Welding <input type="checkbox"/> Retrofit <input type="checkbox"/> New	
Work Performed By: <input type="checkbox"/> In House People <input type="checkbox"/> Outside Contractor(s)	
Cutter/Welder Name:	Fire Watch Name:
<p>Is work to be done on ammonia refrigeration piping or equipment? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Is fire watch required (required for all hot work outside engineering designated area)? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Is there overhead work? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Relocation of combustible materials including plastic components? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Protective covering to protect unmovable combustibles? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Is there equipment to convey sparks? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Type of fire extinguisher required. <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> ABC</p> <p>Was required completed – Firewatch training annually and hot work procedure triennial? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Describe precautions required with any combustible materials:</p> <p><input type="checkbox"/> To ensure the floors are clear or protected from combustible fires we completed the following:</p> <p><input type="checkbox"/> To ensure the walls and ceiling are clear or protected from combustible fires we completed the following:</p> <p><input type="checkbox"/> To ensure components on and around equipment are clear or protected from combustible fires we completed the following:</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No – There are no plastics or other combustibles in area (within 35 feet) that are not removed or protected?</p>	

SECTION 2

ATTENTION

Before approving any cutting and welding permit, the chief engineer or assistant chief engineer or designee shall inspect the work area and confirm that precautions have been taken to prevent fire in accordance with Hot Work Procedures.

PRECAUTIONS

- ☐ Sprinkler in service.
- ☐ Cutting and welding equipment in good repair.

WITHIN 35 FT. OF WORK AREA

- ☐ Floors swept clean of combustibles.
- ☐ Combustible floors wet down, covered with damp sand, metal or other shields.
- ☐ No combustible material or flammable liquids in the area including unprotected plastics components.
- ☐ Combustible component (plastics) and flammable liquids protected with covers, guards or metal shields.
- ☐ All wall and floors openings covered.
- ☐ Covers suspended beneath work to collect sparks.

WORK ON WALLS OR CEILINGS

- ☐ Construction noncombustible and without combustible covering.
- ☐ Combustibles moved away from opposite wall.

WORK ON ENCLOSED EQUIPMENT

(Tanks, containers, piping, ducts, dust collectors, etc.)

- ☐ Equipment cleaned of all combustibles.
- ☐ Opening of ammonia refrigeration systems practices followed.
- ☐ Containers properly purged of flammable liquid and vapors.

FIRE WATCH

- ☐ To be provided during and 30 minutes after operation.
- ☐ Supplied with fire extinguishers and small water hose.
- ☐ Trained in use of equipment and in sounding fire alarm.

After the above inspection is completed sign below to authorize the work to begin:

Chief or Assistant Chief Engineer or designee: _____ Date: _____

Welder/Cutter: _____ Date: _____

Fire Watch: _____ Date: _____

SECTION 3

FINAL CHECK-UP

Work area and all adjacent areas to which sparks and heat might have spread (including floors above and below and on opposite sides of walls) were inspected 30 minutes after the work was completed and were found fire safe.

Site Inspection Date/Time: _____

Issued By: _____

Welder/Cutter: _____

Fire Watcher: _____

THIS FORM SHOULD BE KEPT ON FILE FOR ONE YEAR AFTER ALL WORK IS COMPLETED.

Alexandria Renew Enterprises
Document: Hazardous Communication Written Program
Training: All Staff
Approval Initials:
Original Issue Date: 04/10/15 Revision Date:



Table of Contents

Section I	OSHA Hazard Communication Standard
Section II	Written Hazard Communication Program
Appendix A	Hazardous Chemical Inventory
Appendix B	HMIS Labeling System
Appendix C	Access to Employee Exposure and Medical Records Standard

Alexandria Renew Enterprises
Document: Hazardous Communication Written Program
Training: All Staff
Approval Initials:
Original Issue Date: 04/10/15 Revision Date:



SECTION I

OSHA HAZARD COMMUNICATION STANDARD

OSHA Hazard Communication Standard

The following summarizes your rights to hazardous chemical information under the Occupational Safety and Health Act, Hazard Communication Standard, 29 CFR Part 1910.1200.

PURPOSE:

The purpose of this Standard is to ensure that the hazards of all chemical manufacturers or importers are evaluated and that information concerning these hazards is communicated to affected employers and employees. This conveyance of information is to be accomplished by means of a comprehensive hazard communication programs, which includes container labeling and other forms of warnings, Material Safety Data Sheets and employee training.

SCOPE AND APPLICATION:

All chemical manufacturers or importers are to assess the hazards of chemicals, which they produce or import. Employers are to provide information to their employees about the hazardous chemicals to which they are exposed. Distributors are to transmit information on hazardous materials supplied to employers who use them in their workplace. This applies to any chemical, which is known to be present in the workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency.

The EHS manager shall maintain Safety Data Sheets and labels on materials used and ensure that employees are informed of the hazards of the chemicals in their workplace and provide proper training in handling and using these chemicals.

HAZARD DETERMINATION:

Chemical manufacturers and importers shall evaluate chemicals they produce or distribute to determine if they are hazardous. Employers are not required to evaluate chemicals unless they choose to, but instead can rely on evaluations performed by the manufacturer or distributor of the materials. Products must be evaluated for both health and physical hazards.

WRITTEN HAZARD COMMUNICATION PROGRAM:

The written program must describe the following:

1. How labeling will be handled.
2. How Material Safety Data Sheets (MSDS) will be maintained.
3. Employee training.
4. List of hazardous chemicals identified in the workplace.
5. Methods used to inform employees of the hazards of non-routine tasks.
6. Methods by which contractors will be informed of the hazardous chemicals in the workplace.

LABELS AND OTHER FORMS OF WARNING:

Containers of hazardous chemicals coming in or leaving the workplace must be labeled, tagged, or marked with the name of the hazardous chemical and appropriate hazard warnings. In addition, the name and address of the manufacturer or distributor should be included on the container.

“Container: is defined as any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank or the like that contains hazardous chemicals. Pipes and piping systems are not considered containers.

SAFETY DATA SHEETS:

Chemical manufacturers and importers are required to obtain or develop a Safety Data Sheet for each hazardous chemical they produce or import. Employees shall have a Safety Data Sheet for each hazardous chemical used in the workplace. Safety Data Sheet content is spelled out by the Standard. Safety Data Sheets must be in English and shall be readily accessible to employees. Safety Data Sheets may be kept in any form as long as the required information is provided.

Where Material Safety Data Sheets are not provided, the employer is required to request one as soon as possible from the supplier. Safety Data Sheets must be currently maintained.

EMPLOYEE TRAINING AND INFORMATION:

Employers must provide employees with information and training on hazardous chemicals in their work areas. Training shall be provided at the time of their initial assignment and anytime a new hazard is introduced.

Employees must be provided information on:

1. Requirements of this Standard.
2. Operations in their work area where hazardous chemicals are present.

3. The location and availability of the written hazard communications program, including the required list of hazardous materials and Safety Data Sheets (SDS).

Employee training shall include:

1. Methods and observations that may be used to detect the presence or release of a hazardous chemical.
2. Physical and health hazards of the chemicals in the work area.
3. How employees can protect themselves from these hazards.
4. How to respond in emergency situations.
5. Details of the hazard communications program, including an explanation of the labeling system and Material Safety Data Sheet system.

TRADE SECRETS:

The Standard provides for trade secret protection by providing specific guidelines for protecting proprietary chemical identification information. Provisions are included to allow the identity of such trade secret information to be given to medical and health professionals if the information is necessary for emergency or first-aid treatment, or required by the user to evaluate health effects within their operation.

Alexandria Renew Enterprises
Document: Hazardous Communication Written Program
Training: All Staff
Approval Initials:
Original Issue Date: 04/10/15 Revision Date:



SECTION II

WRITTEN HAZARD COMMUNICATION PROGRAM

Written Hazard Communication Program

Alexandria Renew Enterprises has developed and is now implementing a **Written Hazard Communication Program** for our workplace. This program examines specific criterion related to label requirements, other forms of warning, Material Safety Data Sheets, and employee information and training. The program breaks down plant work areas, chemicals used in each area and defines “safe working”. Our goal is to provide a safe working environment for all employees. We intend to protect our employees from hazardous chemicals in the workplace by means of a thorough employee training program.

I. LISTING OF ALL HAZARDOUS CHEMICALS

A listing of all hazardous chemicals used by Alexandria Renew Enterprises is listed in “Appendix A” of this training manual. The identity of each hazardous chemical is listed by its *common name*; the name that will be recognizable and familiar to employees. “Appendix A” also states which department is affected. Labels or other warning forms are in place concerning each product.

II. LABELING AND OTHER FORMS OF WARNING

The purpose of the label or other form of warning is to provide an immediate visual warning to employees concerning the hazards of the chemical in its container. Two important points must appear on hazardous chemical labels and they are as follows:

1. Identity of the hazardous chemical
2. Appropriate hazard warnings
3. Name and address of the chemical manufacturer, importer or other responsible party

The identity of the hazardous chemical on the label may appear either as the chemical name or common name. For the sake of our program and training reference purposes, we will always utilize the product’s common name (if applicable). Any labels that we make and apply will also use the product’s common name.

There are many areas of responsibility regarding an effective labeling program. A team effort is necessary in order for our program to be successful. Every employee should become label conscious. The label hazard warning must convey the hazard of the chemical by appropriate warning. Phrases such as “Warning”, “Danger” do not meet the requirements established by OSHA. Hazard Warning means any words, pictures, or combination thereof and are appropriate that convey the hazards of the chemical. All

containers in the workplace that contain a hazardous chemical must be properly labeled. Each department supervisor will be responsible for ensuring that all containers in the plant or outstations are labeled by that date.

Labeling responsibilities will be an ongoing process. As each department orders and receives products, it will be that department head's responsibility to check incoming and outgoing products that fit into the hazard chemical category for proper labeling. Labels will be distributed to every department for use on containers without labels. No one shall remove or deface existing labels on the incoming containers of hazardous chemicals unless the container is immediately marked with the required information. Department Managers and Supervisors will make sure that labels or other forms of warning are legible, written in English, and prominently displayed on the container or readily available in the work area throughout each work shift. Signs, placards, process sheets, batch tickets, operating procedures, or other such written materials may be used in lieu of affixing labels to individual stationary process containers as long as the alternative method identifies the containers to which it is applied and it conveys the appropriate information.

Portable containers are exempt from labeling as long as the hazardous chemical is for the immediate use of the employee who performs the transfer.

Any reviewing, updating of labeling systems, and alternative labeling must be approved by the EHS Manager.

III. SAFETY DATA SHEETS

The EHS Manager has overall responsibility of the Hazard Communication Program and will, along with the applicable Department Managers and Supervisors, update information on current SDS's and also obtain new SDS's. The EHS Manager will ensure that formal classroom training is conducted in order to introduce and familiarize all employees with our Hazard Communication Program and the SDS's.

After initiation of the Hazard Communication Program with all present employees, the responsibility of covering out program with new employees will rest with the departmental supervisors. As a part of their first day on the job, new employees will be familiarized with our program and trained to recognize hazardous chemicals in the workplace and have a basic understanding of the information provide by the SDS's.

The SDS includes information such as the properties of each chemical; the physical, health, and environmental health hazards; protective measures; and safety precautions for handling, storing, and transporting the chemical. The information contained in the SDS must be in English (although it may be in other languages as well). In addition, OSHA requires that SDS preparers provide specific minimum

information as detailed in Appendix D of 29 CFR 1910.1200. The SDS preparers may also include additional information in various section(s).

Sections 1 through 8 contain general information about the chemical, identification, hazards, composition, safe handling practices, and emergency control measures (e.g., fire fighting). This information should be helpful to those that need to get the information quickly. Sections 9 through 11 and 16 contain other technical and scientific information, such as physical and chemical properties, stability and reactivity information, toxicological information, exposure control information, and other information including the date of preparation or last revision. The SDS must also state that no applicable information was found when the preparer does not find relevant information for any required element.

The SDS must also contain Sections 12 through 15, to be consistent with the UN Globally Harmonized System of Classification and Labeling of Chemicals (GHS), but OSHA will not enforce the content of these sections because they concern matters handled by other agencies.

description of all 16 sections of the SDS, along with their contents, is presented below:

Section 1: Identification

This section identifies the chemical on the SDS as well as the recommended uses. It also provides the essential contact information of the supplier. The required information consists of:

- Product identifier used on the label and any other common names or synonyms by which the substance is known.
- Name, address, phone number of the manufacturer, importer, or other responsible party, and emergency phone number.
- Recommended use of the chemical (e.g., a brief description of what it actually does, such as flame retardant) and any restrictions on use (including recommendations given by the supplier). ¹

Section 2: Hazard(s) Identification

This section identifies the hazards of the chemical presented on the SDS and the appropriate warning information associated with those hazards. The required information consists of:

- The hazard classification of the chemical (e.g., flammable liquid, category¹).
- Signal word.
- Hazard statement(s).
- Pictograms (the pictograms or hazard symbols may be presented as graphical reproductions of the symbols in black and white or be a description of the name of the symbol (e.g., skull and crossbones, flame).
- Precautionary statement(s).
- Description of any hazards not otherwise classified.
- For a mixture that contains an ingredient(s) with unknown toxicity, a statement describing how much (percentage) of the mixture consists of ingredient(s) with unknown acute toxicity. Please note that this is a total percentage of the mixture and not tied to the individual ingredient(s).

Section 3: Composition/Information on Ingredients

This section identifies the ingredient(s) contained in the product indicated on the SDS, including impurities and stabilizing additives. This section includes information on substances, mixtures, and all chemicals where a trade secret is claimed. The required information consists of:

Substances

- Chemical name.
- Common name and synonyms.
- Chemical Abstracts Service (CAS) number and other unique identifiers.
- Impurities and stabilizing additives, which are themselves classified and which contribute to the classification of the chemical.

Mixtures

- Same information required for substances.
- The chemical name and concentration (i.e., exact percentage) of all ingredients which are classified as health hazards and are:
 - Present above their cut-off/concentration limits or
 - Present a health risk below the cut-off/concentration limits.
- The concentration (exact percentages) of each ingredient must be specified except concentration ranges may be used in the following situations:
 - A trade secret claim is made,
 - There is batch-to-batch variation, or
 - The SDS is used for a group of substantially similar mixtures.

Chemicals where a trade secret is claimed

- A statement that the specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret is required.

Section 4: First-Aid Measures

This section describes the initial care that should be given by untrained responders to an individual who has been exposed to the chemical. The required information consists of:

- Necessary first-aid instructions by relevant routes of exposure (inhalation, skin and eye contact, and ingestion).
- Description of the most important symptoms or effects, and any symptoms that are acute or delayed.
- Recommendations for immediate medical care and special treatment needed, when necessary.

Section 5: Fire-Fighting Measures

This section provides recommendations for fighting a fire caused by the chemical. The required information consists of:

- Recommendations of suitable extinguishing equipment, and information about extinguishing equipment that is not appropriate for a particular situation.
- Advice on specific hazards that develop from the chemical during the fire, such as any hazardous combustion products created when the chemical burns.
- Recommendations on special protective equipment or precautions for firefighters.

Section 6: Accidental Release Measures

This section provides recommendations on the appropriate response to spills, leaks, or releases, including containment and cleanup practices to prevent or minimize exposure to people, properties, or the environment. It may also include recommendations distinguishing between responses for large and small spills where the spill volume has a significant impact on the hazard. The required information may consist of recommendations for:

- Use of personal precautions (such as removal of ignition sources or providing sufficient ventilation) and protective equipment to prevent the contamination of skin, eyes, and clothing.
- Emergency procedures, including instructions for evacuations, consulting experts when needed, and appropriate protective clothing.
- Methods and materials used for containment (e.g., covering the drains and capping procedures).
- Cleanup procedures (e.g., appropriate techniques for neutralization, decontamination, cleaning or vacuuming; adsorbent materials; and/or equipment required for containment/clean up)

Section 7: Handling and Storage

This section provides guidance on the safe handling practices and conditions for safe storage of chemicals. The required information consists of:

- Precautions for safe handling, including recommendations for handling incompatible chemicals, minimizing the release of the chemical into the environment, and providing advice on general hygiene practices (e.g., eating, drinking, and smoking in work areas is prohibited).
- Recommendations on the conditions for safe storage, including any incompatibilities. Provide advice on specific storage requirements (e.g., ventilation requirements)

Section 8: Exposure Controls/Personal Protection

This section indicates the exposure limits, engineering controls, and personal protective measures that can be used to minimize worker exposure. The required information consists of:

- OSHA Permissible Exposure Limits (PELs), American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs), and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the safety data sheet, where available.
- Appropriate engineering controls (e.g., use local exhaust ventilation, or use only in an enclosed system).

- Recommendations for personal protective measures to prevent illness or injury from exposure to chemicals, such as personal protective equipment (PPE) (e.g., appropriate types of eye, face, skin or respiratory protection needed based on hazards and potential exposure).
- Any special requirements for PPE, protective clothing or respirators (e.g., type of glove material, such as PVC or nitrile rubber gloves; and breakthrough time of the glove material).

Section 9: Physical and Chemical Properties

This section identifies physical and chemical properties associated with the substance or mixture. The minimum required information consists of:

- Appearance (physical state, color, etc.);
- Upper/lower flammability or explosive limits;
- Odor;
- Vapor pressure;
- Odor threshold;
- Vapor density;
- pH;
- Relative density;
- Melting point/freezing point;
- Solubility(ies);
- Initial boiling point and boiling range;
- Flash point;
- Evaporation rate;
- Flammability (solid, gas);
- Upper/lower flammability or explosive limits;
- Vapor pressure;
- Vapor density;
- Relative density;
- Solubility(ies);
- Partition coefficient: n-octanol/water;
- Auto-ignition temperature;
- Decomposition temperature; and
- Viscosity.

The SDS may not contain every item on the above list because information may not be relevant or is not available. When this occurs, a notation to that effect must be made for that chemical property. Manufacturers may also add other relevant properties, such as the dust deflagration index (Kst) for combustible dust, used to evaluate a dust's explosive potential

Section 10: Stability and Reactivity

This section describes the reactivity hazards of the chemical and the chemical stability information. This section is broken into three parts: reactivity, chemical stability, and other. The required information consists of:

Reactivity

- Description of the specific test data for the chemical(s). This data can be for a class or family of the chemical if such data adequately represent the anticipated hazard of the chemical(s), where available.

Chemical stability

- Indication of whether the chemical is stable or unstable under normal ambient temperature and conditions while in storage and being handled.
- Description of any stabilizers that may be needed to maintain chemical stability.
- Indication of any safety issues that may arise should the product change in physical appearance.

Other

- Indication of the possibility of hazardous reactions, including a statement whether the chemical will react or polymerize, which could release excess pressure or heat, or create other hazardous conditions. Also, a description of the conditions under which hazardous reactions may occur.
- List of all conditions that should be avoided (e.g., static discharge, shock, vibrations, or environmental conditions that may lead to hazardous conditions).
- List of all classes of incompatible materials (e.g., classes of chemicals or specific substances) with which the chemical could react to produce a hazardous situation.
- List of any known or anticipated hazardous decomposition products that could be produced because of use, storage, or heating. (Hazardous combustion products should also be included in Section 5 (Fire-Fighting Measures) of the SDS.)

Section 11: Toxicological Information

This section identifies toxicological and health effects information or indicates that such data are not available. The required information consists of:

- Information on the likely routes of exposure (inhalation, ingestion, skin and eye contact). The SDS should indicate if the information is unknown.
- Description of the delayed, immediate, or chronic effects from short- and long-term exposure.
- The numerical measures of toxicity (e.g., acute toxicity estimates such as the LD50 (median lethal dose)) - the estimated amount [of a substance] expected to kill 50% of test animals in a single dose.
- Description of the symptoms. This description includes the symptoms associated with exposure to the chemical including symptoms from the lowest to the most severe exposure.
- Indication of whether the chemical is listed in the National Toxicology Program (NTP) Report on Carcinogens (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest editions) or found to be a potential carcinogen by OSHA

Section 12: Ecological Information (non-mandatory)

This section provides information to evaluate the environmental impact of the chemical(s) if it were released to the environment. The information may

include:

- Data from toxicity tests performed on aquatic and/or terrestrial organisms, where available (e.g., acute or chronic aquatic toxicity data for fish, algae, crustaceans, and other plants; toxicity data on birds, bees, plants).
- Whether there is a potential for the chemical to persist and degrade in the environment either through biodegradation or other processes, such as oxidation or hydrolysis.
- Results of tests of bioaccumulation potential, making reference to the octanol-water partition coefficient (Kow) and the bioconcentration factor (BCF), where available.
- The potential for a substance to move from the soil to the groundwater (indicate results from adsorption studies or leaching studies).
- Other adverse effects (e.g., environmental fate, ozone layer depletion potential, photochemical ozone creation potential, endocrine disrupting potential, and/or global warming potential).

Section 13: Disposal Considerations (non-mandatory)

This section provides guidance on proper disposal practices, recycling or reclamation of the chemical(s) or its container, and safe handling practices. To minimize exposure, this section should also refer the reader to Section 8 (Exposure Controls/Personal Protection) of the SDS. The information may include:


- Description of appropriate disposal containers to use.
- Recommendations of appropriate disposal methods to employ.
- Description of the physical and chemical properties that may affect disposal activities.
- Language discouraging sewage disposal.
- Any special precautions for landfills or incineration activities

Section 14: Transport Information (non-mandatory)

This section provides guidance on classification information for shipping and transporting of hazardous chemical(s) by road, air, rail, or sea. The information may include:

- UN number (i.e., four-figure identification number of the substance)¹.
- UN proper shipping name¹.
- Transport hazard class(es)¹.
- Packing group number, if applicable, based on the degree of hazard².
- Environmental hazards (e.g., identify if it is a marine pollutant according to the International Maritime Dangerous Goods Code (IMDG Code)).
- Guidance on transport in bulk (according to Annex II of MARPOL 73/78³ and the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (International Bulk Chemical Code (IBC Code))).
- Any special precautions which an employee should be aware of or needs to comply with, in connection with transport or conveyance either within or outside their premises (indicate when information is not available).

Section 15: Regulatory Information (non-mandatory)

Alexandria Renew Enterprises Document: Hazardous Communication Written Program Training: All Staff Approval Initials: Original Issue Date: 04/10/15 Revision Date:	
--	--



This section identifies the safety, health, and environmental regulations specific for the product that is not indicated anywhere else on the SDS. The information may include:

- Any national and/or regional regulatory information of the chemical or mixtures (including any OSHA, Department of Transportation, Environmental Protection Agency, or Consumer Product Safety Commission regulations)

Section 16: Other Information

This section indicates when the SDS was prepared or when the last known revision was made. The SDS may also state where the changes have been made to the previous version. You may wish to contact the supplier for an explanation of the changes. Other useful information also may be included here.

V. NON-ROUTINE TASKS

In the event non-routine tasks need to be performed, each department supervisor will be responsible for informing their employees about special precautions needed while working with a hazardous chemical. Non-routine tasks many times involve working in confined areas and/or spaces or performing special tasks that are not done on a regular basis. Each department supervisor, using the MSDS, will review and brief employees before allowing work to begin in their work area regarding non-routine tasks.

Also, all other company safety compliance programs will coordinate with this program and govern work activities (Example: Confined Space, Lockout/Tagout, Respirator Program, etc.)

In the event outside contractors work in a department, the department supervisor in that area must use the MSDS to make them aware of hazardous chemicals present in the workplace. Once the contractor has been informed, it becomes their responsibility to inform their own employees.

IV. SUMMARY

Being able to locate important facts about hazardous materials from the eleven informational sections of the MSDS will help each employee maintain a safe working environment. The MSDS will tell us how to work safely when using hazardous materials by providing us with warning information, precautionary measures, emergency first-aid procedures, occupational control procedures, fire protection information, reactivity data, physical data, health effects and spill, leak and disposal information. Certainly it is impossible to memorize all these facts. This training program is to make you aware of where to find this information in your work area by referring to MSDS's in your department.

Alexandria Renew Enterprises

Document: Hazardous Communication Written Program

Training: All Staff

Approval Initials:

Original Issue Date: 04/10/15 Revision Date:



The MSDS's will be available anytime for all employees to use as an effective tool to aid in "working safely".

Alexandria Renew Enterprises
Document: Hazardous Communication Written Program
Training: All Staff
Approval Initials:
Original Issue Date: 04/10/15 Revision Date:



APPENDIX A

HAZARDOUS CHEMICAL INVENTORY

Alexandria Renew Enterprises

Document: Hazardous Communication Written Program

Training: All Staff

Approval Initials:

Original Issue Date: 04/10/15 Revision Date:



APPENDIX B

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM (HMIS)

ALTERNATE LABELING SYSTEM

The Occupational and Safety Administration's (OSHA) Hazard Communication Standard (1910.1200) requires that all chemicals be labeled to include appropriate Hazard Warnings. Remember that no one label can be the answer to every hazardous situation--- Communication must be ongoing and specific.

To assure that chemical containers may or may not have the appropriate labeling, our Facility utilizes an alternate labeling system in addition to any label attached by the supplier. This Labeling System is called the Hazardous Material Identification System or HMIS.

HMIS Labels identify chemicals with standard Hazard Ratings from 0-4 for Health, Flammability and Reactivity, plus an alphabetical designation for the required or recommended Personal Protective Equipment.

HMIS Labeling Information Charts are posted by our MSDS Manual Stations and chemical storage areas to provide a convenient central reference. This enables workers to assess their protective needs at a glance by explaining Hazard Ratings and show visually each protective equipment required for each alphabetical designation.

Hazardous Material Identification System (HMIS)

COLOR CODES

BLUE = HEALTH

Indicates that the material may, directly or indirectly, cause permanent or temporary injury due to acute exposure by physical contact, inhalation or ingestion.

RED = FLAMMABILITY

Assesses the relative susceptibility of materials to fireburst, based on the form or condition of the material and its surrounding environment.

YELLOW = REACTIVITY

Advises that the material may be susceptible to explosion, whether through self-reaction or polymerization, or by exposure to certain conditions or substances.

WHITE = SPECIAL PRECAUTIONS REQUIRED

White indicates the Personal Protective Equipment that is required or recommended when working with this chemical.

Alexandria Renew Enterprises

Document: Hazardous Communication Written Program

Training: All Staff

Approval Initials:

Original Issue Date: 04/10/15 Revision Date:



Alexandria Renew Enterprises

Document: Hazardous Communication Written Program

Training: All Staff

Approval Initials:

Original Issue Date: 04/10/15 Revision Date:



APPENDIX C

ACCESS TO EMPLOYEE EXPOSURE AND MEDICAL RECORDS STANDARD

Regulations (Standards - 29 CFR)

Access to employee exposure and medical records. - 1910.1020



[Regulations \(Standards - 29 CFR\) - Table of Contents](#)

- **Part Number:** 1910
- **Part Title:** Occupational Safety and Health Standards
- **Subpart:** Z
- **Subpart Title:** Toxic and Hazardous Substances
- **Standard Number:** [1910.1020](#)
- **Title:** Access to employee exposure and medical records.

- **Appendix:** [A](#) , [B](#)

[1910.1020\(a\)](#)

"Purpose." The purpose of this section is to provide employees and their designated representatives a right of access to relevant exposure and medical records; and to provide representatives of the Assistant Secretary a right of access to these records in order to fulfill responsibilities under the Occupational Safety and Health Act. Access by employees, their representatives, and the Assistant Secretary is necessary to yield both direct and indirect improvements in the detection, treatment, and prevention of occupational disease. Each employer is responsible for assuring compliance with this section, but the activities involved in complying with the access to medical records provisions can be carried out, on behalf of the employer, by the physician or other health care personnel in charge of employee medical records. Except as expressly provided, nothing in this section is intended to affect existing legal and ethical obligations concerning the maintenance and confidentiality of employee medical information, the duty to disclose information to a patient/employee or any other aspect of the medical-care relationship, or affect existing legal obligations concerning the protection of trade secret information.

..1910.1020(b)

[1910.1020\(b\)](#)

"Scope and application."

1910.1020(b)(1)

This section applies to each general industry, maritime, and construction employer who makes,

maintains, contracts for, or has access to employee exposure or medical records, or analyses thereof, pertaining to employees exposed to toxic substances or harmful physical agents.

1910.1020(b)(2)

This section applies to all employee exposure and medical records, and analyses thereof, of such employees, whether or not the records are mandated by specific occupational safety and health standards.

1910.1020(b)(3)

This section applies to all employee exposure and medical records, and analyses thereof, made or maintained in any manner, including on an in-house or contractual (e.g., fee-for-service) basis. Each employer shall assure that the preservation and access requirements of this section are complied with regardless of the manner in which records are made or maintained.

[1910.1020\(c\)](#)

"Definitions."

1910.1020(c)(1)

"Access" means the right and opportunity to examine and copy.

1910.1020(c)(2)

"Analysis using exposure or medical records" means any compilation of data or any statistical study based at least in part on information collected from individual employee exposure or medical records or information collected from health insurance claims records, provided that either the analysis has been reported to the employer or no further work is currently being done by the person responsible for preparing the analysis.

..1910.1020(c)(3)

1910.1020(c)(3)

"Designated representative" means any individual or organization to whom an employee gives written authorization to exercise a right of access. For the purposes of access to employee exposure records and analyses using exposure or medical records, a recognized or certified collective bargaining agent shall be treated automatically as a designated representative without regard to written employee authorization.

1910.1020(c)(4)

"Employee" means a current employee, a former employee, or an employee being assigned or transferred to work where there will be exposure to toxic substances or harmful physical agents. In the case of a deceased or legally incapacitated employee, the employee's legal representative may directly exercise all the employee's rights under this section.

[1910.1020\(c\)\(5\)](#)

"Employee exposure record" means a record containing any of the following kinds of information:

[1910.1020\(c\)\(5\)\(i\)](#)

Environmental (workplace) monitoring or measuring of a toxic substance or harmful physical agent, including personal, area, grab, wipe, or other form of sampling, as well as related collection and analytical methodologies, calculations, and other background data relevant to interpretation of the results obtained;

[1910.1020\(c\)\(5\)\(ii\)](#)

Biological monitoring results which directly assess the absorption of a toxic substance or harmful physical agent by body systems (e.g., the level of a chemical in the blood, urine, breath, hair, fingernails, etc.) but not including results which assess the biological effect of a substance or agent or which assess an employee's use of alcohol or drugs;

..1910.1020(c)(5)(iii)

[1910.1020\(c\)\(5\)\(iii\)](#)

Material safety data sheets indicating that the material may pose a hazard to human health; or

[1910.1020\(c\)\(5\)\(iv\)](#)

In the absence of the above, a chemical inventory or any other record which reveals where and when used and the identity (e.g., chemical, common, or trade name) of a toxic substance or harmful physical agent.

[1910.1020\(c\)\(6\)](#)

[1910.1020\(c\)\(6\)\(i\)](#)

"Employee medical record" means a record concerning the health status of an employee which is made or maintained by a physician, nurse, or other health care personnel, or technician, including:

1910.1020(c)(6)(i)(A)

Medical and employment questionnaires or histories (including job description and occupational exposures),

1910.1020(c)(6)(i)(B)

The results of medical examinations (pre-employment, pre-assignment, periodic, or episodic) and laboratory tests (including chest and other X-ray examinations taken for the purpose of establishing a base-line or detecting occupational illnesses and all biological monitoring not defined as an "employee exposure record"),

1910.1020(c)(6)(i)(C)

Medical opinions, diagnoses, progress notes, and recommendations,

..1910.1020(c)(6)(i)(D)

1910.1020(c)(6)(i)(D)

First aid records,

1910.1020(c)(6)(i)(E)

Descriptions of treatments and prescriptions, and

1910.1020(c)(6)(i)(F)

Employee medical complaints.

1910.1020(c)(6)(ii)

"Employee medical record" does not include medical information in the form of:

1910.1020(c)(6)(ii)(A)

Physical specimens (e.g., blood or urine samples) which are routinely discarded as a part of normal medical practice, or

1910.1020(c)(6)(ii)(B)

Records concerning health insurance claims if maintained separately from the employer's medical program and its records, and not accessible to the employer by employee name or other direct

personal identifier (e.g., social security number, payroll number, etc.), or

1910.1020(c)(6)(ii)(C)

Records created solely in preparation for litigation which are privileged from discovery under the applicable rules of procedure or evidence; or

1910.1020(c)(6)(ii)(D)

Records concerning voluntary employee assistance programs (alcohol, drug abuse, or personal counseling programs) if maintained separately from the employer's medical program and its records.

..1910.1020(c)(7)

1910.1020(c)(7)

"Employer" means a current employer, a former employer, or a successor employer.

1910.1020(c)(8)

"Exposure" or "exposed" means that an employee is subjected to a toxic substance or harmful physical agent in the course of employment through any route of entry (inhalation, ingestion, skin contact or absorption, etc.), and includes past exposure and potential (e.g., accidental or possible) exposure, but does not include situations where the employer can demonstrate that the toxic substance or harmful physical agent is not used, handled, stored, generated, or present in the workplace in any manner different from typical non-occupational situations.

1910.1020(c)(9)

"Health Professional" means a physician, occupational health nurse, industrial hygienist, toxicologist, or epidemiologist, providing medical or other occupational health services to exposed employees.

1910.1020(c)(10)

"Record" means any item, collection, or grouping of information regardless of the form or process by which it is maintained (e.g., paper document, microfiche, microfilm, X-ray film, or automated data processing).

..1910.1020(c)(11)

1910.1020(c)(11)

"Specific chemical identity" means a chemical name, Chemical Abstracts Service (CAS) Registry

Number, or any other information that reveals the precise chemical designation of the substance.

1910.1020(c)(12)

1910.1020(c)(12)(i)

"Specific written consent" means a written authorization containing the following:

1910.1020(c)(12)(i)(A)

The name and signature of the employee authorizing the release of medical information,

1910.1020(c)(12)(i)(B)

The date of the written authorization,

1910.1020(c)(12)(i)(C)

The name of the individual or organization that is authorized to release the medical information,

1910.1020(c)(12)(i)(D)

The name of the designated representative (individual or organization) that is authorized to receive the released information,

1910.1020(c)(12)(i)(E)

A general description of the medical information that is authorized to be released,

1910.1020(c)(12)(i)(F)

A general description of the purpose for the release of the medical information, and

1910.1020(c)(12)(i)(G)

A date or condition upon which the written authorization will expire (if less than one year).

..1910.1020(c)(12)(ii)

1910.1020(c)(12)(ii)

A written authorization does not operate to authorize the release of medical information not in existence on the date of written authorization, unless the release of future information is expressly authorized,

and does not operate for more than one year from the date of written authorization.

1910.1020(c)(12)(iii)

A written authorization may be revoked in writing prospectively at any time.

1910.1020(c)(13)

"Toxic substance or harmful physical agent" means any chemical substance, biological agent (bacteria, virus, fungus, etc.), or physical stress (noise, heat, cold, vibration, repetitive motion, ionizing and non-ionizing radiation, hypo - or hyperbaric pressure, etc.) which:

1910.1020(c)(13)(i)

Is listed in the latest printed edition of the National Institute for Occupational Safety and Health (NIOSH) Registry of Toxic Effects of Chemical Substances (RTECS) which is incorporated by reference as specified in Sec. 1910.6; or

1910.1020(c)(13)(ii)

Has yielded positive evidence of an acute or chronic health hazard in testing conducted by, or known to, the employer; or

1910.1020(c)(13)(iii)

Is the subject of a material safety data sheet kept by or known to the employer indicating that the material may pose a hazard to human health.

..1910.1020(c)(14)

1910.1020(c)(14)

"Trade secret" means any confidential formula, pattern, process, device, or information or compilation of information that is used in an employer's business and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it.

1910.1020(d)

"Preservation of records."

1910.1020(d)(1)

Unless a specific occupational safety and health standard provides a different period of time, each

employer shall assure the preservation and retention of records as follows:

[1910.1020\(d\)\(1\)\(i\)](#)

"Employee medical records." The medical record for each employee shall be preserved and maintained for at least the duration of employment plus thirty (30) years, except that the following types of records need not be retained for any specified period:

1910.1020(d)(1)(i)(A)

Health insurance claims records maintained separately from the employer's medical program and its records,

1910.1020(d)(1)(i)(B)

First aid records (not including medical histories) of one-time treatment and subsequent observation of minor scratches, cuts, burns, splinters, and the like which do not involve medical treatment, loss of consciousness, restriction of work or motion, or transfer to another job, if made on-site by a non-physician and if maintained separately from the employer's medical program and its records, and

..1910.1020(d)(1)(i)(C)

1910.1020(d)(1)(i)(C)

The medical records of employees who have worked for less than (1) year for the employer need not be retained beyond the term of employment if they are provided to the employee upon the termination of employment.

[1910.1020\(d\)\(1\)\(ii\)](#)

"Employee exposure records." Each employee exposure record shall be preserved and maintained for at least thirty (30) years, except that:

1910.1020(d)(1)(ii)(A)

Background data to environmental (workplace) monitoring or measuring, such as laboratory reports and worksheets, need only be retained for one (1) year so long as the sampling results, the collection methodology (sampling plan), a description of the analytical and mathematical methods used, and a summary of other background data relevant to interpretation of the results obtained, are retained for at least thirty (30) years; and

[1910.1020\(d\)\(1\)\(ii\)\(B\)](#)

Material safety data sheets and paragraph (c)(5)(iv) records concerning the identity of a substance or agent need not be retained for any specified period as long as some record of the identity (chemical name if known) of the substance or agent, where it was used, and when it was used is retained for at least thirty (30) years(1); and

Footnote(1) Material safety data sheets must be kept for those chemicals currently in use that are effected by the Hazard Communication Standard in accordance with 29 CFR 1910.1200(g).

1910.1020(d)(1)(ii)(C)

Biological monitoring results designated as exposure records by specific occupational safety and health standards shall be preserved and maintained as required by the specific standard.

..1910.1020(d)(1)(iii)

1910.1020(d)(1)(iii)

"Analyses using exposure or medical records." Each analysis using exposure or medical records shall be preserved and maintained for at least thirty (30) years.

1910.1020(d)(2)

Nothing in this section is intended to mandate the form, manner, or process by which an employer preserves a record so long as the information contained in the record is preserved and retrievable, except that chest X-ray films shall be preserved in their original state.

1910.1020(e)

"Access to records" -

1910.1020(e)(1)

"General."

1910.1020(e)(1)(i)

Whenever an employee or designated representative requests access to a record, the employer shall assure that access is provided in a reasonable time, place, and manner. If the employer cannot reasonably provide access to the record within fifteen (15) working days, the employer shall within the fifteen (15) working days apprise the employee or designated representative requesting the record of

the reason for the delay and the earliest date when the record can be made available.

1910.1020(e)(1)(ii)

The employer may require of the requester only such information as should be readily known to the requester and which may be necessary to locate or identify the records being requested (e.g. dates and locations where the employee worked during the time period in question).

..1910.1020(e)(1)(iii)

1910.1020(e)(1)(iii)

Whenever an employee or designated representative requests a copy of a record, the employer shall assure that either:

1910.1020(e)(1)(iii)(A)

A copy of the record is provided without cost to the employee or representative,

1910.1020(e)(1)(iii)(B)

The necessary mechanical copying facilities (e.g., photocopying) are made available without cost to the employee or representative for copying the record, or

1910.1020(e)(1)(iii)(C)

The record is loaned to the employee or representative for a reasonable time to enable a copy to be made.

1910.1020(e)(1)(iv)

In the case of an original X-ray, the employer may restrict access to on-site examination or make other suitable arrangements for the temporary loan of the X-ray.

1910.1020(e)(1)(v)

Whenever a record has been previously provided without cost to an employee or designated representative, the employer may charge reasonable, non-discriminatory administrative costs (i.e., search and copying expenses but not including overhead expenses) for a request by the employee or designated representative for additional copies of the record, except that

..1910.1020(e)(1)(v)(A)

1910.1020(e)(1)(v)(A)

An employer shall not charge for an initial request for a copy of new information that has been added to a record which was previously provided; and

1910.1020(e)(1)(v)(B)

An employer shall not charge for an initial request by a recognized or certified collective bargaining agent for a copy of an employee exposure record or an analysis using exposure or medical records.

1910.1020(e)(1)(vi)

Nothing in this section is intended to preclude employees and collective bargaining agents from collectively bargaining to obtain access to information in addition to that available under this section.

1910.1020(e)(2)

"Employee and designated representative access" -

1910.1020(e)(2)(i)

"Employee exposure records."

1910.1020(e)(2)(i)(A)

Except as limited by paragraph (f) of this section, each employer shall, upon request, assure the access to each employee and designated representative to employee exposure records relevant to the employee. For the purpose of this section, an exposure record relevant to the employee consists of:

1910.1020(e)(2)(i)(A)(1)

A record which measures or monitors the amount of a toxic substance or harmful physical agent to which the employee is or has been exposed;

..1910.1020(e)(2)(i)(A)(2)

1910.1020(e)(2)(i)(A)(2)

In the absence of such directly relevant records, such records of other employees with past or present job duties or working conditions related to or similar to those of the employee to the extent necessary to reasonably indicate the amount and nature of the toxic substances or harmful physical agents to which the employee is or has been subjected, and

1910.1020(e)(2)(i)(A)(3)

Exposure records to the extent necessary to reasonably indicate the amount and nature of the toxic substances or harmful physical agents at workplaces or under working conditions to which the employee is being assigned or transferred.

1910.1020(e)(2)(i)(B)

Requests by designated representatives for unconsented access to employee exposure records shall be in writing and shall specify with reasonable particularity:

1910.1020(e)(2)(i)(B)(1)

The record requested to be disclosed; and

1910.1020(e)(2)(i)(B)(2)

The occupational health need for gaining access to these records.

1910.1020(e)(2)(ii)

"Employee medical records."

1910.1020(e)(2)(ii)(A)

Each employer shall, upon request, assure the access of each employee to employee medical records of which the employee is the subject, except as provided in paragraph (e)(2)(ii)(D) of this section.

..1910.1020(e)(2)(ii)(B)

1910.1020(e)(2)(ii)(B)

Each employer shall, upon request, assure the access of each designated representative to the employee medical records of any employee who has given the designated representative specific written consent. Appendix A to this section contains a sample form which may be used to establish specific written consent for access to employee medical records.

1910.1020(e)(2)(ii)(C)

Whenever access to employee medical records is requested, a physician representing the employer may recommend that the employee or designated representative:

1910.1020(e)(2)(ii)(C)(1)

Consult with the physician for the purposes of reviewing and discussing the records requested,

1910.1020(e)(2)(ii)(C)(2)

Accept a summary of material facts and opinions in lieu of the records requested, or

1910.1020(e)(2)(ii)(C)(3)

Accept release of the requested records only to a physician or other designated representative.

..1910.1020(e)(2)(ii)(D)

1910.1020(e)(2)(ii)(D)

Whenever an employee requests access to his or her employee medical records, and a physician representing the employer believes that direct employee access to information contained in the records regarding a specific diagnosis of a terminal illness or a psychiatric condition could be detrimental to the employee's health, the employer may inform the employee that access will only be provided to a designated representative of the employee having specific written consent, and deny the employee's request for direct access to this information only. Where a designated representative with specific written consent requests access to information so withheld, the employer shall assure the access of the designated representative to this information, even when it is known that the designated representative will give the information to the employee.

1910.1020(e)(2)(ii)(E)

A physician, nurse, or other responsible health care personnel maintaining employee medical records may delete from requested medical records the identity of a family member, personal friend, or fellow employee who has provided confidential information concerning an employee's health status.

1910.1020(e)(2)(iii)

Analyses using exposure or medical records.

1910.1020(e)(2)(iii)(A)

Each employer shall, upon request, assure the access of each employee and designated representative to each analysis using exposure or medical records concerning the employee's working conditions or workplace.

..1910.1020(e)(2)(iii)(B)

1910.1020(e)(2)(iii)(B)

Whenever access is requested to an analysis which reports the contents of employee medical records by either direct identifier (name, address, social security number, payroll number, etc.) or by information which could reasonably be used under the circumstances indirectly to identify specific employees (exact age, height, weight, race, sex, date of initial employment, job title, etc.), the employer shall assure that personal identifiers are removed before access is provided. If the employer can demonstrate that removal of personal identifiers from an analysis is not feasible, access to the personally identifiable portions of the analysis need not be provided.

1910.1020(e)(3)

"OSHA access."

1910.1020(e)(3)(i)

Each employer shall, upon request, and without derogation of any rights under the Constitution or the Occupational Safety and Health Act of 1970, 29 U.S.C. 651 "et seq.," that the employer chooses to exercise, assure the prompt access of representatives of the Assistant Secretary of Labor for Occupational Safety and Health to employee exposure and medical records and to analyses using exposure or medical records. Rules of agency practice and procedure governing OSHA access to employee medical records are contained in 29 CFR 1913.10.

1910.1020(e)(3)(ii)

Whenever OSHA seeks access to personally identifiable employee medical information by presenting to the employer a written access order pursuant to 29 CFR 1913.10(d), the employer shall prominently post a copy of the written access order and its accompanying cover letter for at least fifteen (15) working days.

..1910.1020(f)

1910.1020(f)

"Trade secrets."

1910.1020(f)(1)

Except as provided in paragraph (f)(2) of this section, nothing in this section precludes an employer from deleting from records requested by a health professional, employee, or designated representative any trade secret data which discloses manufacturing processes, or discloses the percentage of a chemical substance in mixture, as long as the health professional, employee, or designated representative is notified that information has been deleted. Whenever deletion of trade secret

information substantially impairs evaluation of the place where or the time when exposure to a toxic substance or harmful physical agent occurred, the employer shall provide alternative information which is sufficient to permit the requesting party to identify where and when exposure occurred.

1910.1020(f)(2)

The employer may withhold the specific chemical identity, including the chemical name and other specific identification of a toxic substance from a disclosable record provided that:

1910.1020(f)(2)(i)

The claim that the information withheld is a trade secret can be supported;

1910.1020(f)(2)(ii)

All other available information on the properties and effects of the toxic substance is disclosed;

1910.1020(f)(2)(iii)

The employer informs the requesting party that the specific chemical identity is being withheld as a trade secret; and

1910.1020(f)(2)(iv)

The specific chemical identity is made available to health professionals, employees and designated representatives in accordance with the specific applicable provisions of this paragraph.

..1910.1020(f)(3)

1910.1020(f)(3)

Where a treating physician or nurse determines that a medical emergency exists and the specific chemical identity of a toxic substance is necessary for emergency or first-aid treatment, the employer shall immediately disclose the specific chemical identity of a trade secret chemical to the treating physician or nurse, regardless of the existence of a written statement of need or a confidentiality agreement. The employer may require a written statement of need and confidentiality agreement, in accordance with the provisions of paragraphs (f)(4) and (f)(5), as soon as circumstances permit.

1910.1020(f)(4)

In non-emergency situations, an employer shall, upon request, disclose a specific chemical identity, otherwise permitted to be withheld under paragraph (f)(2) of this section, to a health professional,

employee, or designated representative if:

1910.1020(f)(4)(i)

The request is in writing;

1910.1020(f)(4)(ii)

The request describes with reasonable detail one or more of the following occupational health needs for the information:

1910.1020(f)(4)(ii)(A)

To assess the hazards of the chemicals to which employees will be exposed;

1910.1020(f)(4)(ii)(B)

To conduct or assess sampling of the workplace atmosphere to determine employee exposure levels;

1910.1020(f)(4)(ii)(C)

To conduct pre-assignment or periodic medical surveillance of exposed employees;

1910.1020(f)(4)(ii)(D)

To provide medical treatment to exposed employees;

1910.1020(f)(4)(ii)(E)

To select or assess appropriate personal protective equipment for exposed employees;

..1910.1020(f)(4)(ii)(F)

1910.1020(f)(4)(ii)(F)

To design or assess engineering controls or other protective measures for exposed employees; and

1910.1020(f)(4)(ii)(G)

To conduct studies to determine the health effects of exposure.

1910.1020(f)(4)(iii)

The request explains in detail why the disclosure of the specific chemical identity is essential and that,

in lieu thereof, the disclosure of the following information would not enable the health professional, employee or designated representative to provide the occupational health services described in paragraph (f)(4)(ii) of this section;

1910.1020(f)(4)(iii)(A)

The properties and effects of the chemical;

1910.1020(f)(4)(iii)(B)

Measures for controlling workers' exposure to the chemical;

1910.1020(f)(4)(iii)(C)

Methods of monitoring and analyzing worker exposure to the chemical; and

1910.1020(f)(4)(iii)(D)

Methods of diagnosing and treating harmful exposures to the chemical;

1910.1020(f)(4)(iv)

The request includes a description of the procedures to be used to maintain the confidentiality of the disclosed information; and

..1910.1020(f)(4)(v)

1910.1020(f)(4)(v)

The health professional, employee, or designated representative and the employer or contractor of the services of the health professional or designated representative agree in a written confidentiality agreement that the health professional, employee or designated representative will not use the trade secret information for any purpose other than the health need(s) asserted and agree not to release the information under any circumstances other than to OSHA, as provided in paragraph (f)(9) of this section, except as authorized by the terms of the agreement or by the employer.

1910.1020(f)(5)

The confidentiality agreement authorized by paragraph (f)(4)(iv) of this section:

1910.1020(f)(5)(i)

May restrict the use of the information to the health purposes indicated in the written statement of need;

1910.1020(f)(5)(ii)

May provide for appropriate legal remedies in the event of a breach of the agreement, including stipulation of a reasonable pre-estimate of likely damages; and,

1910.1020(f)(5)(iii)

May not include requirements for the posting of a penalty bond.

1910.1020(f)(6)

Nothing in this section is meant to preclude the parties from pursuing non-contractual remedies to the extent permitted by law.

1910.1020(f)(7)

If the health professional, employee or designated representative receiving the trade secret information decides that there is a need to disclose it to OSHA, the employer who provided the information shall be informed by the health professional prior to, or at the same time as, such disclosure.

..1910.1020(f)(8)

1910.1020(f)(8)

If the employer denies a written request for disclosure of a specific chemical identity, the denial must:

1910.1020(f)(8)(i)

Be provided to the health professional, employee or designated representative within thirty days of the request;

1910.1020(f)(8)(ii)

Be in writing;

1910.1020(f)(8)(iii)

Include evidence to support the claim that the specific chemical identity is a trade secret;

1910.1020(f)(8)(iv)

State the specific reasons why the request is being denied; and,

1910.1020(f)(8)(v)

Explain in detail how alternative information may satisfy the specific medical or occupational health need without revealing the specific chemical identity.

1910.1020(f)(9)

The health professional, employee, or designated representative whose request for information is denied under paragraph (f)(4) of this section may refer the request and the written denial of the request to OSHA for consideration.

1910.1020(f)(10)

When a health professional, employee, or designated representative refers a denial to OSHA under paragraph (f)(9) of this section, OSHA shall consider the evidence to determine if:

..1910.1020(f)(10)(i)

1910.1020(f)(10)(i)

The employer has supported the claim that the specific chemical identity is a trade secret;

1910.1020(f)(10)(ii)

The health professional employee, or designated representative has supported the claim that there is a medical or occupational health need for the information; and

1910.1020(f)(10)(iii)

The health professional, employee or designated representative has demonstrated adequate means to protect the confidentiality.

1910.1020(f)(11)

1910.1020(f)(11)(i)

If OSHA determines that the specific chemical identity requested under paragraph (f)(4) of this section is not a "bona fide" trade secret, or that it is a trade secret but the requesting health professional, employee or designated representatives has a legitimate medical or occupational health need for the information, has executed a written confidentiality agreement, and has shown adequate means for complying with the terms of such agreement, the employer will be subject to citation by OSHA.

..1910.1020(f)(11)(ii)

1910.1020(f)(11)(ii)

If an employer demonstrates to OSHA that the execution of a confidentiality agreement would not provide sufficient protection against the potential harm from the unauthorized disclosure of a trade secret specific chemical identity, the Assistant Secretary may issue such orders or impose such additional limitations or conditions upon the disclosure of the requested chemical information as may be appropriate to assure that the occupational health needs are met without an undue risk of harm to the employer.

1910.1020(f)(12)

Notwithstanding the existence of a trade secret claim, an employer shall, upon request, disclose to the Assistant Secretary any information which this section requires the employer to make available. Where there is a trade secret claim, such claim shall be made no later than at the time the information is provided to the Assistant Secretary so that suitable determinations of trade secret status can be made and the necessary protections can be implemented.

1910.1020(f)(13)

Nothing in this paragraph shall be construed as requiring the disclosure under any circumstances of process or percentage of mixture information which is a trade secret.

1910.1020(g)

"Employee information."

[1910.1020\(g\)\(1\)](#)

Upon an employee's first entering into employment, and at least annually thereafter, each employer shall inform current employees covered by this section of the following:

1910.1020(g)(1)(i)

The existence, location, and availability of any records covered by this section;

1910.1020(g)(1)(ii)

The person responsible for maintaining and providing access to records; and

..1910.1020(g)(1)(iii)

1910.1020(g)(1)(iii)

Each employee's rights of access to these records.

1910.1020(g)(2)

Each employer shall keep a copy of this section and its appendices, and make copies readily available, upon request, to employees. The employer shall also distribute to current employees any informational materials concerning this section which are made available to the employer by the Assistant Secretary of Labor for Occupational Safety and Health.

1910.1020(h)

"Transfer of records."

1910.1020(h)(1)

Whenever an employer is ceasing to do business, the employer shall transfer all records subject to this section to the successor employer. The successor employer shall receive and maintain these records.

1910.1020(h)(2)

Whenever an employer is ceasing to do business and there is no successor employer to receive and maintain the records subject to this standard, the employer shall notify affected current employees of their rights of access to records at least three (3) months prior to the cessation of the employer's business.

1910.1020(h)(3)

Whenever an employer either is ceasing to do business and there is no successor employer to receive and maintain the records, or intends to dispose of any records required to be preserved for at least thirty (30) years, the employer shall:


..1910.1020(h)(3)(i)

1910.1020(h)(3)(i)

Transfer the records to the Director of the National Institute for Occupational Safety and Health (NIOSH) if so required by a specific occupational safety and health standard; or

1910.1020(h)(3)(ii)

Notify the Director of NIOSH in writing of the impending disposal of records at least three (3) months prior to the disposal of the records.

Alexandria Renew Enterprises Document: Hazardous Communication Written Program Training: All Staff Approval Initials: Original Issue Date: 04/10/15 Revision Date:	
--	--



1910.1020(h)(4)

Where an employer regularly disposes of records required to be preserved for at least thirty (30) years, the employer may, with at least (3) months notice, notify the Director of NIOSH on an annual basis of the records intended to be disposed of in the coming year.

1910.1020(i)

"Appendices." The information contained in appendices A and B to this section is not intended, by itself, to create any additional obligations not otherwise imposed by this section nor detract from any existing obligation.

THIS PAGE INTENTIONALLY BLANK



To: All Employers Working on AlexRenew's Campus

From: Karen Pallansch, General Manager and CEO

Date: September 30, 2020

RE: Update to COVID-19 Construction Field Safety Guidelines

.....
This memo is effective as of September 30, 2020 and supersedes any preceding guidance, policy documents, or procedures issued related to the COVID-19 or State of Emergency. These guidelines apply to any work that will be done in areas where AlexRenew staff routinely works. This includes all buildings with staff offices, buildings where staff congregate, buildings that house treatment processes or equipment, and outdoor areas regularly accessed by AlexRenew staff. Access to these areas requires prior approval from the CEO. Access to the Control Room is strictly limited to only approved employees of AlexRenew.

The goal of these guidelines is to communicate reasonable, minimum expectations for providing a safe work site in light of the challenges posed by COVID-19. These guidelines are not all encompassing and employers may require additional measures they deem necessary. Guidelines are based on CDC, OSHA, and Virginia OSH recommendations and will be updated as more information is released.

These guidelines will be in effect until the CEO provides written notification that they are no longer necessary.

Safety Plans

- All visitors onsite must submit a Site-Specific Health and Safety Plan to the owner and resubmit every time it is updated internally. Safety plans should include a Job Hazard Assessment of tasks that can potentially expose employees to SARS-CoV-2 or COVID-19. Employers shall classify each employee according to the hazards they are potentially exposed to and establish the engineering, administrative and PPE controls required for each specific tasks.
- Employers that are working more than two consecutive days onsite must designate a supervisor to monitor and implement all recommended safety practices regarding the COVID-19 virus with all of their staff members. This person should have training commensurate with this hazard and all required industrial hygiene practices that may be required on the job site and will be responsible to maintain supplies of disinfectants and make sure that workers follow decontamination, hand washing, distancing, and PPE rules. This person should be the single point of contact for all employees to use if they have concerns/questions/symptoms, etc.
- Unless otherwise specified, employers must work with the owner to establish an assembly point for staff to perform daily Mandatory Health Screening, described below, before the start of work activities each day, that complies with the recommended social distancing parameters.

Site Access

- Employers will establish the minimum crew size necessary for safely accomplishing the task. Only the staff necessary for the task will be allowed on AlexRenew's campus.
- Employers will work with the AlexRenew Staff Lead (or the CM, if applicable) to obtain approval from the CEO prior to starting or restarting work at AlexRenew.
 - All employers must be listed on AlexRenew's Approved Essential Contractors and Suppliers List prior to accessing the site.

- Complete and submit the Approval Request form (Attachment A) by Tuesday prior to the week requested onsite.
- Contractor work within the EC Building, Building L, Bldg J Laboratory and Breakrooms are prohibited without the specific approval from AlexRenew. The Contractor is required to submit a Request for Restricted Area Access (Attachment B)

Mandatory Health Screening, COVID Positive Test, Tracing, Notifications and Reporting

- Employers shall not permit known COVID-19 or suspected COVID-19 employees or other persons to report to or be allowed to remain at work or on a job site until cleared for return to work or the job site by a medical professional.
- Employers will establish a daily screening protocol for arriving staff, to ensure that staff who are experiencing symptoms or who have been exposed to the virus do not enter the AlexRenew Campus. The daily screening protocol and forms must be included your Safety Plan. The daily screening protocol must be at least as restrictive as the health screening protocol (Attachment C).
- Daily screening must indicate when employees are experiencing symptoms consistent with COVID-19, and no alternative diagnosis has been made (e.g., tested positive for influenza). Such employees shall be designated by the employer as “suspected to be infected with SARS-CoV-2 virus. Symptomatic means the employee is experiencing symptoms similar to those attributed to COVID-19 including fever or chills, cough, shortness of breath or difficulty breathing, fatigue, muscle or body aches, headache, sore throat, new loss of taste or smell, congestion or runny nose, nausea or vomiting, or diarrhea. Symptoms may appear in 2 to 14 days after exposure to the virus.
- Employers must document the results of the screening and report results daily to the owner.
- When employers are notified of a known or suspected COVID-19 case who are been on the AlexRenew site within the last 14 days, the employer will inform AlexRenew immediately but no later than within 4 hours. The employer will work with AlexRenew and the health department to do contact tracing.
- Employers should make available to their employees flexible sick leave as appropriate and in compliance with local, state and federal laws.

Notifications

In addition to any notification requirements to employees or officials required by federal, state and local authorities, laws and regulations; the Contractor shall immediately notify the following:

1. AlexRenew COVID Coordinator: Alex.Rigby@AlexRenew.com
2. AlexRenew CM: James.Ohnigian@AlexRenew.com
3. Resident Engineer Project Specific
4. RE&I Site Safety Manager Project Specific

Reporting

In addition to any reporting requirements required by federal, state and local authorities, laws and regulations; the Contractor shall complete and email an AlexRenew Daily Summary Report (Attachment D) by 9am the following day to the RE&I Site Safety Manager.

Physical Distancing

- Employers shall communicate the importance of maintaining at least 6 feet of physical distance between themselves and others.

- Employers will prohibit their employees from congregating during meal times or breaks.
- Employers will minimize the amount of time that employees interact in person with AlexRenew staff.
- Virtual meetings and electronic tools must be available for meeting and interacting with work teams.
- In-person, face to face meetings are an option of last resort. If in-person, face to face meetings are necessary, they should be limited to less than 10 people, hosted in an area that allows for physical distancing (preferably outside), and all attendees must wear face coverings.
- Close proximity work clusters (i.e. multiple workers within a 6- radius) shall be limited to side by side work required by the type of work task and not gatherings to discuss sports, lunch, or work instructions.
- Employers will establish a vehicle policy that is at least as restrictive as AlexRenew's vehicle policy. (Attachment E)
- For employers who will spend more than one consecutive month on the AlexRenew campus, employers should consider establishing rotating team coverage to reduce number of employees working within a field trailer, while maintaining an appropriate level of on-site field management.

Face Coverings

- At a minimum, Employers will mandate the proper use of cloth face covering at all times when onsite as recommended by the Commonwealth of Virginia when not working in a construction environment that requires an OSHA required dust mask/respirator (i.e. demolition crew requiring protection from dust/silica). Refer to CDC for description of suitable cloth face coverings <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/cloth-face-cover.html>
- Employees shall wear face coverings at all times when inside a building that is occupied by AlexRenew staff or when it may be expected to come into close contact with another person. *
- When outside, employees may lower their face covering below the nose when they are working within an exterior work area which is setup with a 6 feet exclusion zone between the edge of the work area and the open plant area.
 - a. The exclusion zone will be clearly bounded by barrels/cones and a continuous caution tape around the full perimeter.
 - b. No one is permitted to work within the exclusion zone without fully covered mouth and nose
 - c. Workers within the work area bounded by the exclusion zone must wear cover the mouth and nose with a face covering when unable to maintain 6 feet of distancing among each other.

*Conditions that may require lowering of face covering below the mouth when maintaining social distancing shall be limited to:

1. Performing heavy physical work and mouth covering inhibits heavy respiratory breathing
2. Prevents work related verbal communication to someone outside your 6 foot social distancing circle

Under no circumstances shall face coverings be lowered below the mouth or nose when unable to socially distance by more than 6 feet.

Handwashing, Hygiene, and Disinfection

- Employers shall communicate and reinforce with their employees the importance of handwashing and proper handwashing technique.
- If working in an area where there is no access to handwashing, employers shall provide hand sanitizer with at least 60% isopropyl alcohol, or shall establish a hand-washing station.
- Employers will require employees to disinfect surfaces in their work areas after they have completed the required task, between shifts and before leaving the worksite and will ensure that each employee disinfect their work area exit and entrance points, small tools and equipment at the beginning and end of each shift. If

working in an area that requires a continued AlexRenew staff presence (electric rooms, server rooms, office areas, stairwells, etc.), the employer will require staff to disinfect surfaces that have been touched or may have been contaminated with airborne particulate at the end of their work on that shift,

- Employers shall ensure only disinfecting chemicals and products are used that are approved by the Environmental Protection Act (EPA) and listed on List N for use against SARS-CoV-2 and emerging viral pathogens. Employers will train their staff and ensure the proper use of the disinfectant provided.
- All employers will provide sufficient access to hand sanitizer or disinfectant wipes (effective for virus per EPA, 60% alcohol or more).
- No spitting allowed (enforcement through disciplinary action will be taken).
- Employers shall ensure that areas on the AlexRenew where known COVID-19 and suspected COVID-19 employees worked are disinfected per CDC guidance (<https://www.cdc.gov/coronavirus/2019-ncov/community/disinfecting-building-facility.html>) prior to allowing other people access to these areas. This requirement shall not apply if the area(s) in question have been unoccupied for seven or more days.

Quarantine and Return to Work

- Employers should follow CDC and State protocols for quarantining and isolating workers who have symptoms or who have had close contact with persons who are confirmed or suspected to have COVID-19.
- Employers shall establish a protocol for return to work that is in compliance with Section 40.C of Virginia OSHA's 12VAC25-220 Emergency Temporary Standard Infectious Disease Prevention: SARS-CoV-2 Virus that Causes COVID-19. (Attachment F)
- Employers shall establish protocols for quarantining after travel. Any employee (or approved visitor) who personally traveled, or who lives with someone who traveled, on a plane or Amtrak/VA Rail train shall self-quarantine for 14 days prior to entry or reentry to the site. Employer's policies should be at least as restrictive as AlexRenew's policies (Attachment G).

Communication

- Employers onsite for more than five consecutive business days will contact the owner with any updates to their Sites Safety Plan and provide a **daily** tailgate session reviewing site protocols with workers to mitigate potential spread of the virus. As information is changing continuously regarding COVID-19, these tailgates should occur daily and attendance and require worker signatures are required.

Deliveries

- UPS, FedEx shall deliver items to the Connex Box located next to the North Bridge Guard Booth. Deliveries to field offices or work locations are suspended. Employers shall self-retrieve their items **but shall disinfect Connex entry handles before unlatching and after closing up.**
- Other deliveries of large quantities of materials or large equipment are required to:
 - Remain outside the plant limit prior to 7am period.
 - Remain outside the plant limit until the driver makes contact with the Contractor regarding delivery location.
 - Remain in their trucks until met by the Contractor
- Drivers who do not know who they are delivering to or do not have contact phone numbers will be required to leave the plant premises. (So make sure your suppliers/vendors include sufficient information on the delivery ticket. The Security Guards will not be handing out maps anymore).
- Drivers may use the space designated for delivery personnel in the G Building to use the restroom. Drivers may not enter any other facility on site. Only one person is allowed in the space at a time.

Vendor Name	Location	Number of Staff	Staff Leads*	Service	Frequency	Approved
Example Subcontractor, LLC	G2, G1 and associated Pipe Galleries	15	Example GC PM	Building J Facilities Relocation and Decommissioning (sub)	Daily	

Sent to

[illegible]

Pulling Fiber in EC

[illegible]

[illegible]



Board of Directors
John Hill, Chair
James Beall, Vice Chair
William Dickinson, Sec'y-Treas
Bruce Johnson
Adriana Caldarelli

Chief Executive Officer
Karen L. Pallansch, P.E., BCEE

General Counsel
McGuireWoods, LLP

COVID-19 HEALTH PRE-SCREENING

No one with symptoms of COVID-19 is allowed on the AlexRenew campus. All persons accessing the AlexRenew campus must attest that they have performed the following pre-screening.

If you answer yes to any of these questions, and no alternative diagnosis has been made by a licensed medical provider; stay home, self-quarantine as per CDC guidance, notify your supervisor, and seek medical attention.

Prescreening Questions

1. When you took your temperature did you have a fever of 100.4°F or higher?
Yes No
2. Do you have new chills that cannot be attributed to another health condition?
Yes No
3. Do you have a new cough that cannot be attributed to another health condition?
Yes No
4. Do you have new shortness of breath that cannot be attributed to another health condition?
Yes No
5. Do you have fatigue, muscle or body aches that cannot be attributed to another health condition?
Yes No
6. Do you have a headache that cannot be attributed to another health condition?
Yes No
7. Do you have a new sore throat that cannot be attributed to another health condition?
Yes No
8. Do you have a recent loss of taste or smell?
Yes No
9. Have you had persistent pain or pressure in the chest that cannot be attributed to another health condition?
Yes No
10. Congestion or runny nose that cannot be attributed to another health condition?
Yes No
11. Nausea or vomiting that cannot be attributed to another health condition?

1800 Limerick Street, Alexandria Virginia 22314 • 703-549-3381 • alexrenew.com

Alexandria's Water Transformers

A decorative graphic at the bottom of the page showing a splash of water with droplets and ripples, rendered in shades of blue.

Yes No

12. Diarrhea that cannot be attributed to another health condition?

Yes No

13. Have you been asked to self-isolate or quarantine by a doctor or other public health official?

Yes No

14. Have you had "close contact" with an individual diagnosed with COVID-19?

- *Being within 6ft of confirmed COVID-19 patient or non-confirmed symptomatic person for a more than 15 minutes.*
- *The timeframe for having contact with an individual also includes the 72-hour time period before the person became symptomatic*

Yes No

15. Have you had direct contact with infectious secretions from a confirmed COVID-19 patient or non-confirmed symptomatic person (being coughed or sneezed on)

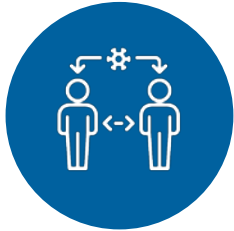
Yes No

[illegible][illegible]

[illegible]

COVID-19 Personnel Vehicle Transport Guidelines

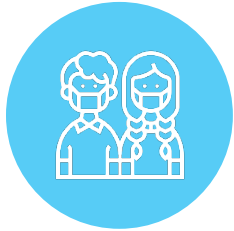
To mitigate exposure to COVID-19, the following is guidance for using company modes of transportation (sedans, SUVs, pick ups, electric vehicles). Minimizing risk of exposure can be accomplished with a combination of methods:



Physical distance throughout the trip



Limit number of employees in vehicles



Passenger hygiene practices



Vehicle hygiene practices



Education

Physical Distance Throughout the Trip

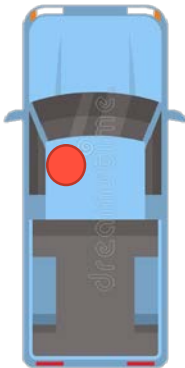
SEDAN/SUV/SUPER CREW TRUCK

2 Occupants



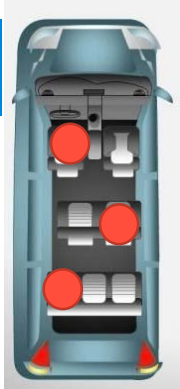
REGULAR PICKUP

1 Occupant;
Driver Only



PASSENGER VAN

of Occupants
Varies by Seating
Configuration;
1 passenger per
row



Tracking

Tracking can be done by a sign-in sheet that is kept with the vehicle. The record should be kept for a minimum of 4 weeks to allow for contact tracing if potential exposure occurs.

16VAC25-220, Emergency Temporary Standard

Infectious Disease Prevention:

SARS-CoV-2 Virus That Causes COVID-19

As Adopted by the

Safety and Health Codes Board

on July 15, 2020



VIRGINIA OCCUPATIONAL SAFETY AND HEALTH (VOSH) PROGRAM

VIRGINIA DEPARTMENT OF LABOR AND INDUSTRY (DOLI)

Effective Date: July 27, 2020

16VAC25-220

Emergency Temporary Standard

Infectious Disease Prevention: SARS-CoV-2 Virus That Causes COVID-19

16VAC25-220

16VAC25-220-10. Purpose, scope, and applicability.

A. This emergency temporary standard is designed to establish requirements for employers to control, prevent, and mitigate the spread of SARS-CoV-2, the virus that causes coronavirus disease 2019 (COVID-19) to and among employees and employers.

B. This standard shall not be extended or amended without public participation in accordance with the Virginia Administrative Process Act (§ 2.2-4000 et seq. of the Code of Virginia) and 16VAC25-60-170.

C. This standard is adopted in accordance with subdivision 6 a of § 40.1-22 of the Code of Virginia and shall apply to every employer, employee, and place of employment in the Commonwealth of Virginia within the jurisdiction of the VOSH program as described in 16VAC25-60-20 and 16VAC25-60-30.

D. This standard is designed to supplement and enhance existing VOSH laws, rules, regulations, and standards applicable directly or indirectly to SARS-CoV-2 virus or COVID-19 disease-related hazards such as, but not limited to, those dealing with personal protective equipment, respiratory protective equipment, sanitation, access to employee exposure and medical records, occupational exposure to hazardous chemicals in laboratories, hazard communication, § 40.1-51.1 A of the Code of Virginia, etc. Should this standard conflict with an

existing VOSH rule, regulation, or standard, the more stringent requirement from an occupational safety and health hazard prevention standpoint shall apply.

E. Application of this standard to a place of employment will be based on the exposure risk level presented by SARS-CoV-2 virus-related and COVID-19 disease-related hazards present or job tasks undertaken by employees at the place of employment as defined in this standard (i.e., very high, high, medium, and lower risk levels).

1. It is recognized that various hazards or job tasks at the same place of employment can be designated as very high, high, medium, or lower exposure risk for purposes of application of the requirements of this standard. It is further recognized that various required job tasks prohibit an employee from being able to observe physical distancing from other persons.

2. Factors that shall be considered in determining exposure risk level include, but are not limited to:

- a. The job tasks being undertaken, the work environment (e.g. indoors or outdoors), the known or suspected presence of the SARS-CoV-2 virus, the presence of a person known or suspected to be infected with the SARS-CoV-2 virus, the number of employees and other persons in relation to the size of the work area, the working distance between employees and other employees or persons, and the duration and frequency of employee exposure through contact inside of six feet with other employees or persons (e.g., including shift work exceeding 8 hours per day); and

b. The type of hazards encountered, including potential exposure to the airborne transmission of SARS-CoV-2 virus; contact with contaminated surfaces or objects, such as tools, workstations, or break room tables, and shared spaces such as shared workstations, break rooms, locker rooms, and entrances and exits to the facility; shared work vehicles; and industries or places of employment where employer sponsored shared transportation is a common practice, such as ride-share vans or shuttle vehicles, car-pools, and public transportation, etc.

F. This standard shall not conflict with requirements and guidelines applicable to businesses set out in any applicable Virginia executive order or order of public health emergency.

G. 1. To the extent that an employer actually complies with a recommendation contained in CDC guidelines, whether mandatory or non-mandatory, to mitigate SARS-CoV-2 virus and COVID-19 disease related hazards or job tasks addressed by this standard, and provided that the CDC recommendation provides equivalent or greater protection than provided by a provision of this standard, the employer's actions shall be considered in compliance with this standard. An employer's actual compliance with a recommendation contained in CDC guidelines, whether mandatory or non-mandatory, to mitigate SARS-COV-2 and COVID19 related hazards or job tasks addressed by this standard shall be considered evidence of good faith in any enforcement proceeding related to this standard.

2. A public or private institution of higher education that has received certification from the State Council of Higher Education of Virginia that the institution's re-opening plans are in compliance with guidance documents, whether mandatory or non-mandatory, developed by the Governor's Office in conjunction with the Virginia Department of Health shall be considered in

compliance with this standard, provided the institution operates in compliance with its certified reopening plans and the certified reopening plans provide equivalent or greater levels of employee protection than this standard. A public school division or private school that submits its plans to the Virginia Department of Education to move to Phase II and Phase III that are aligned with CDC guidance for reopening of schools that provide equivalent or greater levels of employee protection than a provision of this standard and who operate in compliance with the public school division's or private school's submitted plans shall be considered in compliance with this standard. An institution's actual compliance with recommendations contained in CDC guidelines or the Virginia Department of Education guidance, whether mandatory or non-mandatory, to mitigate SARS-CoV-2 and COVID-19 related hazards or job tasks addressed by this standard shall be considered evidence of good faith in any enforcement proceeding related to this standard.

H. Nothing in the standard shall be construed to require employers to conduct contact tracing of the SARS-CoV-2 virus or COVID-19 disease.

16VAC25-220-20. Effective and expiration dates.

This emergency temporary standard shall take immediate effect July 27, 2020, upon publication in a newspaper of general circulation, published in the City of Richmond, Virginia.

With the exception of 16VAC25-220-80 B 10 regarding training required on infectious disease preparedness and response plans, the training requirements in 16VAC25-220-80 shall take effect on August 26, 2020. The training requirements under 16VAC25-220-80 B 10 shall take effect on September 25, 2020.

The requirements for 16VAC25-220-70 shall take effect on September 25, 2020.

This emergency temporary standard shall expire (i) within six months of its effective date, upon expiration of the Governor's State of Emergency, or when superseded by a permanent standard, whichever occurs first or (ii) when repealed by the Virginia Safety and Health Codes Board.

16VAC25-220-30. Definitions.

The following words and terms when used in this standard shall have the following meanings unless the context clearly indicates otherwise:

"Administrative control" means any procedure that significantly limits daily exposure to SARS-CoV-2 virus and COVID-19 disease related workplace hazards and job tasks by control or manipulation of the work schedule or manner in which work is performed. The use of personal protective equipment is not considered a means of administrative control.

"Airborne infection isolation room" or "AIIR," formerly a negative pressure isolation room, means a single-occupancy patient-care room used to isolate persons with a suspected or confirmed airborne infectious disease. Environmental factors are controlled in AIIRs to minimize the transmission of infectious agents that are usually transmitted from person to person by droplet nuclei associated with coughing or aerosolization of contaminated fluids. AIIRs provide (i) negative pressure in the room so that air flows under the door gap into the room, (ii) an air flow rate of 6-12 air changes per hour (ACH) (6 ACH for existing structures, 12 ACH for new construction or renovation), and (iii) direct exhaust of air from the room to the outside of the building or recirculation of air through a High Efficiency Particulate Air (HEPA) filter before returning to circulation.

"Asymptomatic" means a person who does not have symptoms.

"Building or facility owner" means the legal entity, including a lessee, that exercises control over management and record keeping functions relating to a building or facility in which activities covered by this standard take place.

"CDC" means Centers for Disease Control and Prevention.

"Cleaning" means the removal of dirt and impurities, including germs, from surfaces. Cleaning alone does not kill germs. But by removing the germs, cleaning decreases their number and therefore any risk of spreading infection.

"Community transmission," also called "community spread," means people have been infected with SARS-CoV-2 in an area, including some who are not sure how or where they became infected. The level of community transmission is classified by the CDC as:

1. "No to minimal" where there is evidence of isolated cases or limited community transmission, case investigations are underway, and no evidence of exposure in large communal settings (e.g., healthcare facilities, schools, mass gatherings, etc.);
2. "Moderate" where there is sustained community transmission with high likelihood or confirmed exposure within communal settings and potential for rapid increase in cases;
3. "Substantial, controlled" where there is large scale, controlled community transmission, including communal settings (e.g., schools, workplaces, etc.); or
4. "Substantial, uncontrolled" where there is large scale, uncontrolled community transmission, including communal settings (e.g., schools, workplaces, etc.).

"COVID-19" means Coronavirus Disease 2019, which is primarily a respiratory disease, caused by the SARS-CoV-2 virus.

"Disinfecting" means using chemicals approved for use against SARS-CoV-2, for example EPA-registered disinfectants, to kill germs on surfaces. The process of disinfecting does not necessarily clean dirty surfaces or remove germs, but killing germs remaining on a surface after cleaning further reduces any risk of spreading infection.

"Duration and frequency of employee exposure" means how long ("duration") and how often ("frequency") an employee is potentially exposed to the SARS-CoV-2 virus or COVID-19 disease. Generally, the greater the frequency or length of exposure, the greater the probability is for potential infection to occur. Frequency of exposure is generally more significant for acute acting agents or situations, while duration of exposure is generally more significant for chronic acting agents or situations. An example of an acute SARS-CoV-2 virus or COVID-19 disease situation would be an unprotected customer, patient, or other person coughing or sneezing directly into the face of an employee. An example of a chronic situation would be a job task that requires an employee to interact either for an extended period of time inside six feet with a smaller static group of other employees or persons or for an extended period of time inside six feet with a larger group of other employees or persons in succession but for periods of shorter duration.

"Economic feasibility" means the employer is financially able to undertake the measures necessary to comply with one or more requirements in this standard. The cost of corrective measures to be taken will not usually be considered as a factor in determining whether a violation of this standard has occurred. If an employer's level of compliance lags significantly behind that of its industry, an employer's claim of economic infeasibility will not be accepted.

"Elimination" means a method of exposure control that removes the employee completely from exposure to SARS-CoV-2 virus and COVID-19 disease related workplace hazards and job tasks.

"Employee" means an employee of an employer who is employed in a business of his employer. Reference to the term "employee" in this standard also includes, but is not limited to, temporary employees and other joint employment relationships, persons in supervisory or management positions with the employer, etc., in accordance with Virginia occupational safety and health laws, standards, regulations, and court rulings.

"Engineering control" means the use of substitution, isolation, ventilation, and equipment modification to reduce exposure to SARS-CoV-2 virus and COVID-19 disease related workplace hazards and job tasks.

"Exposure risk level" means an assessment of the possibility that an employee could be exposed to the hazards associated with SARS-CoV-2 virus and the COVID-19 disease. The exposure risk level assessment should address all risks and all modes of transmission including airborne transmission, as well as transmission by asymptomatic and presymptomatic individuals. Risk levels should be based on the risk factors present that increase risk exposure to COVID-19 and are present during the course of employment regardless of location. Hazards and job tasks have been divided into four risk exposure levels: very high, high, medium, and lower:

"Very high" exposure risk hazards or job tasks are those in places of employment with high potential for employee exposure to known or suspected sources of the SARS-CoV-2 virus (e.g.,

laboratory samples) or persons known or suspected to be infected with the SARS-CoV-2 virus, including, but not limited to, during specific medical, postmortem, or laboratory procedures:

1. Aerosol-generating procedures (e.g., intubation, cough induction procedures, bronchoscopies, some dental procedures and exams, or invasive specimen collection) on a patient or person known or suspected to be infected with the SARS-CoV-2 virus;
2. Collecting or handling specimens from a patient or person known or suspected to be infected with the SARS-CoV-2 virus (e.g., manipulating cultures from patients known or suspected to be infected with the SARS-CoV-2 virus); and
3. Performing an autopsy that involves aerosol-generating procedures on the body of a person known or suspected to be infected with the SARS-CoV-2 virus at the time of their death.

"High" exposure risk hazards or job tasks are those in places of employment with high potential for employee exposure inside six feet with known or suspected sources of SARS-CoV-2, or with persons known or suspected to be infected with the SARS-CoV-2 virus that are not otherwise classified as very high exposure risk, including, but not limited to:

1. Healthcare (physical and mental health) delivery and support services provided to a patient known or suspected to be infected with the SARS-CoV-2 virus, including field hospitals (e.g., doctors, nurses, cleaners, and other hospital staff who must enter patient rooms or areas);
2. Healthcare (physical and mental) delivery, care, and support services, wellness services, non-medical support services, physical assistance, etc., provided to a patient, resident, or

other person known or suspected to be infected with the SARS-CoV-2 virus involving skilled nursing services, outpatient medical services, clinical services, drug treatment programs, medical outreach services, mental health services, home health care, nursing home care, assisted living care, memory care support and services, hospice care, rehabilitation services, primary and specialty medical care, dental care, COVID-19 testing services, blood donation services, contact tracer services, and chiropractic services;

3. First responder services provided to a patient, resident, or other person known or suspected to be infected with the SARS-CoV-2 virus;

4. Medical transport services (loading, transporting, unloading, etc.) provided to patients known or suspected to be infected with the SARS-CoV-2 virus (e.g., ground or air emergency transport, staff, operators, drivers, pilots, etc.); and

5. Mortuary services involved in preparing (e.g., for burial or cremation) the bodies of persons who are known or suspected to be infected with the SARS-CoV-2 virus at the time of their death.

"Medium" exposure risk hazards or job tasks are those not otherwise classified as very high or high exposure risk in places of employment that require more than minimal occupational contact inside six feet with other employees, other persons, or the general public who may be infected with SARS-CoV-2, but who are not known or suspected to be infected with the SARS-CoV-2 virus. Medium exposure risk hazards or job tasks may include, but are not limited to, operations and services in:

1. Poultry, meat, and seafood processing; agricultural and hand labor; commercial transportation of passengers by air, land, and water; on campus educational settings in schools, colleges, and universities; daycare and afterschool settings; restaurants and bars; grocery stores, convenience stores, and food banks; drug stores and pharmacies; manufacturing settings; indoor and outdoor construction settings; correctional facilities, jails, detentions centers, and juvenile detention centers; work performed in customer premises, such as homes or businesses; retail stores; call centers; package processing settings; veterinary settings; personal care, personal grooming , salon, and spa settings; venues for sports, entertainment, movies, theaters, and other forms of mass gatherings; homeless shelters; fitness, gym, and exercise facilities; airports, and train and bus stations; etc.; and

2. Situations not involving exposure to known or suspected sources of SARS-CoV-2: hospitals, other healthcare (physical and mental) delivery and support services in a non-hospital setting, wellness services, physical assistance, etc.; skilled nursing facilities; outpatient medical facilities; clinics, drug treatment programs, and medical outreach services; non-medical support services; mental health facilities; home health care, nursing homes, assisted living facilities, memory care facilities, and hospice care; rehabilitation centers, doctors' offices, dentists' offices, and chiropractors' offices; first responders services provided by police, fire, paramedic and emergency medical services providers, medical transport; contact tracers, etc.

"Lower" exposure risk hazards or job tasks are those not otherwise classified as very high, high, or medium exposure risk that do not require contact inside six feet with persons known to

be, or suspected of being, or who may be infected with SARS-CoV-2. Employees in this category have minimal occupational contact with other employees, other persons, or the general public, such as in an office building setting; or are able to achieve minimal occupational contact through the implementation of engineering, administrative and work practice controls, such as, but not limited to

1. Installation of floor to ceiling physical barriers constructed of impermeable material and not subject to unintentional displacement (e.g., such as clear plastic walls at convenience stores behind which only one employee is working at any one time);
2. Telecommuting;
3. Staggered work shifts that allow employees to maintain physical distancing from other employees, other persons, and the general public;
4. Delivering services remotely by phone, audio, video, mail, package delivery, curbside pickup or delivery, etc., that allows employees to maintain physical distancing from other employees, other persons, and the general public; and
5. Mandatory physical distancing of employees from other employees, other persons, and the general public.

Employee use of face coverings for contact inside six feet of coworkers, customers, or other persons is not an acceptable administrative or work practice control to achieve minimal occupational contact. However, when it is necessary for an employee to have brief contact with others inside the six feet distance a face covering is required.

"Face covering" means an item normally made of cloth or various other materials with elastic bands or cloth ties to secure over the wearer's nose and mouth in an effort to contain or reduce the spread of potentially infectious respiratory secretions at the source (i.e., the person's nose and mouth). A face covering is not intended to protect the wearer, but it may reduce the spread of virus from the wearer to others. A face covering is not a surgical/medical procedure mask. A face covering is not subject to testing and approval by a state or government agency, so it is not considered a form of personal protective equipment or respiratory protection equipment under VOSH laws, rules, regulations, and standards.

"Face shield" means a form of personal protective equipment made of transparent, impermeable materials intended to protect the entire face or portions of the face from droplets or splashes.

"Feasible" as used in this standard includes both technical and economic feasibility.

"Filtering facepiece respirator" means a negative pressure air purifying particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium. Filtering facepiece respirators are certified for use by the National Institute for Occupational Safety and Health (NIOSH).

"Hand sanitizer" means an alcohol-based hand rub containing at least 60% alcohol, unless otherwise provided for in this standard.

"HIPAA" means Health Insurance Portability and Accountability Act.

"Known to be infected with the SARS-CoV-2 virus" means a person, whether symptomatic or asymptomatic, who has tested positive for SARS-CoV-2, and the employer knew or with reasonable diligence should have known that the person has tested positive for SARS-CoV-2.

"May be infected with SARS-CoV-2 virus" means any person not currently a person known or suspected to be infected with SARS-CoV-2 virus and not currently vaccinated against the SARS-CoV-2 virus.

"Occupational exposure" means the state of being actually or potentially exposed to contact with SARS-CoV-2 virus or COVID-19 disease related hazards at the work location or while engaged in work activities at another location.

"Personal protective equipment" means equipment worn to minimize exposure to hazards that cause serious workplace injuries and illnesses. These injuries and illnesses may result from contact with chemical, radiological, physical, electrical, mechanical, biological, or other workplace hazards. Personal protective equipment may include, but is not limited to, items such as gloves, safety glasses, shoes, earplugs or muffs, hard hats, respirators, surgical/medical procedure masks, gowns, face shields, coveralls, vests, and full body suits.

"Physical distancing" also called "social distancing" means keeping space between yourself and other persons while conducting work-related activities inside and outside of the physical establishment by staying at least six feet from other persons. Physical separation of an employee from other employees or persons by a permanent, solid floor to ceiling wall constitutes physical distancing from an employee or other person stationed on the other side of the wall.

"Respirator" means a protective device that covers the nose and mouth or the entire face or head to guard the wearer against hazardous atmospheres. Respirators are certified for use by the National Institute for Occupational Safety and Health (NIOSH). Respirators may be (i) tight-fitting, which means either a half mask that covers the mouth and nose or a full face piece that covers the face from the hairline to below the chin or (ii) loose-fitting, such as hoods or helmets that cover the head completely.

There are two major classes of respirators:

1. Air-purifying, which remove contaminants from the air; and
2. Atmosphere-supplying, which provide clean, breathable air from an uncontaminated source. As a general rule, atmosphere-supplying respirators are used for more hazardous exposures.

"Respirator user" means an employee who in the scope of their current job may be assigned to tasks that may require the use of a respirator in accordance with this standard or required by other provisions in the VOSH and OSHA standards.

"SARS-CoV-2" means a betacoronavirus, like MERS-CoV and SARS-CoV. Coronaviruses are named for the crown-like spikes on their surfaces. The SARS-CoV-2 causes what has been designated as the Coronavirus Disease 2019 (COVID-19).

"Signs of COVID-19" include trouble breathing, persistent pain or pressure in the chest, new confusion, inability to wake or stay awake, bluish lips or face, etc.

"Surgical/medical procedure mask" means a mask to be worn over the wearer's nose and mouth that is fluid resistant and provides the wearer protection against large droplets, splashes,

or sprays of bodily or other hazardous fluids, and prevents the wearer from exposing others in the same fashion. A surgical/medical procedure mask protects others from the wearer's respiratory emissions. A surgical/medical procedure mask has a loose fitting face seal. A surgical/medical procedure mask does not provide the wearer with a reliable level of protection from inhaling smaller airborne particles. A surgical/medical procedure mask is considered a form of personal protective equipment, but is not considered respiratory protection equipment under VOSH laws, rules, regulations, and standards. Testing and approval is cleared by the U.S. Food and Drug Administration (FDA).

"Suspected to be infected with SARS-CoV-2 virus" means a person who has signs or symptoms of COVID-19 but has not tested positive for SARS-CoV-2, and no alternative diagnosis has been made (e.g., tested positive for influenza).

"Symptomatic" means the employee is experiencing symptoms similar to those attributed to COVID-19 including fever or chills, cough, shortness of breath or difficulty breathing, fatigue, muscle or body aches, headache, new loss of taste or smell, sore throat, congestion or runny nose, nausea or vomiting, or diarrhea. Symptoms may appear in two to 14 days after exposure to the virus.

"Technical feasibility" means the existence of technical know-how as to materials and methods available or adaptable to specific circumstances that can be applied to one or more requirements in this standard with a reasonable possibility that employee exposure to the SARS-CoV-2 virus and COVID-19 disease hazards will be reduced. If an employer's level of compliance lags significantly behind that of the employer's industry, allegations of technical infeasibility will not be accepted.

"VOSH" means Virginia Occupational Safety and Health.

"Work practice control" means a type of administrative control by which the employer modifies the manner in which the employee performs assigned work. Such modification may result in a reduction of exposure to SARS-CoV-2 virus and COVID-19 disease related workplace hazards and job tasks through such methods as changing work habits, improving sanitation and hygiene practices, or making other changes in the way the employee performs the job.

16VAC25-220-40. Mandatory requirements for all employers.

A. Employers in all exposure risk levels shall ensure compliance with the requirements in this section to protect employees from workplace exposure to the SARS-CoV-2 virus that causes the COVID-19 disease.

B. Exposure assessment and determination, notification requirements, and employee access to exposure and medical records.

1. Employers shall assess their workplace for hazards and job tasks that can potentially expose employees to the SARS-CoV-2 virus or COVID-19 disease. Employers shall classify each job task according to the hazards employees are potentially exposed to and ensure compliance with the applicable sections of this standard for very high, high, medium, or lower risk levels of exposure. Tasks that are similar in nature and expose employees to the same hazard may be grouped for classification purposes.

2. Employers shall inform employees of the methods of and encourage employees to self-monitor for signs and symptoms of COVID-19 if employees suspect possible exposure or are experiencing signs of an oncoming illness.

3. Serological testing, also known as antibody testing, is a test to determine if persons have been infected with SARS-CoV-2 virus. Serological testing has not been determined if persons who have the antibodies are immune from infection.

a. Serologic test results shall not be used to make decisions about returning employees to work who were previously classified as known or suspected to be infected with the SARS-CoV-2 virus.

b. Serologic test results shall not be used to make decisions concerning employees who were previously classified as known or suspected to be infected with the SARS-CoV-2 virus about grouping, residing in or being admitted to congregate settings, such as schools, dormitories, etc.

4. Employers shall develop and implement policies and procedures for employees to report when employees are experiencing symptoms consistent with COVID-19, and no alternative diagnosis has been made (e.g., tested positive for influenza). Such employees shall be designated by the employer as “suspected to be infected with SARS-CoV-2 virus.”

5. Employers shall not permit employees or other persons known or suspected to be infected with SARS-CoV-2 virus to report to or remain at the work site or engage in work at a customer or client location until cleared for return to work (see subsection C of this section). Nothing in this standard shall prohibit an employer from permitting an employee known or suspected to be infected with SARS-CoV-2 virus from engaging in teleworking or other form of work isolation that would not result in potentially exposing other employees to the SARS-CoV-2 virus.

6. To the extent feasible and permitted by law, including but not limited to the Families First Coronavirus Response Act, employers shall ensure that sick leave policies are flexible and consistent with public health guidance and that employees are aware of these policies.

7. Employers shall discuss with subcontractors and companies that provide contract or temporary employees about the importance of employees or other persons who are known or suspected to be infected with the SARS-CoV-2 virus of staying home. Subcontractor, contract, or temporary employees known or suspected to be infected with the SARS-CoV-2 virus shall not report to or be allowed to remain at the work site until cleared for return to work. Subcontractors shall not allow their known or suspected to be infected with the SARS-CoV-2 virus employees to report to or be allowed to remain at work or on a job site until cleared for return to work.

8. To the extent permitted by law, including HIPAA, employers shall establish a system to receive reports of positive SARS-CoV-2 tests by employees, subcontractors, contract employees, and temporary employees (excluding patients hospitalized on the basis of being known or suspected to be infected with SARS-CoV-2 virus) present at the place of employment within the previous 14 days from the date of positive test, and the employer shall notify:

- a. The employer's own employees who may have been exposed, within 24 hours of discovery of the employees possible exposure, while keeping confidential the identity of the known to be infected with SARS-CoV-2 virus person in accordance with the

requirements of the Americans with Disabilities Act (ADA) and other applicable federal and Virginia laws and regulations; and

b. In the same manner as subdivision 8 a of this subsection, other employers whose employees were present at the work site during the same time period; and

c. In the same manner as subdivision 8 a of this subsection, the building or facility owner. The building or facility owner will require all employer tenants to notify the owner of the occurrence of a SARS-CoV-2-positive test for any employees or residents in the building. This notification will allow the owner to take the necessary steps to sanitize the common areas of the building. In addition, the building or facility owner will notify all employer tenants in the building that one or more cases have been discovered and the floor or work area where the case was located. The identity of the individual will be kept confidential in accordance with the requirements of the Americans with Disabilities Act (ADA) and other applicable federal and Virginia laws and regulations; and

d. The Virginia Department of Health within 24 hours of the discovery of a positive case; and

e. The Virginia Department of Labor and Industry within 24 hours of the discovery of three or more employees present at the place of employment within a 14-day period testing positive for SARS-CoV-2 virus during that 14-day time period.

9. Employers shall ensure employee access to the employee's own SARS-CoV-2 virus and COVID-19 disease related exposure and medical records in accordance with the standard

applicable to its industry. Employers in the agriculture, public sector marine terminal, and public sector longshoring industries shall ensure employees access to the employees' own SARS-CoV-2 virus and COVID-19 disease related exposure and medical records in accordance with 16VAC25-90-1910.1020, Access to Employee Exposure and Medical Records.

C. Return to work.

1. The employer shall develop and implement policies and procedures for employees known or suspected to be infected with the SARS-CoV-2 virus to return to work using either a symptom-based or test-based strategy, depending on local healthcare and testing circumstances. While an employer may rely on other reasonable options, a policy that involves consultation with appropriate healthcare professionals concerning when an employee has satisfied the symptoms based strategy requirements in subdivision 1 a of this subsection will constitute compliance with the requirements of this subsection.

a. For known or suspected to be infected with the SARS-CoV-2 virus employees the symptom-based strategy excludes an employee from returning to work until (i) at least three days (72 hours) have passed since recovery, defined as resolution of fever without the use of fever-reducing medications and improvement in respiratory symptoms (e.g., cough, shortness of breath) and (ii) at least 10 days have passed since symptoms first appeared.

b. The test-based strategy excludes an employee from returning to work until (i) resolution of fever without the use of fever-reducing medications, (ii) improvement

in respiratory symptoms (e.g., cough, shortness of breath), and (iii) negative results of an FDA Emergency Use Authorized COVID-19 molecular assay for detection of SARS-CoV-2 RNA from at least two consecutive respiratory specimens collected 24 hours or more apart (total of two negative specimens).

i. If a known or suspected to be infected with the SARS-CoV-2 virus employee refuses to be tested, the employer compliance with subdivision 1 a of this subsection, symptom-based strategy, will be considered in compliance with this standard. Nothing in this standard shall be construed to prohibit an employer from requiring a known or suspected to be infected with the SARS-CoV-2 virus employee to be tested in accordance with subdivision 1 b of this subsection.

ii. For purposes of this section, COVID-19 testing is considered a “medical examination” under § 40.1-28 of the Code of Virginia. The employer shall not require the employee to pay for the cost of COVID-19 testing for return to work determinations.

2. The employer shall develop and implement policies and procedures for known to be infected with SARS-CoV-2 asymptomatic employees to return to work using either a time-based or test-based strategy depending on local healthcare and testing circumstances. While an employer may rely on other reasonable options, a policy that involves consultation with appropriate healthcare professionals concerning when an employee has satisfied the time based strategy requirements in subdivision 2 a of this subsection will constitute compliance with the requirements of this subsection.

a. The time-based strategy excludes an employee from returning to work until at least 10 days have passed since the date of the employee's first positive COVID-19 diagnostic test assuming the employee has not subsequently developed symptoms since the employee's positive test. If the employee develops symptoms, then the symptom-based or test-based strategy shall be used.

b. The test-based strategy excludes an employee from returning to work until negative results of an FDA Emergency Use Authorized COVID-19 molecular assay for detection of SARS-CoV-2 RNA from at least two consecutive respiratory specimens collected 24 hours or more apart (total of two negative specimens).

i If a known to be infected with SARS-CoV-2 asymptomatic employee refuses to be tested, employer compliance with subdivision 2 a of this subsection, time-based strategy, will be considered in compliance with this standard. Nothing in this standard shall be construed to prohibit an employer from requiring a known to be infected with SARS-CoV-2 asymptomatic employee to be tested in accordance with subdivision 2 b of this subsection.

ii. For purposes of this section, COVID-19 testing is considered a “medical examination” under § 40.1-28 of the Code of Virginia. The employer shall not require the employee to pay for the cost of COVID-19 testing for return to work determinations.

D. Unless otherwise provided in this standard, employers shall ensure that employees observe physical distancing while on the job and during paid breaks on the employer's property, including policies and procedures that:

1. Use verbal announcements, signage, or visual cues to promote physical distancing.
2. Decrease worksite density by limiting non-employee access to the place of employment or restrict access to only certain workplace areas to reduce the risk of exposure.
3. An employer's compliance with occupancy limits contained in any applicable Virginia executive order or order of public health emergency will constitute compliance with the requirements in this subsection.

E. Access to common areas, breakrooms, or lunchrooms shall be closed or controlled.

1 If the nature of an employer's work or the work area does not allow employees to consume meals in the employee's workspace while observing physical distancing, an employer may designate, reconfigure, and alternate usage of spaces where employees congregate, including lunch and break rooms, locker rooms, time clocks, etc., with controlled access, provided the following conditions are met:

- a. At the entrance of the designated common area or room the employer shall clearly post the policy limiting the occupancy of the space, and requirements for physical distancing, hand washing and hand sanitizing, and cleaning and disinfecting of shared surfaces.

b. The employer shall limit occupancy of the designated common area or room so that occupants can maintain physical distancing from each other. The employer shall enforce the occupancy limit.

c. Employees shall be required to clean and disinfect the immediate area in which they were located prior to leaving, or the employer may provide for cleaning and disinfecting of the common area or room at regular intervals throughout the day, and between shifts of employees using the same common area or room (i.e., where an employee or groups of employees have a designated lunch period and the common area or room can be cleaned in between occupancies).

d. Hand washing facilities, and hand sanitizer where feasible, are available to employees. Hand sanitizers required for use to protect against SARS-CoV-2 are flammable and use and storage in hot environments can result in a hazard.

F. When multiple employees are occupying a vehicle for work purposes, the employer shall ensure compliance with respiratory protection and personal protective equipment standards applicable to the employer's industry.

G. Employers shall also ensure compliance with mandatory requirements of any applicable Virginia executive order or order of public health emergency.

H. Where the nature of an employee's work or the work area does not allow the employee to observe physical distancing requirements, employers shall ensure compliance with respiratory protection and personal protective equipment standards applicable to its industry.

I. Nothing in this standard shall require the use of a respirator, surgical/medical procedure mask, or face covering by any employee for whom doing so would be contrary to the employee's health or safety because of a medical condition; however, nothing in this standard shall negate an employer's obligations to comply with personal protective equipment and respiratory protection standards applicable to its industry.

J. Requests to the Department for religious waivers from the required use of respirators, surgical/medical procedure masks, or face coverings will be handled in accordance with the requirements of applicable federal and state law, standards, regulations and the U.S. and Virginia Constitutions, after Department consultation with the Office of the Attorney General.

K. Sanitation and disinfecting.

1. In addition to the requirements contained in this standard, employers shall comply with the VOSH sanitation standard applicable to its industry.

2. Employees that interact with customers, the general public, contractors, and other persons shall be provided with and immediately use supplies to clean and disinfectant surfaces contacted during the interaction where there is the potential for exposure to the SARS-CoV-2 virus by themselves or other employees.

3. In addition to the requirements contained in this standard, employers shall comply with the VOSH hazard communication standard applicable to the employers' industry for cleaning and disinfecting materials and hand sanitizers.

4. Areas in the place of employment where known or suspected to be infected with the SARS-CoV-2 virus employees or other persons accessed or worked shall be cleaned and

disinfected prior to allowing other employees access to the areas. Where feasible, a period of 24 hours will be observed prior to cleaning and disinfecting. This requirement shall not apply if the areas in question have been unoccupied for seven or more days.

5. All common spaces, including bathrooms, frequently touched surfaces, and doors, shall at a minimum be cleaned and disinfected at the end of each shift. All shared tools, equipment, workspaces, and vehicles shall be cleaned and disinfected prior to transfer from one employee to another.

6. Employers shall ensure that cleaning and disinfecting products are readily available to employees to accomplish the required cleaning and disinfecting. In addition, employers shall ensure use of only disinfecting chemicals and products indicated in the Environmental Protection Agency (EPA) List N for use against SARS-CoV-2.

7. Employers shall ensure that the manufacturer's instructions for use of all disinfecting chemicals and products are complied with (e.g., concentration, application method, contact time, PPE, etc.).

8. Employees shall have easy, frequent access and permission to use soap and water, and hand sanitizer where feasible, for the duration of work. Employees assigned to a work station where job tasks require frequent interaction inside six feet with other persons shall be provided with hand sanitizer where feasible at the employees work station. Mobile crews shall be provided with hand sanitizer where feasible for the duration of work at a work site and shall have transportation immediately available to nearby toilet facilities and handwashing facilities that meet the requirements of VOSH

laws, standards, and regulations dealing with sanitation. Hand sanitizers required for use to protect against SARS-CoV-2 are flammable, and use and storage in hot environments can result in a hazard.

9. It is recognized that various hazards or job tasks at the same place of employment can be designated as very high, high, medium, or lower as presenting potential exposure risk for purposes of application of the requirements of this standard. In situations other than emergencies, the employer shall ensure that protective measures are put in place to prevent cross-contamination.

L. Unless otherwise provided in this standard, when engineering, work practice, and administrative controls are not feasible or do not provide sufficient protection, employers shall provide personal protective equipment to their employees and ensure the equipment's proper use in accordance with VOSH laws, standards, and regulations applicable to personal protective equipment, including respiratory protection equipment.

16VAC25-220-50. Requirements for hazards or job tasks classified as very high or high exposure risk.

A. The requirements in this section for employers with hazards or job tasks classified as very high or high exposure risk apply in addition to requirements contained in 16VAC25-220-40, 16VAC25-220-70, and 16VAC25-220-80.

B. Engineering controls.

1. Employers shall ensure that appropriate air-handling systems:

- a. Are installed and maintained in accordance with manufacturer's instructions in healthcare facilities and other places of employment treating, caring for, or housing persons with known or suspected to be infected with the SARS-CoV-2 virus; and
 - b. Comply with minimum American National Standards Institute (ANSI)/American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standards 62.1 and 62.2 (ASHRAE 2019a, 2019b), which include requirements for outdoor air ventilation in most residential and nonresidential spaces, and ANSI/ASHRAE/ASHE Standard 170 (ASHRAE 2017a), which covers both outdoor and total air ventilation in healthcare facilities. Based on risk assessments or owner project requirements, designers of new and existing facilities can go beyond the minimum requirements of these standards.
2. For employers not covered by subdivision 1 of this subsection, ensure that air-handling systems where installed are appropriate to address the SARS-CoV-2 virus and COVID-19 disease related hazards and job tasks that occur at the workplace:
 - a. Are maintained in accordance with the manufacturer's instructions; and
 - b. Comply with subdivision 1 b of this subsection.
3. Hospitalized patients with known or suspected to be infected with the SARS-CoV-2 virus, where feasible and available, shall be placed in an airborne infection isolation room (AIIR).

4. Employers shall use AIIR rooms when available for performing aerosol-generating procedures on patients with known or suspected to be infected with the SARS-CoV-2 virus.

5. For postmortem activities, employers shall use autopsy suites or other similar isolation facilities when performing aerosol-generating procedures on the bodies of known or suspected to be infected with the SARS-CoV-2 virus persons at the time of their death.

6. Employers shall use special precautions associated with Biosafety Level 3 (BSL-3), as defined by the U.S. Department of Health and Human Services Publication No. (CDC) 21-1112 “Biosafety in Microbiological and Biomedical Laboratories” (Dec. 2009), which is hereby incorporated by reference, when handling specimens from known or suspected to be infected with the SARS-CoV-2 virus patients or persons.

7. To the extent feasible, employers shall install physical barriers, (e.g., clear plastic sneeze guards, etc.), where such barriers will aid in mitigating the spread of SARS-CoV-2 and COVID-19 virus transmission.

C. Administrative and work practice controls.

1. Prior to the commencement of each work shift, prescreening or surveying shall be required to verify each covered employee does not have signs or symptoms of COVID-19.

2. In healthcare facilities, an employer shall follow existing guidelines and facility standards of practice for identifying and isolating infected persons and for protecting employees.

3. An employer shall limit non-employee access to the place of employment or restrict access to only certain workplace areas to reduce the risk of exposure. An employer's compliance with occupancy limits contained in any applicable Virginia executive order or order of public health emergency will constitute compliance with the requirements of this paragraph.

4. An employer shall post signs requesting patients and family members to immediately report symptoms of respiratory illness on arrival at the healthcare facility and use disposable face coverings.

5. An employer shall offer enhanced medical monitoring of employees during COVID-19 outbreaks.

6. An employer shall provide all employees with job-specific education and training on preventing transmission of COVID-19, including initial and routine and refresher training in accordance with 16VAC25-220-80.

7. To the extent feasible, an employer shall ensure that psychological and behavioral support is available to address employee stress at no cost to the employee.

8. In health care settings, an employer shall provide alcohol-based hand sanitizers containing at least 60% ethanol or 70% isopropanol to employees at fixed work sites and to emergency responders and other personnel for decontamination in the field when working away from fixed work sites.

9. Provide face coverings to suspected to be infected with SARS-CoV-2 virus non-employees to contain respiratory secretions until the non-employees are able to leave the site (i.e., for medical evaluation and care or to return home).

10. Where feasible, employers shall:

- a. Implement flexible worksites (e.g., telework).
- b. Implement flexible work hours (e.g., staggered shifts).
- c. Increase physical distancing between employees at the worksite to six feet.
- d. Increase physical distancing between employees and other persons to six feet.
- e. Implement flexible meeting and travel options (e.g., use telephone or video conferencing instead of in person meetings; postpone non-essential travel or events; etc.).
- f. Deliver services remotely (e.g. phone, video, internet, etc.).
- g. Deliver products through curbside pick-up.

D. Personal protective equipment (PPE).

1. Employers covered by this section and not otherwise covered by the VOSH Standards for General Industry (16VAC25-90-1910), shall comply with the following requirements for a SARS-CoV-2 virus and COVID-19 disease hazard assessment and personal protective equipment selection:

- a. The employer shall assess the workplace to determine if SARS-CoV-2 virus or COVID-19 disease hazards or job tasks are present or are likely to be present that necessitate

the use of personal protective equipment (PPE). The employer shall provide for employee and employee representative involvement in the assessment process.

b. If such hazards or job tasks are present or likely to be present, the employer shall:

(1) Except as otherwise required in the standard, select and have each affected employee use the types of PPE that will protect the affected employee from the SARS-CoV-2 virus or COVID-19 disease hazards identified in the hazard assessment;

(2) Communicate selection decisions to each affected employee; and

(3) Select PPE that properly fits each affected employee.

2. The employer shall verify that the required SARS-CoV-2 virus and COVID-19 disease workplace hazard assessment has been performed through a written certification that identifies the workplace evaluated; the person certifying that the evaluation has been performed; the date of the hazard assessment; and the document as a certification of hazard assessment.

3. Unless specifically addressed by an industry specific standard applicable to the employer and providing for PPE protections to employees from the SARS-COV-2 virus or COVID-19 disease (e.g., 16VAC25-175-1926, 16VAC25-190-1928, 16VAC25-100-1915, 16VAC25-120-1917, or 16VAC25-130-1918), the requirements of 16VAC25-90-1910.132 (General requirements) and 16VAC25-90-1910.134 (Respiratory protection) shall apply to all employers for that purpose.

4. The employer shall implement a respiratory protection program in accordance with 16VAC25-90-1910.134 (b) through (d) (except (d)(1)(iii)), and (f) through (m), that covers each employee required to use a respirator.

5. Unless contraindicated by a hazard assessment and equipment selection requirements in subdivision 1 of this subsection, employees classified as very high or high exposure risk shall be provided with and wear gloves, a gown, a face shield or goggles, and a respirator when in contact with or inside six feet of patients or other persons known to be or suspected of being infected with SARS-CoV-2. Where indicated by the hazard assessment and equipment selection requirements in subsection D of this section, such employees shall also be provided with and wear a surgical/medical procedure mask. Gowns shall be large enough to cover the areas requiring protection.

E. Employee training shall be provided in accordance with the requirements of 16VAC25-220-80 of this standard.

16VAC25-220-60. Requirements for hazards or job tasks classified at medium exposure risk.

A. The requirements in this section for employers with hazards or job tasks classified as medium exposure risk apply in addition to requirements contained in 16VAC25-220-40, 16VAC25-70, and 16VAC25-80.

B. Engineering controls.

1. Employers shall ensure that air-handling systems where installed are appropriate to address the SARS-CoV-2 virus and COVID-19 disease related hazards and job tasks that occur at the workplace and:

- a. Are maintained in accordance with the manufacturer's instructions; and
- b. Comply with minimum American National Standards Institute (ANSI)/American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standards 62.1 and 62.2 (ASHRAE 2019a, 2019b), which include requirements for outdoor air ventilation in most residential and nonresidential spaces, and ANSI/ASHRAE/ASHE Standard 170 (ASHRAE 2017a), which covers both outdoor and total air ventilation in healthcare facilities. Based on risk assessments or owner project requirements, designers of new and existing facilities can go beyond the minimum requirements of these standards.

C. Administrative and work practice controls.

- 1. To the extent feasible, employers shall implement the following administrative and work practice controls:
 - a. Prior to the commencement of each work shift, prescreening or surveying shall be required to verify each covered employee does not have signs or symptoms of COVID-19.
 - b. Provide face coverings to suspected to be infected with SARS-COV-2 non-employees to contain respiratory secretions until the non-employees are able to leave the site (i.e., for medical evaluation and care or to return home).
 - c. Implement flexible worksites (e.g., telework).
 - d. Implement flexible work hours (e.g., staggered shifts).

- e. Increase physical distancing between employees at the worksite to six feet.
- f. Increase physical distancing between employees and other persons, including customers to six feet (e.g., drive-through physical barriers) where such barriers will aid in mitigating the spread of SARS-CoV-2 virus transmission, etc.
- g. To the extent feasible, install physical barriers (e.g., such as clear plastic sneeze guards, etc.), where such barriers will aid in mitigating the spread of SARS-CoV-2 virus transmission.
- h. Implement flexible meeting and travel options (e.g., using telephone or video conferencing instead of in person meetings; postponing non-essential travel or events; etc.).
- i. Deliver services remotely (e.g. phone, video, internet, etc.).
- j. Deliver products through curbside pick-up or delivery.
- k. Require employers to provide and employees to wear face coverings who, because of job tasks cannot feasibly practice physical distancing from another employee or other person if the hazard assessment has determined that personal protective equipment, such as respirators or surgical/medical procedure masks, was not required for the job task.
- l. Require employers to provide and employees in customer facing jobs to wear face coverings.

D. Personal protective equipment.

1. Employers covered by this section and not otherwise covered by the VOSH Standards for General Industry (16VAC25-90-1910) shall comply with the following requirements for a SARS-CoV-2 virus and COVID-19 disease related hazard assessment and personal protective equipment selection:

a. The employer shall assess the workplace to determine if SARS-CoV-2 or COVID-19 hazards or job tasks are present or are likely to be present that necessitate the use of personal protective equipment (PPE). The employer shall provide for employee and employee representative involvement in the assessment process. If such hazards or job tasks are present or likely to be present, the employer shall:

i. Except as otherwise required in the standard, select and have each affected employee use the types of PPE that will protect the affected employee from the SARS-CoV-2 virus or COVID-19 disease hazards identified in the hazard assessment;

ii. Communicate selection decisions to each affected employee; and

iii. Select PPE that properly fits each affected employee.

2. The employer shall verify that the required SARS-CoV-2 virus and COVID-19 disease workplace hazard assessment has been performed through a written certification that identifies the workplace evaluated; the person certifying that the evaluation has been performed; the date of the hazard assessment; and the document as a certification of hazard assessment.

3. Unless specifically addressed by an industry specific standard applicable to the employer and providing for PPE protections to employees from the SARS-COV-2 virus or

COVID-19 disease (e.g., 16VAC25-175-1926, 16VAC25-190-1928, 16VAC25-100-1915, 16VAC25-120-1917, or 16VAC25-130-1918), the requirements of 16VAC25-90-1910.132 (General requirements) and 16VAC25-90-1910.134 (Respiratory protection) shall apply to all employers for that purpose.

4. PPE ensembles for employees in the medium exposure risk category will vary by work task, the results of the employer's hazard assessment, and the types of exposures employees have on the job.

16VAC25-220-70. Infectious disease preparedness and response plan.

A. Employers with hazards or job tasks classified as:

1. Very high and high shall develop and implement a written Infectious Disease Preparedness and Response Plan;
2. Medium with 11 or more employees shall develop and implement a written Infectious Disease Preparedness and Response Plan.

B. The plan and training requirements tied to the plan shall only apply to those employees classified as very high, high, and medium covered by this section.

C. Employers shall designate a person to be responsible for implementing their plan. The plan shall:

1. Identify the name or title of the person responsible for administering the plan. This person shall be knowledgeable in infection control principles and practices as the principles and practices apply to the facility, service, or operation.

2. Provide for employee involvement in development and implementation of the plan.

3. Consider and address the level of SARS-CoV-2 virus and COVID-19 disease risk associated with various places of employment, the hazards employees are exposed to at those sites, and job tasks employees perform at those sites. Such considerations shall include:

a. Where, how, and to what sources of the SARS-CoV-2 virus or COVID-19 disease might employees be exposed at work, including:

i. The general public, customers, other employees, patients, and other persons;

ii. Known or suspected to be infected with the SARS-CoV-2 virus persons or those at particularly high risk of COVID-19 infection (e.g., local, state, national, and international travelers who have visited locations with ongoing COVID-19 community transmission and healthcare employees who have had unprotected exposures to known or suspected to be infected with SARS-CoV-2 virus persons); and

iii. Situations where employees work more than one job with different employers and encounter hazards or engage in job tasks that present a very high, high, or medium level of exposure risk.

b. To the extent permitted by law, including HIPAA, employees' individual risk factors.

For example, people of any age with one or more of the following conditions are at increased risk of severe illness from COVID-19: chronic kidney disease; COPD (chronic obstructive pulmonary disease); immunocompromised state (weakened immune system) from solid organ transplant; obesity (body mass index or BMI of 40 or higher);

serious heart conditions, such as heart failure, coronary artery disease, or cardiomyopathies; sickle cell disease; or type 2 diabetes mellitus). Also, for example, people with one or more of the following conditions might be at an increased risk for severe illness from COVID-19: asthma (moderate-to-severe); cerebrovascular disease (affects blood vessels and blood supply to the brain); cystic fibrosis; hypertension or high blood pressure; immunocompromised state (weakened immune system) from blood or bone marrow transplant, immune deficiencies, HIV, use of corticosteroids, or use of other immune weakening medicines; neurologic conditions, such as dementia; liver disease; pregnancy; pulmonary fibrosis (having damaged or scarred lung tissues); smoking; thalassemia (a type of blood disorder); type 1 diabetes mellitus; etc.).

c. Engineering, administrative, work practice, and personal protective equipment controls necessary to address those risks.

4. Consider contingency plans for situations that may arise as a result of outbreaks, such as:

- a. Increased rates of employee absenteeism;
- b. The need for physical distancing, staggered work shifts, downsizing operations, delivering services remotely, and other exposure-reducing workplace control measures such as elimination and substitution, engineering controls, administrative and work practice controls, and personal protective equipment, e.g., respirators, surgical/medical procedure masks, etc.

- c. Options for conducting essential operations with a reduced workforce, including cross-training employees across different jobs in order to continue operations or deliver surge services; and
 - d. Interrupted supply chains or delayed deliveries.
- 5. Identify basic infection prevention measures to be implemented:
 - a. Promote frequent and thorough hand washing, including by providing employees, customers, visitors, the general public, and other persons to the place of employment with a place to wash their hands. If soap and running water are not immediately available, provide hand sanitizers.
 - b. Maintain regular housekeeping practices, including routine cleaning and disinfecting of surfaces, equipment, and other elements of the work environment.
 - c. Establish policies and procedures for managing and educating visitors to the place of employment.
- 6. Provide for the prompt identification and isolation of known or suspected to be infected with the SARS-CoV-2 virus employees away from work, including procedures for employees to report when they are experiencing symptoms of COVID-19.
- 7. Address infectious disease preparedness and response with outside businesses, including, but not limited to, subcontractors who enter the place of employment, businesses that provide or contract or temporary employees to the employer, and other persons accessing the place of employment to comply with the requirements of this standard and the employer's plan.

8. Identify the mandatory and non-mandatory recommendations in any CDC guidelines or Commonwealth of Virginia guidance documents the employer is complying with, if any, in lieu of a provision of this standard, as provided for in 16VAC25-220-10 G 1 and G 2.

9. Ensure compliance with mandatory requirements of any applicable Virginia executive order or order of public health emergency related to the SARS-CoV-2 virus or COVID-19 disease.

16VAC25-220-80. Training.

A. Employers with hazards or job tasks classified as very high, high, or medium exposure risk at a place of employment shall provide training on the hazards and characteristics of the SARS-CoV-2 virus and COVID-19 disease to all employees working at the place of employment regardless of employee risk classification. The training program shall enable each employee to recognize the hazards of the SARS-CoV-2 virus and signs and symptoms of COVID-19 disease and shall train each employee in the procedures to be followed in order to minimize these hazards.

B. The training required under subsection A shall include:

1. The requirements of this standard;
2. The mandatory and non-mandatory recommendations in any CDC guidelines or State of Virginia guidance documents the employer is complying with, if any, in lieu of a provision of this standard as provided for in section 16VAC25-220-10 G 1 and G 2;
3. The characteristics and methods of transmission of the SARS-CoV-2 virus;
4. The signs and symptoms of the COVID-19 disease;

5. Risk factors of severe COVID-19 illness with underlying health conditions;
6. Awareness of the ability of pre-symptomatic and asymptomatic COVID-19 persons to transmit the SARS-CoV-2 virus;
7. Safe and healthy work practices, including but not limited to, physical distancing, disinfection procedures, disinfecting frequency, ventilation, noncontact methods of greeting, etc.;
8. PPE:
 - a. When PPE is required;
 - b. What PPE is required;
 - c. How to properly don, doff, adjust, and wear PPE;
 - d. The limitations of PPE;
 - e. The proper care, maintenance, useful life, and disposal of PPE; and
 - f. Heat-related illness prevention including the signs and symptoms of heat-related illness;
9. The anti-discrimination provisions in 16VAC25-220-90; and
10. The employer's Infectious Disease Preparedness and Response Plan, where applicable.

C. Employers covered by 16VAC25-220-50 shall verify compliance with 16VAC25-220-80 A by preparing a written certification record for those employees exposed to hazards or job tasks classified as very high, high, or medium exposure risk levels. The written certification record shall

contain the name or other unique identifier of the employee trained, the trained employee's physical or electronic signature, the date of the training, and the name of the person who conducted the training, or for computer-based training, the name of the person or entity that prepared the training materials. If the employer relies on training conducted by another employer or completed prior to the effective date of this standard, the certification record shall indicate the date the employer determined the prior training was adequate rather than the date of actual training

D. The latest training certification shall be maintained.

E. When the employer has reason to believe that any affected employee who has already been trained does not have the understanding and skill required by 16VAC25-220-80 A, the employer shall retrain each such employee. Circumstances where retraining is required include, but are not limited to, situations where:

1. Changes in the workplace, SARS-CoV-2 virus or COVID-19 disease hazards exposed to, or job tasks performed render previous training obsolete;
2. Changes are made to the employer's Infectious Disease Preparedness and Response Plan; or
3. Inadequacies in an affected employee's knowledge or use of workplace control measures indicate that the employee has not retained the requisite understanding or skill.

F. Employers with hazards or job tasks classified at lower risk shall provide written or oral information to employees exposed to such hazards or engaged in such job tasks on the hazards and characteristics of SARS-COV-2 and the symptoms of COVID-19 and measures to minimize

exposure. The Department of Labor and Industry shall develop an information sheet containing information on the items listed in subsection G, which an employer may utilize to comply with this subsection.

G. The information required under subsection F shall include at a minimum:

1. The requirements of this standard;
2. The characteristics and methods of transmission of the SARS-CoV-2 virus;
3. The symptoms of the COVID-19 disease;
4. The ability of pre-symptomatic and asymptomatic COVID-19 persons to transmit the SARS-CoV-2 virus;
5. Safe and healthy work practices and control measures, including but not limited to, physical distancing, sanitation and disinfection practices; and
6. The anti-discrimination provisions of this standard in 16VAC25-220-90.

16VAC25-220-90. Discrimination against an employee for exercising rights under this standard is prohibited.

A. No person shall discharge or in any way discriminate against an employee because the employee has exercised rights under the safety and health provisions of this standard, Title 40.1 of the Code of Virginia, and implementing regulations under 16VAC25-60-110 for themselves or others.

B. No person shall discharge or in any way discriminate against an employee who voluntarily provides and wears the employee's own personal protective equipment, including but not limited

to a respirator, face shield, or gloves, or face covering if such equipment is not provided by the employer, provided that the PPE does not create a greater hazard to the employee or create a serious hazard for other employees.

C. No person shall discharge or in any way discriminate against an employee who raises a reasonable concern about infection control related to the SARS-CoV-2 virus and COVID-19 disease to the employer, the employer's agent, other employees, a government agency, or to the public such as through print, online, social, or any other media.

D. Nothing in this standard shall limit an employee from refusing to do work or enter a location that the employee feels is unsafe. 16VAC25-60-110 contains the requirements concerning discharge or discipline of an employee who has refused to complete an assigned task because of a reasonable fear of injury or death.

COVID-19 Travel Protocols

Remember: We are All Safer at Home

Scenario	Risk	Actions Taken	Return to Work
1. Business travel to in-person meetings or conferences.	HIGH	All business travel is canceled until October 15. Travel after October 15 must be approved by HR manager and CEO.	N/A
2. Personal travel on cruise ship.	HIGH	Employee notifies HR before they travel. Employee will be asked to quarantine.	Quarantined employees can return to work after 14 days without symptoms starting the day they returned home; or, after receiving two consecutive negative swab tests (>24 hours apart).
3. Personal travel on planes or trains.	HIGH	Employee notifies HR before they travel. Employee will be asked to quarantine.	Quarantined employees can return to work after 14 days without symptoms starting the day they returned home; or, after receiving two consecutive negative swab tests (>24 hours apart).
4. Personal travel using own vehicle to an area with increasing number of cases.	MED	Employee notifies HR before they travel. Employee works with HR to develop a safe travel plan to include wearing a face covering when getting gas or stopping in public places; practicing extra caution about hand washing and disinfection; limiting your exposure to others; and, avoiding busy places. Employee may be asked to quarantine upon return.	Quarantined employees can return to work after 14 days without symptoms starting the day they returned home; or, after receiving two consecutive negative swab tests (>24 hours apart).
5. Personal travel using own vehicle to an area with steady or decreasing number of cases.	LOW	Employee notifies HR before they travel. Employee works with HR to develop a safe travel plan to include wearing a face covering when getting gas or stopping in public places; practicing extra caution about hand washing and disinfection; limiting your exposure to others; and, avoiding busy places.	Upon return from travel.
6. Employee was in facility or crowd with someone who tested positive. Employee was not in close contact and has no symptoms.	LOW	Work may continue, continue to wear face coverings, wash hands frequently and maintain physical distance. Must continue perform health checks daily and report any symptoms.	N/A

THIS PAGE INTENTIONALLY BLANK

SECTION 01 55 00 VEHICULAR ACCESS AND PARKING

PART 1 GENERAL

1.01 SUMMARY

- A. Work specified in this Section includes but is not limited to requirements for vehicular access and parking.

1.02 SUBMITTALS

- A. Informational Submittals:
 - 1. Temporary Construction Submittals:
 - a. Contractor's parking area plans at the AlexRenew property.
 - b. Traffic and Pedestrian Control and Routing Plans: As specified herein, and proposed revisions thereto.

1.03 VEHICLE ACCESS AND PARKING

- A. Construction workers are prohibited from on-street parking within the City of Alexandria.
- B. The Contractor may utilize portions of the assigned laydown/staging area for privately owned vehicle parking (POV) and marked company vehicles. All Contractor POV shall comply with requirements of this section including the Dominion Consent Agreement for Right of Way Easement.
- C. The Contractor must control vehicle parking within the limits of the Work as shown on the Drawings to preclude interference with traffic or parking, access by emergency vehicles, Owner's operations, or other construction operations.
- D. The Contractor must confine construction traffic to designated haul routes as shown on the Drawings.
- E. AlexRenew Department of Occupational Safety and Health reserves the right to declare parking conditions unsafe or unacceptable and to require the contractor to make necessary on-the-spot changes at no cost to the Owner.
- F. If Contractor's, subcontractors, or vendors'/suppliers' employees, or any other Contractor invitee violates these Contract requirements, the Contractor must immediately remedy the violation upon Owner notification to the Contractor.

- G. The Contractor shall be responsible for providing transportation to and from the job site for project personnel parking in an offsite area.
- H. Vehicle speed on AlexRenew property shall not exceed 15 mph. Violators may be prohibited from the site at the discretion of the Owner.

1.04 TRAFFIC CONTROL PLAN:

- A. Comply with onsite and offsite traffic plans shown in the drawings.
- B. A city condition of approval requires that: a) a copy of the offsite traffic control plan be posted in the onsite construction trailer, and b) a copy of the offsite traffic control plan be given to each subcontractor before they begin work.
- C. If the offsite truck traffic plan, including the notes, is found to be violated during the course of construction, citations will be issued by the City for each infraction and a correction notice will be forwarded to the Contractor by the Owner.
- D. If the violation is not corrected within 5 calendar days, a “stop work order” will be issued by the City, with construction halted until the violation has been corrected.
- E. Adhere to traffic control plans reviewed and accepted by Engineer. Changes to these plans shall be made only by written approval of Engineer. Secure approvals for necessary changes so as not to delay progress of the Work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

3.01 PARKING AREAS

- A. Control vehicular parking to preclude interference with public traffic or parking, access by emergency vehicles, Owner’s operations, or construction operations.

3.02 VEHICULAR TRAFFIC

- A. No public or private road shall be closed. Ensure the least possible obstruction to traffic.
- B. Conduct the Work to interfere as little as possible with public travel, whether vehicular or pedestrian.
- C. All posted speed limits on Site must be obeyed.

- D. Construction traffic on plant roads will be limited to stabilized road surfaces to the greatest extent practical, as shown on the Drawings.
- E. Whenever it is necessary to cross or obstruct onsite roads, driveways, and walks, provide and maintain suitable and safe bridges, detours, or other temporary expedients for accommodation of public and private travel.
- F. Maintain top of backfilled trenches before they are paved, to allow normal vehicular traffic to pass over. Provide temporary access driveways where required. Cleanup operations shall follow immediately behind backfilling.
- G. When flaggers and guards are required by the traffic plan included in the drawings, the Contractor's Traffic Routing Plan as approved by the Engineer, or when deemed necessary for safety, furnish them with approved hardhats, orange wearing apparel, and other regulation traffic control devices.
- H. Provide snow removal to facilitate normal vehicular traffic on private travelways and walkways within construction zone. Snow removed from roadways and walkways shall not block walkways or sidewalks. Perform snow removal promptly and efficiently by means of suitable equipment whenever necessary for safety, and as may be directed by proper authority.
- I. Coordinate traffic routing with that of others working in same or adjacent areas. Other contracts will be under construction during portions of the duration of this project.

3.03 PLANT ROADS

- A. Unless otherwise approved by the Owner, plant roads shall remain open at all times with at least one 12-foot traffic lane, unless specifically indicated otherwise on the Drawings.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 58 10
HANDLING, TESTING, AND DISPOSAL OF HAZARDOUS WASTE

PART 1 GENERAL

1.01 SUMMARY

- A. This section contains requirements for furnishing all equipment and materials and performing all work necessary to handle, test, and dispose of excavated materials and construction dewatering discharges that are a Hazardous Waste (HW) in accordance with Legal Requirements. These requirements also shall apply to other HW generated as a result of performing the Work. For the purpose of preparing the Contractor's price proposal, no soil or groundwater that represents a Hazardous Waste is known to be present within Project Limits at time of award.

1.02 REFERENCE STANDARDS

- A. Code of Federal Regulations (CFR):
1. 29 CFR 1910 - Occupational Safety and Health Standards for General Industry
 2. 29 CFR 1926 - Safety and Health Regulations for Construction
 3. 40 CFR 124 - Procedures for Decision Making
 4. 40 CFR 260 - Hazardous Waste Management System: General
 5. 40 CFR 261 - Identification and Listing of Hazardous Waste
 6. 40 CFR 262 - Standards Applicable to Generators of Hazardous Waste
 7. 40 CFR 263 - Standards Applicable to Transporters of Hazardous Waste
 8. 40 CFR 264 - Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
 9. 40 CFR 265 - Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
 10. 40 CFR 266 - Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities
 11. 40 CFR 268 - Land Disposal Restrictions
 12. 40 CFR 270 - EPA Administered Permit Programs: The Hazardous Waste Permit Program
 13. 40 CFR 271 - Requirements for Authorization of Commonwealth of Virginia Hazardous Waste Programs
 14. 40 CFR 272 - Approved Commonwealth of Virginia Hazardous Waste Management Programs
 15. 40 CFR 273 - Standards for Universal Waste Management
 16. 40 CFR 279 - Standards for the Management of Used Oil

17. 40 CFR 280 - Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks (UST)
18. 40 CFR 300 - National Oil and Hazardous Substances Pollution Contingency Plan
19. 40 CFR 355 - Emergency Planning and Notification
20. 40 CFR 372 SUBPART D - Specific Toxic Chemical Listings
21. 40 CFR 761 - Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
22. 49 CFR 171 - Transportation General Information, Regulations, and Definitions
23. 49 CFR 172 - Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
24. 49 CFR 173 - Shippers – General Requirements for Shipments and Packaging's
25. 49 CFR 174 - Carriage by Rail
26. 49 CFR 175 - Carriage by Aircraft
27. 49 CFR 176 - Carriage by Vessel
28. 49 CFR 177 - Carriage by Public Highway
29. 49 CFR 178 - Specifications for Packaging's
30. 49 CFR 107, 110, 130, 171, 172, 173, 177, 178, 180 – Research and Special Programs Administration, Department of Transportation (Hazardous Materials Regulations)
31. 49 CFR 397 - Federal Motor Carrier Safety Administration, Department of Transportation (Transportation of Hazardous Materials).

B. Other Reference Standards:

1. 9VAC20-60 - Virginia Hazardous Waste Management Regulations
2. 9VAC20-110 - Virginia Regulations Governing the Transportation of Hazardous Materials
3. All Legal Requirements for jurisdictions where Hazardous Waste will be transported, stored, treated, and/or disposed
4. EPA Executive Orders 1440.2 and 1440.3
5. EPA 530/F-93/004 (1993; Rev O; Updates I, II, IIA, IIB, and III) - Test Methods for Evaluating Solid Waste (Vol IA, IB, IC, and II) (SW-846).
6. OSHA Guidance Manual for Hazardous Waste Site Activities, DHHS/NIOSH Pub. No. 85-115.

1.03 DEFINITIONS

- A. Refer to Section 01 10 00, General Requirements, and Section 01 59 00, Handling, Testing, and Disposal of Excavated Materials, for additional definitions.
- B. Hazardous Waste (HW): Hazardous Waste: Excavated or otherwise disturbed material that is a "solid waste" as defined by EPA or ADOE and meets the definition of a "hazardous waste" as defined by EPA hazardous water regulations or ADOE. This definition also applies to other "solid wastes" that meet the EPA or ADOE definition of a "hazardous waste" and are generated as a result of performing Work on the Project, including but not limited to, liquids, gasses, refuse, used oil, used hydraulic fluid, other waste lubricants, waste paints, dewatering fluids and solids, and waste solvents).

1.04 QUALITY ASSURANCE

- A. All Contractor personnel conducting Work described in this section shall meet the training requirements specified in 29 CFR 1910.120(e)(3) and 29 CFR 1910.120(e)(8).
- B. The Safety Supervisor/Representative shall meet the training requirements specified in 29 CFR 1910.120(e)(4) and 29 CFR 1910.120(e)(8).
- C. Personnel shall also meet applicable training requirements specified under EPA Resource Conservation and Recovery Act (RCRA) Regulations.

1.05 SUBMITTALS FOR REVIEW

- A. At least 60 days prior to commencing any site mobilization, dewatering, or ground disturbance activities, the Contractor shall submit a Hazardous Waste Management Plan (HWMP) including HW handling measures, waste transportation, and off-site management and disposal procedures. The measures shall include a written description of excavation or dewatering, staging, handling, transportation, decontamination, and disposal procedures; list of tasks; and statement of qualifications for Hazardous Waste Management personnel, including names, addresses, and telephone numbers of responsible individuals.
- B. The HWMP shall address all requirements herein and be written or reviewed by a Professional Engineer (PE) licensed in the Commonwealth of Virginia or a Certified Hazardous Materials Manager (CHMM). The PE or CHMM and Environmental Manager shall sign and seal each HWMP submission. The site-specific HWMP shall include, but not be limited to, the following items:

1. Identify personnel responsible for safety, including the name and qualifications of the Contractor's Safety Supervisor/Representative.
2. Address levels of personal protection to be employed during HW Management Work, setting forth specific criteria for choices of protective clothing and equipment.
3. Designate Construction Staging Area (CSA), exclusion zone(s) and decontamination zone(s) as defined by the Occupational Safety and Health Administration (OSHA). Describe how zone(s) will be marked/barricaded and made known to all persons at each CSA.
4. Establish construction area emergency procedures including escape routes, signals for evacuating work parties, emergency communications, and procedures for response to fire and explosions. Describe emergency equipment to be made available at the CSA, such as portable extinguishers and first aid kits.
5. Identify, provide location of, and list arrangements with the nearest medical facility.
6. Provide action levels based on air monitoring to upgrade personal protection against airborne contaminants.
7. Provide a contingency plan to be followed if air monitoring action levels are exceeded. The plan shall include the engineering, administrative, and personal protection controls to be implemented if action levels are exceeded.
8. Set forth procedures for decontamination of personnel, materials, and equipment.
9. Provide waste handling, storage, sampling, transportation, and disposal procedures.
10. Include a Waste Sampling and Testing Plan for excavated soils and groundwater (dewatering fluids) suspected to be HW. Include the names of testing laboratories to be used to perform analyses. Describe field and laboratory sampling procedures, testing methods, and quality assurance/quality control procedures.
11. Include and submit evidence of current valid permits, licenses, and certifications including, at a minimum, the following:
 - a. Training certificates (current Hazardous Waste Operations and Emergency Response [HAZWOPER] 40-hour Training or 8-hour Refresher) and proof of enrollment in a medical monitoring program of all workers to be engaged in Work under this Section, including the Safety Supervisor/Representative, in accordance with 29 CFR 1910.120(e).
 - b. Valid off-site transportation and disposal permits and licenses from the waste hauler and disposal facility and a copy of the Spill Prevention and Response Plan.
 - c. Name, location, telephone number, and all applicable permits for disposal facilities that will receive HW.

- d. EPA Form 8700-12 completed for each CSA where Hazardous Waste will be generated or where used oil, batteries or other universal waste will be stored. Submit a separate completed Form 8700-12 for Hazardous Waste generated as a result of Contractor or Contractor Related Entity error or omission.
- e. Any other documentation requested for review by the Owner to conform or comply with all applicable Legal Requirements.

1.06 SUBMITTALS OF INFORMATION

- A. For all identified HW, provide documentation including, at a minimum, the following:
 - 1. Summaries of waste characterization sampling and laboratory testing results.
 - 2. Uniform Hazardous Waste Manifests (UHWI) for each shipment of HW removed, transported, and disposed. Include manifests for materials associated with the handling of HW (personal protective equipment, decontamination fluids).
 - 3. Waste manifests signed by a responsible party of the receiving facility.
 - 4. Certificate of final disposal (or destruction) for each manifest.
 - 5. Owner shall review and sign all Uniform Hazardous Waste Manifests except those for HW generated as a result of Contractor or Contractor Related Entity error or omission.

PART 2 PRODUCTS

2.01 MATERIALS

- A. The Contractor shall provide all materials required for the packaging, labeling, marking, placarding, and transportation of HW in conformance with U.S. Department of Transportation regulations, Virginia's Regulations Governing the Transportation of HM, and all other Legal Requirements.

PART 3 EXECUTION

3.01 HAZARDOUS WASTE MANAGEMENT

- A. Obtain HW Generator Identification Number from Owner. This number shall only be used to transport and dispose of Owner HW. All HW generated by a Contractor or Contractor Related Entity error or omission shall be transported and disposed under a HW Generator Identification Number obtained by, and in the name of, the Contractor or Contractor Related Entity.

- B. Only qualified Contractor personnel and Contractor Related Entity personnel shall handle, package, label, and sample HW.
- C. Display or have available at all times at each point of generation of HW a copy of the approved HWMP.
- D. All manifests must be signed by the Owner prior to leaving the site, unless shipment is of Contractor generated HW.
- E. Transportation and disposal of any HW is required to be tracked using a UHWM.
- F. Contractor is prohibited from storing HW onsite for more than 30 days or as specified by site work permits obtained by Contractor or the Owner. If a conflict arises, the more stringent time limit shall apply.
- G. The Contractor shall be responsible for ensuring compliance with all Legal Requirements and shall verify those requirements when preparing reports, waste shipment records, waste manifests, or other documents.
- H. Identify HW in accordance with requirements of 40 CFR 261.
- I. When accumulating HW on the Site, the Contractor shall comply with generator requirements in 40 CFR 262 and Virginia Legal Requirements including 9VAC-20-60 and 9VAC20-110. On-site accumulation times shall be restricted to 30-days, 40 CFR 262 Section 34, or any Virginia Legal Requirements, whichever is more restrictive.
- J. The Contractor shall be responsible for immediately marking all HW containers as required by Legal Requirements as soon as the waste is placed in a container.
- K. The Contractor, in consultation with the Owner, shall identify all waste codes applicable to each hazardous waste stream based on requirements in 40 CFR 261 or any Legal Requirements of jurisdictions where waste will be transported and disposed.
- L. The Contractor shall also identify all applicable treatment standards contained in 40 CFR 268 and land disposal restrictions and shall make a determination as to whether or not the waste meets or exceeds the standards.
- M. Stockpile HW in a designated storage location protected from precipitation, erosion, and stormwater runoff using plastic sheeting and containment berms. All generated HW must be removed from any CSA and disposed of within 30 days of first being generated.

- N. Design storage areas to prevent stockpiled materials from entering surrounding surface soils or waters. Line and cover stockpiled areas with impervious plastic sheeting.
 - 1. Provide appropriate berms, sumps, or ditches around the storage area to prevent surface water runoff from contacting the stockpiles and to prevent infiltrating water from discharging from the stockpiles.
 - 2. Provide a drainage system to collect accumulated liquids from all storage areas and divert the liquids to an appropriate water collection, storage, and/or treatment system.
- O. Confirm all waste testing parameters that may be required by each HW disposal facility.
- P. Dust control and monitoring requirements in accordance with the Sections 01 10 00, General Requirements and 01 54 50, Construction Safety.
- Q. Erosion and sediment control requirements in accordance with the Contract Drawings.

3.02 TRANSPORTATION AND FINAL DISPOSAL

- A. All HW must be transported and disposed of offsite within 30 days of the date the waste was first generated in accordance with Legal Requirements.
- B. Applicable US Department of Transportation (DOT), Virginia DOT, and other jurisdiction's hazardous materials transporter regulations shall be followed during the transportation and handling of HW.
- C. Contractor shall ensure the correct RCRA hazardous waste generator identification, waste codes, waste descriptions, transporter name(s), and accepting facility(s) are on each HW manifest.
- D. Provide copies of all paperwork (shipping documents) that accompany any HW shipment, including a description of the material and the on-site source, to the Owner within two days of each shipment.
- E. Provide final weight tickets and waste/shipping documents for all HW removed, transported, and disposed within seven days of each shipment.
- F. The Contractor shall be responsible for ensuring the Owner receives applicable copies of each manifest (generator shipping copy, final accepting facility copy to generator, etc.) within the timeframes specified in EPA RCRA Regulations and Virginia's Hazardous Waste Management Regulations.

- G. Submit final waste manifests and final certificates of destruction or disposal to the Owner for each shipment of HW within 3 days of receipt of waste by the receiving facility.

END OF SECTION

SECTION 01 61 00 COMMON PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 DEFINITIONS

A. Products:

1. New items for incorporation in the Work, whether purchased by Contractor or Owner for the Project, or taken from previously purchased stock, and may also include existing materials or components required for reuse.
2. Includes the terms material, equipment, machinery, components, subsystem, system, hardware, software, and terms of similar intent and is not intended to change meaning of such other terms used in Contract Documents, as those terms are self-explanatory and have well recognized meanings in construction industry.
3. Items identified by manufacturer's product name, including make or model designation, indicated in manufacturer's published product literature, that is current as of the date of the Contract Documents.

1.02 CODES

A. Provide systems, equipment, and components that comply with the following codes as adopted by the City of Alexandria.

1. 2015 Virginia Construction Code (IBC).
2. [2015 Virginia Energy Conservation Code](#) (with ASHRAE 90.1-2010).
3. [2015 Virginia Mechanical Code](#) (International Mechanical Code).
4. [2015 Virginia Plumbing Code](#) (International Plumbing Code).
5. [2015 Virginia Fuel Gas Code](#) (International Fuel Gas Code).
6. 2014 National Electrical Code.
7. [2015 Virginia Existing Building Code](#) (International Existing Building Code).
8. [2015 Virginia Fire Code](#) (International Fire Code).

1.03 DESIGN REQUIREMENTS

- A. Where Contractor design is specified, design of installation, systems, equipment, and components, including supports and anchorage, shall be in accordance with provisions of 2012 Virginia Construction Code (VCC) and 2012 International Building Code (IBC) by International Code Council as modified by VCC.

1. See Structural Notes on Drawings for project-specific structural design criteria.

1.04 ENVIRONMENTAL REQUIREMENTS

- A. Provide equipment and devices installed outdoors or in unheated enclosures capable of continuous operation within an ambient temperature range of 0 degrees F to 100 degrees F.

1.05 PREPARATION FOR SHIPMENT

- A. When practical, factory assemble products. Mark or tag separate parts and assemblies to facilitate field assembly. Cover machined and unpainted parts that may be damaged by the elements with strippable protective coating.
- B. Whenever possible, order equipment and materials in bulk quantities to minimize excess packaging. Avoid over-ordering of material quantities.
- C. The Contractor is encouraged to request that equipment and material suppliers ship items with minimal and/or recyclable packaging products without sacrificing adequate protection for all items. Submit documentation to the Engineer that such requests have been made.
- D. Package products to facilitate handling and protect from damage during shipping, handling, and storage. Mark or tag outside of each package or crate to indicate its purchase order number, bill of lading number, contents by name, name of Project and Contractor, equipment number, and approximate weight. Include complete packing list and bill of materials with each shipment.
- E. Recycle, reuse, or return packaging items to the greatest extent practical.
- F. Extra Materials, Special Tools, Test Equipment, and Expendables:
 1. Furnish as required by individual Specifications.
 2. Schedule:
 - a. Ensure that shipment and delivery occurs concurrent with shipment of associated equipment.
 - b. Transfer to Owner shall occur immediately subsequent to Contractor's acceptance of equipment from Supplier.
 3. Packaging and Shipment:
 - a. Package and ship extra materials and special tools to avoid damage during long term storage in original cartons insofar as possible, or in appropriately sized, hinged-cover, wood, plastic, or metal box.
 - b. Prominently displayed on each package, the following:

- 1) Manufacturer's part nomenclature and number, consistent with Operation and Maintenance Manual identification system.
 - 2) Applicable equipment description.
 - 3) Quantity of parts in package.
 - 4) Equipment manufacturer.
4. Deliver materials to Site. Notify Construction Manager upon arrival for transfer of materials.
5. Replace extra materials and special tools found to be damaged or otherwise inoperable at time of transfer to Owner.
- G. Request a minimum 7-day advance notice of shipment from manufacturer. Upon receipt of manufacturer's advance notice of shipment, promptly notify Engineer of anticipated date and place of equipment arrival.
- H. Factory Test Results: Reviewed and accepted by Engineer before product shipment as required in individual Specification sections.

1.06 DELIVERY AND INSPECTION

- A. Deliver products in accordance with accepted current Progress Schedule and coordinate to avoid conflict with the Work and conditions at Site. Schedule deliveries in succession to avoid vehicle idling on site.
- B. Deliver anchor bolts and templates sufficiently early to permit setting prior to placement of structural concrete.
- C. Deliver products in undamaged condition, in manufacturer's original container or packaging, with identifying labels intact and legible. Include on label, date of manufacture and shelf life, where applicable.
- D. Unload products in accordance with manufacturer's instructions for unloading or as specified. Record receipt of products at Site. Promptly inspect for completeness and evidence of damage during shipment.
- E. Remove damaged products from Site and expedite delivery of identical new undamaged products, and remedy incomplete or lost products to provide that specified, so as not to delay progress of the Work.

1.07 HANDLING, STORAGE, AND PROTECTION

- A. Handle and store products in accordance with manufacturer's written instructions and in a manner to prevent damage. Store in approved storage yards or sheds provided in accordance with Section 01 50 52, Contractor Facilities. Provide manufacturer's recommended maintenance during storage, installation, and until products are accepted for use by Owner.

- B. Manufacturer's instructions for material requiring special handling, storage, or protection shall be provided prior to delivery of material.
- C. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to ensure that products are maintained under specified conditions, and free from damage or deterioration. Keep running account of products in storage to facilitate inspection and to estimate progress payments for products delivered, but not installed in the Work.
- D. Store electrical, instrumentation, and control products, and equipment with bearings in weather-tight structures maintained above 60 degrees F. Protect electrical, instrumentation, and control products, and insulate against moisture, water, and dust damage. Connect and operate continuously space heaters furnished in electrical equipment.
- E. Store fabricated products above ground on blocking or skids, and prevent soiling or staining. Store loose granular materials in well-drained area on solid surface to prevent mixing with foreign matter. Cover products that are subject to deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.
- F. Store finished products that are ready for installation in dry and well-ventilated areas. Do not subject to extreme changes in temperature or humidity.
- G. After installation, provide coverings to protect products from damage due to traffic and construction operations. Remove coverings when no longer needed.
- H. Hazardous Materials: Prevent contamination of personnel, storage area, and Site. Meet requirements of product specification, codes, and manufacturer's instructions.

1.08 SUBSTITUTE AND "OR-EQUAL" PRODUCTS

- A. Any substitute and "or-equal" products must meet the requirements of the General Conditions, the Specification sections, and as set forth herein.
- B. Submit each proposed substitute or "or-equal" item/method. Include all supporting data to allow Engineer's review in accordance with Section 01 33 00, Submittal Procedures, and as follows:
 - 1. With consideration of the additional evaluation time necessary for Engineer's review of such items, indicate for each item the review status; either substitute or "or-equal."

2. Contractor, in indicating the review status of the proposed item, acknowledges that the time shown for Engineer's review on the current accepted schedule is sufficient only to allow Engineer to accomplish review for the status indicated and not sufficient to perform both a review for "or-equal" status and a subsequent review for substitute status on the same product.
3. Engineer shall require the Contractor to provide the specified product and may return unreviewed those submissions which fall into one or more of the following categories:
 - a. Not shown on the current accepted schedule.
 - b. Review status differs from that indicated on the accepted list unless previously approved in writing by Engineer.
 - c. Not in accordance with paragraph 7.05 of the General Conditions and as specified herein.
 - d. Incomplete.
 - e. Uncertified.

C. Disposition of Substitute Item/Method:

1. Accepted: Engineer will evidence such acceptance by recommendation of a Change Order for Contractor and Owner execution. Such Change Order will accompany Engineer's evaluation and acceptance of Contractor's proposed substitute.
2. Rejected:
 - a. If a hard copy submittal was provided:
 - 1) One copy retained by Engineer.
 - 2) Remaining copies returned to Contractor with a commentary by Engineer.
 - b. Contractor shall provide item specified in Contract Documents.

PART 2 PRODUCTS

2.01 GENERAL

- A. Provide manufacturer's standard materials suitable for service conditions, unless otherwise specified in the individual Specifications.
- B. Where product specifications include a named manufacturer, with or without model number, and also include performance requirements, named manufacturer's products must meet the performance specifications.
- C. Like items of products furnished and installed in the Work shall be end products of one manufacturer and of the same series or family of models to achieve standardization for appearance, operation and maintenance, spare parts and replacement, manufacturer's services, and implement same or

similar process instrumentation and control functions in same or similar manner.

- D. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.
- E. Provide interchangeable components of the same manufacturer, for similar components, unless otherwise specified.
- F. Equipment, Components, Systems, and Subsystems: Design and manufacture with due regard for health and safety of operation, maintenance, and accessibility, durability of parts, and shall comply with applicable OSHA, state, and local health and safety regulations.
- G. Regulatory Requirement: Coating materials shall meet federal, state, and local requirements limiting the emission of volatile organic compounds and for worker exposure.
- H. Safety Guards: Provide for all belt or chain drives, fan blades, couplings, or other moving or rotary parts. Cover rotating part on all sides. Design for easy installation and removal. Use 16-gauge or heavier; galvanized steel, aluminum coated steel, or galvanized or aluminum coated 1/2-inch mesh expanded steel. Provide galvanized steel accessories and supports, including bolts. For outdoors application, prevent entrance of rain and dripping water.
- I. Authority Having Jurisdiction (AHJ):
 - 1. Provide the Work in accordance with NFPA 70, National Electrical Code (NEC). Where required by the AHJ, material and equipment shall be labeled or listed by a nationally recognized testing laboratory or other organization acceptable to the AHJ in order to provide a basis for approval under NEC.
 - 2. Materials and equipment manufactured within the scope of standards published by Underwriters Laboratories, Inc. shall conform to those standards and shall have an applied UL listing mark.
- J. Equipment Finish:
 - 1. Provide manufacturer's standard finish and color, except where specific color is indicated.
 - 2. If manufacturer has no standard color, provide equipment with gray finish as approved by Owner and Engineer.
- K. Special Tools and Accessories: Furnish to Owner, upon acceptance of equipment, all accessories required to place each item of equipment in full operation. These accessory items include, but are not limited to, adequate oil

and grease (as required for first lubrication of equipment after field testing), light bulbs, fuses, hydrant wrenches, valve keys, handwheels, chain operators, special tools, and other spare parts as required for maintenance.

- L. Lubricant: Provide initial lubricant recommended by equipment manufacturer in sufficient quantity to fill lubricant reservoirs and to replace consumption during testing, startup, and operation until final acceptance by Owner.
- M. Components and Materials in Contact with Water for Human Consumption: Comply with the requirements of the Safe Drinking Water Act and other applicable federal, state, and local requirements. Provide certification by manufacturer or an accredited certification organization recognized by the Authority Having Jurisdiction that components and materials comply with the maximum lead content standard in accordance with NSF/ANSI 61 and NSF/ANSI 372.
 - 1. Use or reuse of components and materials without a traceable certification is prohibited.

2.02 FABRICATION AND MANUFACTURE

A. General:

- 1. Manufacture parts to U.S.A. standard sizes and gauges.
- 2. Two or more items of the same type shall be identical, by the same manufacturer, and interchangeable.
- 3. Design structural members for anticipated shock and vibratory loads.
- 4. Use 1/4-inch minimum thickness for steel that will be submerged, wholly or partially, during normal operation.
- 5. Modify standard products as necessary to meet performance Specifications.

B. Lubrication System:

- 1. Require no more than weekly attention during continuous operation.
- 2. Convenient and accessible; oil drains with bronze or stainless steel valves and fill-plugs easily accessible from the normal operating area or platform. Locate drains to allow convenient collection of oil during oil changes without removing equipment from its installed position.
- 3. Provide constant-level oilers or oil level indicators for oil lubrication systems.
- 4. For grease type bearings, which are not easily accessible, provide and install stainless steel tubing; protect and extend tubing to convenient location with suitable grease fitting.

2.03 SOURCE QUALITY CONTROL

- A. Where Specifications call for factory testing to be witnessed by Engineer, notify Engineer not less than 14 days prior to scheduled test date, unless otherwise specified.
- B. Calibration Instruments: Bear the seal of a reputable laboratory certifying instrument has been calibrated within the previous 12 months to a standard endorsed by the National Institute of Standards and Technology (NIST).
- C. Factory Tests: Perform in accordance with accepted test procedures and document successful completion.

PART 3 EXECUTION

3.01 INSPECTION

- A. Inspect materials and equipment for signs of pitting, rust decay, or other deleterious effects of storage. Do not install material or equipment showing such effects. Remove damaged material or equipment from the Site and expedite delivery of identical new material or equipment. Delays to the Work resulting from material or equipment damage that necessitates procurement of new products will be considered delays within Contractor's control.

3.02 INSTALLATION

- A. Equipment Drawings show general locations of equipment, devices, and raceway, unless specifically dimensioned.
- B. No shimming between machined surfaces is allowed.
- C. Install the Work in accordance with NECA Standard of Installation, unless otherwise specified.
- D. Repaint painted surfaces that are damaged prior to equipment acceptance.
- E. Do not cut or notch any structural member or building surface without specific approval of Engineer.
- F. Handle, install, connect, clean, condition, and adjust products in accordance with manufacturer's instructions, and as may be specified. Retain a copy of manufacturers' instruction at Site, available for review at all times.
- G. For material and equipment specifically indicated or specified to be reused in the Work:

1. Use special care in removal, handling, storage, and reinstallation to assure proper function in the completed Work.
2. Arrange for transportation, storage, and handling of products that require offsite storage, restoration, or renovation. Include costs for such Work in the Contract Price.
3. Reused or relocated shall mean reused or relocated in-kind. The Contractor shall be responsible for all mechanical, electrical, instrumentation and any other Work required to make the relocated or reused material or equipment completely functional in all respects to the original installation.

3.03 FIELD FINISHING

- A. In accordance with individual Specification sections.

3.04 ADJUSTMENT AND CLEANING

- A. Perform required adjustments, tests, operation checks, and other startup activities.

3.05 LUBRICANTS

- A. Fill lubricant reservoirs and replace consumption during testing, startup, and operation prior to acceptance of equipment by Owner.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 71 16 BENEFICIAL OCCUPANCY

PART 1 GENERAL

1.01 SUMMARY

- A. The Contractor shall provide all personnel, services and materials required to furnish the Work in full operating order. This is to include system start-up and operation, training of operators and mechanics, furnishing all service manuals, delivery of spare parts, and system commissioning and testing to ensure correct operation and function. This also includes demonstration and verification of all project related items. Where other facilities are to be closed and their functions are to be performed at or by the project then the project must be capable of providing all services required.
 - 1. Work shall be sufficiently complete so that the Owner can fully occupy and utilize the Work or designated portion thereof for the use for which it is intended.
 - 2. Beneficial Occupancy is independent of other non-project circumstances, which could prevent The Owner from occupying, and operating the project.
 - 3. Beneficial Occupancy does not require completion of demobilization, non-impacting change orders, Directives or The Owner-supplied items/services, minor punch list items, landscaping and general cleanup to the extent that such items do not interfere with occupancy and use of the project by The Owner.

1.02 CONTRACT WORK ESSENTIAL FOR BENEFICIAL OCCUPANCY

- A. All paved areas, pavement, curbs, sidewalks, walkways, stairs, ladders, elevators, and platforms required for access to the facility shall be complete in accordance with Contract requirements.
- B. Final cleanup, as required for occupation of areas of the facility and access thereto, shall be completed.
- C. All facility systems, including but not limited to, all process equipment, HVAC, plumbing, utilities, power, fire protection and communication systems, must be operated by the Contractor for a full continuous period of 15 calendar days per the accepted Systems Operation Plan (specified herein). If, during this period any system or part of a system fails, the problems shall be corrected expeditiously and the required 15 calendar days will start from zero again.

- D. All training of The Owner's personnel in the proper operation and maintenance of systems, equipment, and similar items (except training which is specifically dependent upon testing over full range of process parameters) shall have been provided as required, prior to the start of the 15 calendar days of continuous operation.
- E. The Contractor shall operate and maintain systems during the 15-day test continuously on a 24 hour per day basis using qualified personnel. System operating parameters shall be established by The Owner. The Contractor shall regularly consult and coordinate his operations during the testing period with The Owner. Any changes in status or performance of equipment being tested shall immediately be reported to the Engineer.

1.03 BENEFICIAL OCCUPANCY PROCESS

- A. Ninety (90) calendar days in advance of his planned facility systems operation the Contractor shall submit:
 - 1. Qualifications resume of the lead engineer, for the facility systems operation.
 - 2. The Systems Operation Plan shall address, in detail, how the required acceptance testing, startup, operator training and beneficial occupancy of the work are to be accomplished.
- B. The Contractor shall prepare and submit 30 days in advance, a notice stating the anticipated date for the initiation of the 15-day facility system operation.
- C. The Notice shall certify that:
 - 1. Work has been completed in accordance with the Contract Documents.
 - 2. Equipment and systems have been tested and certified by manufacturers as required, and are operational.
 - 3. Work specified in this Section is completed and ready for Beneficial Occupancy inspection and testing.
 - 4. All submittals referenced in this Section have been made.
- D. The Engineer will make an inspection to verify status of completion and shall verify that Work has been inspected for compliance with the Contract Documents.
- E. Should the Engineer determine that the Work is incomplete or defective:
 - 1. The Engineer promptly will so notify the Contractor, in writing, listing the incomplete or defective work.
 - 2. The Contractor shall remedy the deficiencies promptly, and notify the Engineer when ready for re-inspection.

- F. When the Engineer determines that the Work is acceptable under the Contract Documents, the Contractor may proceed with the 15-day systems operation. Upon successful completion of 15-day of continuous operation the Engineer will issue a Certificate of Beneficial Occupancy.

1.04 SUBMITTALS

- A. Beneficial Occupancy submittals include, but are not necessarily limited to:
1. Manufacturer's/suppliers certifications that the equipment is ready for start-up
 2. Operation and Maintenance data and all Service Manuals, for items so listed in other pertinent sections of these specifications, and for other items when so directed by the Engineer;
 3. Warranties and Bonds;
 4. Keys and Keying Schedule;
 5. Spare parts and materials extra stock;
 6. Evidence of compliance with requirements of governmental agencies having jurisdiction including, but not necessarily limited to:
 - a. Certificates of Inspection;
 - b. Certificates of Occupancy;
 7. Evidence of payment and release of liens of suppliers and subcontractors;
 8. List of subcontractors, service organizations, and principal vendors, including names, addresses, and telephone numbers where they can be reached for emergency service at all times including nights, weekends, and holidays;
 9. Certificates of Insurance for products and completed operations.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 74 00 CLEANING

PART 1 GENERAL

1.01 SUMMARY

- A. Work specified in this Section includes but is not limited to the following:
 - 1. Furnish all labor, materials, equipment and appurtenances required to provide cleaning as shown and specified.
 - 2. Cleaning includes:
 - 3. Cleaning during construction
 - 4. Final cleaning of project and related site work

1.02 CLEANING DURING CONSTRUCTION

- A. In accordance with General Conditions, as may be specified in other Specification sections, and as required herein.
- B. Control accumulation of waste materials and rubbish; periodically dispose of offsite.
- C. Keep site and construction areas clean on a weekly basis.
- D. Clean interior areas prior to start of finish work, maintain areas free of dust and other contaminants during finishing operations.

1.03 FINAL CLEANING

- A. Execute cleaning prior to inspection for Substantial Completion of the Work.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Use materials which will not create hazards to health or property, and which will not damage surfaces.
- B. Use only materials and methods recommended by manufacturer of material being cleaned.
- C. All cleaning products utilized in the Contractor's field office and at the construction site must be certified by Green Seal.

PART 3 EXECUTION

3.01 CLEANING

- A. In addition to removal of debris and cleaning specified in other sections, clean interior and exterior exposed to view surfaces.
- B. Remove waste, foreign matter, and debris from roofs, gutters, areaways, and drainage systems.
- C. Cleaning During Construction:
 - 1. Execute periodic cleaning to keep building, site, and adjacent properties free of accumulations of waste materials, debris, rubbish, and windblown debris resulting from construction operations.
 - 2. Prior to Substantial Completion remove construction tools, scaffolding, equipment, machinery, and surplus materials.
 - 3. Broom clean and vacuum interior areas prior to start of surface finishing, and continue cleaning to eliminate dust. Protect existing and new equipment from construction dust and dust cleaning operations and per manufacturer's recommendations.
 - 4. Schedule cleaning operations such that dust and other contaminants will not fall on, or adhere to, wet or newly coated surfaces.
 - 5. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing space.
 - 6. Store volatile wastes in covered metal containers and remove from premises daily. Prevent accumulation of waste which creates hazardous conditions. Provide adequate ventilation during use of volatile or noxious substances.
 - 7. Do not throw materials from heights.
 - 8. Open free-fall chutes not permitted. Terminate closed chutes into appropriate containers with lids.
 - 9. Collect and remove waste materials, debris, and rubbish from site weekly until execution of final cleaning and dispose off-site in lawful manner.
 - 10. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
 - 11. Do not burn or bury rubbish and waste materials on Project site. Do not dispose of volatile wastes or hazardous materials such as mineral spirits, oil, or paint thinner in storm or sanitary drains. Do not dispose of wastes into streams or waterways.
 - 12. Maintain cleaning until Final Completion.

- D. Final Cleaning: In addition to cleaning during construction, prior to Substantial Completion provide the following:
1. Remove temporary protection and labels not required to remain.
 2. Clean finishes free of dust, stains, films and other foreign substances.
 3. Clean transparent and glossy materials to a polished condition; remove foreign substances. Polish reflective surfaces to a clear shine.
 4. Vacuum clean carpeted and/or similar soft surfaces.
 5. Clean, damp mop, wax, and polish resilient and hard surface floor as specified.
 6. Clean surfaces of equipment; remove excess lubrication.
 7. Clean permanent filters of ventilating equipment and replace disposable filters when units have been operated during construction; in addition, clean ducts, blowers, and coils when units have been operated without filters during construction.
 8. Clean light fixtures and lamps.
 9. Clean all roadways, parking areas and sidewalks within the project site and offsite, if applicable.
 10. Remove waste, debris, and surplus materials from site. Clean grounds; remove stains, spills, and foreign substances from paved areas and sweep clean. Rake clean other exterior surfaces.
- E. Site Maintenance: Should the Contractor fail to clean up the construction area each day to the satisfaction of the Owner, this may be done by others and the cost thereof plus ten percent (10%) deducted from the final payment.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 74 19 WASTE MANAGEMENT

PART 1 GENERAL

1.01 SUMMARY

- A. This Section includes administrative requirements for the following:
 - 1. Salvaging nonhazardous demolition waste.
 - 2. Recycling nonhazardous demolition waste.
 - 3. Disposing of nonhazardous demolition waste

1.02 DEFINITIONS

- A. Contaminated Material: In accordance with definition in Section 01 10 00, General Requirements.
- B. Construction Waste; Building and site improvement materials and other solid waste resulting from construction, remodeling, renovations or repair operations. Construction waste includes packaging.
- C. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations. Any demolition waste from subsurface structures in contaminated zones must be handled as Contaminated Material.
- D. Disposal: Removal off-site of demolition waste and subsequent sale, recycling, reuse, or deposit in landfills acceptable to authorities having jurisdiction.
- E. Recycle: Recovery of demolition waste for subsequent processing in preparation for reuse.
- F. Salvage: Recovery of demolition waste and subsequent sale or reuse in another facility.

1.03 SUBMITTALS

- A. Informational Submittals:
 - 1. Waste Management Plan: Submit five (5) copies of plan within ten (10) days following the Notice to Proceed.
 - 2. Waste Accountability Report: Concurrent with request for substantial completion, submit three (3) copies of report. Include the following information:

- a. Total quantity of waste generated in tons
 - b. Quantity of waste recycled in tons
 - c. Quantity of waste salvaged in tons
 - d. Quantity of waste landfilled in tons
 - e. Waste Diversion Rate - Total quantity of waste recovered (sum of salvaged and recycled) as a percentage of total waste generated.
3. Records of Donations/Sales: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations.
 4. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
 5. Landfill Disposal Records: Indicate receipt and acceptance of waste by landfill facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

1.04 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

1.05 PERFORMANCE REQUIREMENT

- A. General: The Owner's end-of-Project goal for salvage/recycling of material is 60 percent with a stretch goal of 90 percent by weight of total nonhazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators.
- B. Waste Management Summary: It is the Contractor's responsibility to keep track of the type and quantity of materials, by weight tickets, sent to salvage yards, recycling centers, and landfills. The following types of materials shall be salvaged or recycled at a minimum:
 1. Asphaltic concrete paving.
 2. Concrete.
 3. Concrete reinforcing steel.
 4. Concrete masonry units and brick.
 5. Piping and electrical conduit.
 6. Copper wiring.
 7. Scrap steel piling.

1.06 WASTE MANAGEMENT PLAN

- A. Develop a waste management plan that consists of a waste identification and a waste reduction work plan. The waste management program shall control

wastes such as discarded building materials, concrete truck washout, chemicals, litter, or trash generated by construction workers or mobile food vendor businesses serving them, and all sanitary waste at the construction site and prevent offsite migration that may cause adverse impacts to neighboring properties or to the environment.

- B. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing, and construction waste generated by the Work.
- C. Waste Reduction Work Plan: List each type of waste and how it will be salvaged, recycled, or disposed.
 - 1. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 - 2. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Use materials which will not create hazards to health or property, and which will not damage surfaces.
- B. Use only materials and methods recommended by manufacturer of material being cleaned.
- C. Cleaning products shall meet specifications in Section 01 74 00, Cleaning.

PART 3 EXECUTION

3.01 WASTE MANAGEMENT PLAN

- A. Implement approved Project Waste Management Plan. Provide handling, containers, transportation, and other items as required to implement waste management plan during the entire duration of the Contract. Provide approved containers for collection and disposal of waste materials, debris, and rubbish. Dispose of such waste materials, debris, and rubbish offsite. Provide separate containers for recyclable materials in addition to non-recyclable waste containers. Remove and properly recycle collected items as material volumes accumulate.
- B. Salvage and refurbish any non-toxic demolition or construction waste items that can be utilized for temporary construction means.

- C. The Contractor shall be responsible for implementing, monitoring, and reporting status of waste management plan.

END OF SECTION

SECTION 01 74 23 FIELD ENGINEERING

PART 1 GENERAL

1.01 SUMMARY

- A. This section specifies the requirements for reference surveys, construction control surveys, measurement and payment surveys, and preconstruction surveys.

1.02 QUALITY CONTROL

- A. Employ a Land Surveyor registered in the Commonwealth of Virginia and acceptable to the Owner.
- B. Employ a Professional Engineer of the discipline required for specific service on Project, licensed in the Virginia.
- C. Personnel shall have worked on projects of similar size and complexity.
- D. The Owner shall be permitted at all times to check the lines, elevations, reference marks, batter boards, etc., set by the Contractor. The Contractor shall correct any errors in lines, elevations, reference marks, batter boards, etc. Such check shall not be construed as approval of the Contractor's work and shall not relieve or diminish in any way the Contractor's responsibility for the accurate and satisfactory construction and completion of the project.

1.03 SUBMITTALS

- A. Submit name, address, and telephone number of registered surveyor before starting of work.
- B. On request, submit documentation verifying accuracy of Survey work.
- C. Design shoring, forms, procedures and similar items provided by Contractor as part of its means and methods of construction.

1.04 SURVEY REFERENCE POINTS

- A. Contractor to verify locations of survey control points prior to starting work.
- B. Promptly notify the Owner of any discrepancies discovered.
- C. Contractor to locate and protect survey control and reference points.

- D. Control datum for survey is indicated on Drawings.
- E. During the progress of the work, the Contractor shall protect and preserve reference points, baselines, and benchmarks.

1.05 REFERENCE SURVEYS

- A. Locations of baselines with reference points and reference benchmarks are shown on the Drawings. Contractor shall provide and pay for the services of a surveyor to establish construction baselines and construction benchmarks from the reference points indicated on the Drawings.
- B. Surveys shall be performed by a surveyor registered in the Virginia.
- C. Obtain approval of proposed surveyor from the Owner prior to the start of field surveys
- D. During progress of the work, protect and preserve reference points, baselines, property line markers and benchmarks. Report to the Owner the loss or destruction of any reference points or permanent benchmarks. Replace any damaged or dislocated reference points or permanent benchmarks at Contractor's expense.

1.06 SURVEY AND LAYOUT DATA

- A. All field books, notes, and other data developed by Contractor in performing surveys required as part of the Work shall be available to the Owner for examination throughout the construction period. All such data shall be submitted to the Owner with the other documentation required for final acceptance of the Work.
- B. Contractor shall keep neat and legible notes of measurements and calculations made by him in connection with the layout of the Work. Copies of such data shall be furnished to the Owner for use in checking Contractor's layout. All such data considered of value to the Authority shall be submitted to the Owner with other records upon completion of the Work.
- C. The Coordinated Layout Drawings shall include large-scale details as well as cross and longitudinal sections as required to fully delineate all conditions. Particular attention shall be given to the location, size and clearance dimensions of equipment items, shafts, operators and necessary maintenance access. Sleeve locations and wall, floor, and ceiling penetrations shall be coordinated to the termination point of the conduit, piping, or ductwork such that potential conflicts are fully resolved.

- D. The Contractor shall make all minor changes in duct, pipe or conduit routings that do not affect the intended function, but items may not be resized or exposed items relocated without the approval of the Authority. No changes shall be made in any wall locations, ceiling heights, door swings or locations, windows or other openings or other features affecting the function or aesthetic effect of the building. If conflicts or interferences cannot be resolved, the Authority shall be notified. Any problems of coordination that require architectural or structural changes of design shall be submitted to the Authority for resolution.
- E. After the reproducible Coordinated Layout Drawings have been coordinated and all necessary changes have been made, the Coordinated Layout Drawings shall be signed by the Contractor and all Subcontractors indicating that all work on that drawing has been coordinated with all associated vendors and Subcontractors and all conflicts have been resolved. Coordinated Layout Drawings shall be submitted to the Authority in accordance with this Section.
- F. No extra compensation will be paid for removing, relocating, refabricating, or changing any duct, pipe, conduit or other material or equipment that has been fabricated or installed without proper coordination among all trades involved. Any failure of the Contractor to properly coordinate the work shall not cause additional costs to the Authority.

1.07 CONSTRUCTION SURVEYS

- A. The Contractor shall make, check, and be responsible for all measurements and dimensions necessary for the proper construction of, and the prevention of misfit in, the work.
- B. Provide and pay for surveys to establish locations of the work.
- C. Establish and stake locations for:
 - 1. Building corners, property lines, column lines, and foundations.
 - 2. Tank and Structural locations and foundation elevations.
 - 3. Location and elevations of manholes, catch basins, etc.
 - 4. Location and elevations for site improvements including roads, walks, fences, catch basins, culvert, storm drains, embankments, manholes and utility lines.
 - 5. Location and elevation of service connections.
 - 6. Location and elevation of pipelines and utilities.
- D. Establish all lines, elevations, reference marks, batter boards, etc., needed during the progress of the work.

- E. During the construction surveys, If Contractor discovers an apparent problem with the reference surveys, immediately report this situation to the Owner. Do not proceed with construction until the problem has been resolved and, if required, the reference surveys have been corrected.
- F. Prior to the start of construction, prepare and submit a drawing, prepared by the approved surveyor, certifying that the locations and elevations established by field surveys are in conformity with the Contract Documents.

1.08 SURVEYS FOR MEASUREMENT AND PAYMENT

- A. Perform surveys to determine quantities of unit price work, including control surveys to establish measurement reference lines.
- B. Contractor shall sign surveyor's field notes and shall calculate and certify quantities for payment purposes
- C. Cut sheets for computing excavation quantities for payment purposes shall be submitted to the Owner as soon as practicable.

1.09 PRECONSTRUCTION SURVEYS

- A. Prior to starting any work, the Contractor shall make a detailed inspection of buildings, structures, roadways, sidewalks, retaining walls, landscaping, and related surface improvements adjacent to and in the vicinity of the proposed work, whenever located.
- B. The preconstruction survey shall consist of documenting conditions of all existing buildings and structures located within the limits of the work and within 100 feet of the limits of work. If work requires rock blasting, limits shall be extended to within 500 feet of the limits of work.
- C. Contractor may, for his own information, elect to perform surveys of areas or buildings outside the area required herewith. Contractor shall conduct the additional surveys at his own expense unless payment for this work is otherwise approved by the Owner
- D. Inspection shall include notes, measurements, and an audio-video (DVD format), with audio sound track, of all facilities prior to the start of construction.
- E. The audio description of the inspection shall include the date, time, weather conditions, address/stationing/location, brief description of the facility, and description of physical conditions encountered.

- F. The video portion of the recording shall produce bright, sharp, clear pictures with accurate colors and shall be free from distortion, tearing, rolls, or any other form of picture imperfection. The audio portion of the recording shall reproduce precise and concise explanatory notes by the camera operator with proper volume, clarity and freedom from distortion.
- G. The recorder shall record the color signal with a minimum horizontal resolution of 400 lines. The color video shall have a minimum horizontal resolution of 700 lines at the center.
- H. A cumulative index correlating the various segments of video coverage to the corresponding DVDs shall be supplied to the Owner. This index shall identify each segment in the video by location, engineering stationing corresponding to the stationing on the contract documents, video counter number, viewing side, point starting from, traveling direction, and ending point. Written documentation must coincide with the information on the tape so as to make easy retrieval of locations sought for at a later date.
- I. The purpose of the survey is to record the conditions of existing property lines, roadway, structures, buildings, their contents and operations and in order to prevent unjust or fraudulent claims against the Contractor and the Owner.
- J. Contractor shall submit qualifications of the firm and/or individual(s) conducting the survey.
- K. Contractor shall contact the Property Owners or their legal representative in order to conduct a survey of their structures or facilities.
 - 1. If the property owner does not grant permission to conduct the survey initially by telephone contact, Contractor shall contact the Property Owner a second time by registered mail/return receipt.
 - 2. The second request for permission to conduct the survey shall be conducted a minimum of 10 days prior to start of work and shall include a description of the survey to be performed and the purpose of the survey.
- L. Color photographs, videotapes, and written descriptions shall be taken as required to document the condition of areas within the limits of the survey area. Particular notes shall be made of evident structural faults or deficiencies, or recent repairs. A description of machinery, processes, activities, etc. which may be subject to disturbances shall be noted. Objects or contents, which may be sensitive to vibration disturbances, shall also be noted. The pictorial documentation shall contain:
 - 1. Clearly labeled with an identification number.

2. Name of the project.
 3. Contractor's name.
 4. Property Owner's name and address.
 5. Date of the picture.
 6. Sufficient information to determine the location of the area in question.
- M. Contractor shall prepare a written report summarizing the results of the survey and shall contain the following:
1. Location and description of each property.
 2. Descriptions of the conditions of the on-site elements.
 3. A summary of the visual inspection.
 4. Color photographs, videotapes and sketches.
- N. Contractor shall submit to the Owner 3 bound copies of the survey report and an electronic copy on a CD and/or DVD.
- O. If, during the course of construction, the Contractor is requested by a property owner to view alleged damage to property, the Contractor shall give advance notice to the Owner so that the Owner may be present to view the alleged damage.

PART 2 PRODUCTS (NOT USED)

2.01 SURVEYS, LAYOUT AND MONUMENTS

- A. Contractor shall be responsible for locating and staking out property lines.
- B. Contractor shall be responsible for laying-out and setting grades for his own work.
- C. Locate and protect existing benchmarks and control points.
- D. Contractor shall verify locations and elevations of utilities or structures at their point of connection with new or existing services/facilities for the project. Report any variations.

2.02 PERFORMANCE

- A. Surveyor's Log: Maintain a surveyor's log of control and other survey work. Make log available for reference.
- B. Existing Utilities: Furnish information necessary to adjust, move or relocate existing structures, utility poles, lines, services, or other appurtenances located in or affect by construction. Coordinate with local authorities having jurisdiction.

2.03 DRAWINGS

- A. All drawings created by the Contractor shall be prepared using ground coordinates that tie into the plant's established survey monumentation and control points shown on the drawings.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 77 00 CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 SUMMARY

- A. This Section specifies administrative and procedural requirements for a Project Closeout.

1.02 PREREQUISITES TO SUBSTANTIAL COMPLETION

- A. Definition: The functional and aesthetic qualities of the work have been completed to the point in which the Owner can utilize the project for the purpose for which it was intended as determined by the Owner.
- B. Complete items in following paragraphs before requesting Certification of Substantial Completion either for entire Work or for portions of Work.
- C. Submit maintenance manuals, project record documents, O & M Manuals, damage or settlement surveys, property surveys, photographs and other similar final record data
- D. Complete facility startup, testing, adjusting and balancing of systems and equipment
- E. Deliver tools, spare parts, extra stock, etc. to the Owner
- F. Perform final cleaning
- G. Complete equipment and process systems operational training.
- H. Submit an Application for Payment that coincides with, or first follows, date Substantial Completion is claimed, show 100 percent completion for portion of Work claimed as substantially completed.
 - 1. Include supporting documentation for completion as indicated in Contract Documents and a statement showing an accounting of changes to Contract Sum.
 - 2. If 100 percent completion cannot be shown, include a list of incomplete items, value of incomplete construction, and reason Work is not completed.
- I. Advise the Owner of pending insurance changeover requirements.
- J. Submit specific warranties, workmanship bonds, maintenance agreements, final certification and similar documents

- K. Obtain and submit releases enabling the Owner unrestricted use of Work and access to services and utilities. Including occupancy permits, operating certificates, and similar releases.

1.03 SUBSTANTIAL COMPLETION INSPECTION

- A. When Contractor considers Work to be substantially complete, submit to the Owner:
 - 1. Written certificate that Work, or designated portion, is substantially complete.
 - 2. List of items to be completed or corrected.
 - 3. Certify that the work has been completed in accordance with the Contract Documents.
 - 4. Certify that the equipment and systems have been tested and are operational.
- B. Within 10 days after receipt of request for Substantial Completion. The Owner will make inspection to determine whether Work or designated portion is substantially completed.
- C. After the inspection, the Owner shall:
 - 1. Prepare and submit to the Contractor, a list of items to be completed or corrected, as determined by the inspection.
 - 2. Prepare and issue a Certificate of Substantial Completion, containing:
 - a. The date of substantial completion
 - b. The list of items to be completed or corrected by the Contractor
 - c. The timeframe within which the Contractor shall complete or correct the work of the above listed items.
 - d. The associated cost of to complete or correct the work of the above listed items.
 - e. The Owner shall pay the Contractor in full within forty-five days following the date of Substantial Completion less only one and one-half times such amount as determined above.
 - f. The time and date that the Owner will assume complete ownership and control of the work or designated portion thereof.
 - g. The responsibilities of the Contractor for:
 - 1) Insurance.
 - 2) Utilities.
 - 3) Maintenance.
 - 4) Security.
 - 5) Operations.
 - 6) Safety.
 - 7) Heat.

- h. Certificate shall contain the signature of the:
 - 1) Owner.
 - 2) Contractor.
 - 3) Resident Engineer, if applicable.
 - 4) Construction Manager, if applicable.
 - 5) Design Engineer, if applicable.
 - 3. The Owner shall have the right to exclude the Contractor from the Work after the date of Substantial Completion, but the Owner shall allow the Contractor reasonable access to complete or correct items on the list.
- D. The Substantial Completion Inspection shall include, but not be limited to:
 - 1. The project contracted work and any additional change orders.
 - 2. All equipment and systems tested and shown operational in the presence of the Owner.
- E. Should the Owner determine that Work is not substantially complete:
 - 1. The Owner shall immediately notify the Contractor, in writing, stating the reasons.
 - 2. Contractor shall complete the work, and then send a second written notice to the Owner certifying that the Project, or designated portion of the Project, is substantially complete.
 - 3. The Owner shall then re-inspect the work upon the Contractors request at a scheduled re-inspection time.

1.04 PREREQUISITES FOR FINAL COMPLETION/FINAL ACCEPTANCE

- A. Definition: Final Completion shall not occur until installation required by the contract documents is one hundred percent (100%) complete as determined by the Owner.
- B. Complete items in following paragraphs before requesting final payment. List known exceptions, if any, in request.
- C. When Contractor considers Work to be complete, submit written verification that:
 - 1. Contract Documents have been reviewed.
 - 2. Work has been examined for compliance with Contract Documents.
 - 3. Work has been completed in accordance with Contract Documents.
 - 4. Work is completed and ready for final inspection.

D. Submit following:

1. Submit a certified copy of the Final Inspection Punch List. This certified copy shall state that each item has been completed or otherwise resolved for acceptance and shall be endorsed and dated by the Owner.
2. Final payment request with final release and supporting documentation not previously submitted and accepted. Include certification of installation for products and completed operations where required.
3. Submit specific warranties, workmanship and maintenance bonds, maintenance agreements, final certifications and other similar documents.
4. Submit all required certified weekly payroll records (contractor and sub-contractors) and reports required by the Virginia Clean Water Revolving Loan Fund, including a narrative explaining if MBE/WBE and other goals were not achieved, and what good faith efforts were exerted to increase participation.
5. Submit Consent of Surety to Final Payment.
6. Certificates of inspection and acceptance by local governing agencies having jurisdiction.
7. Releases from all parties who are entitled to claims against the subject Project, property, or improvement pursuant to the provisions of law.
8. Certify that the work has been completed in accordance with the Contract Documents.
9. Certify that the equipment and systems have been tested and are operational.
10. Submit a final liquidated damages settlement statement.
11. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
12. Submit an updated final statement, accounting for final additional changes to Contract Sum.
13. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when the Owner took possession of and assumed responsibility for corresponding elements of Work.
14. Evidence of release of all liens and stop notices.
15. Provide copies of hazardous waste manifests and hazardous materials spill records.
16. Certify that the Project is completed and is ready for final inspection.

1.05 FINAL COMPLETION INSPECTION

- A. Within ten (10) days after receipt of request for final inspection, the Owner will make inspection to determine whether Work or designated portion is complete following procedures indicated in the Conditions of the Contract. In the event the Owner considers Work to be incomplete or defective:

1. The Owner will promptly notify Contractor, in writing, listing incomplete or defective work.
 2. Contractor shall take immediate steps to remedy stated deficiencies and give a written request to the Owner that Work is complete.
 3. The Owner will re-inspect Work.
- B. When the Owner consider the work is finally complete and in accordance with the requirements of the Contract Documents, the Owner shall request the Contractor to make Project Closeout submittals.
- C. At completion of the Contract and before final payment is made, the Contractor shall furnish the Owner two (2) full size set of clearly readable, documents and PDFs submitted through eBuilder or in a media format acceptable to the Owner, each containing a complete electronic set of Record Documents (including reference documents, shop drawings, technical submittals, O&M Manuals, training Manuals, cut sheets, etc.)

1.06 REINSPECTION PROCEDURES

- A. The Owner will re-inspect the Work to verify that the items identified on the Incomplete Work List and Punch List has been completed.
- B. Re-inspections will be scheduled upon receipt of notice that Work from the respective inspection lists has been completed.
- C. At the Owner's discretion, Contractor shall pay all costs associated with repetitive re-inspections (more than two re-inspections) of the same inspection list items.

1.07 BENEFICIAL OCCUPANCY

- A. Beneficial Occupancy of process equipment and or systems may be required when incremental acceptance of portions of the Work is required due to construction sequencing issues.
- B. Beneficial Occupancy shall include all aspects of that portion of the Work as defined by the Owner.
- C. Proposed Beneficial Occupancy shall be addressed in the Progress Schedule as described in the Contract Documents.
- D. Beneficial Occupancy shall be as approved by the Owner.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 78 23 OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Detailed information for the preparation, submission, and Engineer's review of Operations and Maintenance (O&M) Data, as required by individual Specification sections. O&M manuals must be submitted in hard copy format.

1.02 DEFINITIONS

- A. Preliminary Data: Initial and subsequent submissions for Engineer's review.
- B. Final Data: Engineer-accepted data, submitted as specified herein.
- C. Maintenance Operation: As used on Maintenance Summary Form is defined to mean any routine operation required to ensure satisfactory performance and longevity of equipment. Examples of typical maintenance operations are lubrication, belt tensioning, adjustment of pump packing glands, and routine adjustments.

1.03 SEQUENCING AND SCHEDULING

- A. Equipment and System Data:
 - 1. Preliminary Data:
 - a. Do not submit until Shop Drawing for equipment or system has been reviewed and approved by Engineer.
 - b. Submit prior to shipment date.
 - c. Submit three hard copies.
 - 2. Final Data: Submit six hard copies and one in electronic format. Submit Instructional Manual Formatted data not less than 30 days prior to equipment or system field functional testing.
- B. Materials and Finishes Data:
 - 1. Preliminary Data: Submit at least 15 days prior to request for final inspection.
 - 2. Final Data: Submit within 10 days after final inspection.

1.04 DATA FORMAT

- A. Prepare preliminary and final data in the form of an instructional manual.
- B. Instructional Manual Format:
 - 1. Binder: Commercial quality, permanent, three-ring or three-post binders with durable plastic cover.
 - 2. Size: 8-1/2 inches by 11 inches, minimum.
 - 3. Cover: Identify manual with typed or printed title "OPERATION AND MAINTENANCE DATA" and list:
 - a. Project title.
 - b. Designate applicable system, equipment, material, or finish.
 - c. Identity of separate structure as applicable.
 - d. Identify volume number if more than one volume.
 - e. Identity of general subject matter covered in manual. Identity of equipment number and Specification section.
 - f. Identify location at the plant.
 - 4. Spine:
 - a. Project title.
 - b. Applicable system, equipment, material, or finish.
 - c. Identify volume number if more than one volume.
 - d. Location.
 - 5. Title Page:
 - a. Contractor name, address, and telephone number.
 - b. Subcontractor, Supplier, installer, or maintenance contractor's name, address, and telephone number, as appropriate.
 - 1) Identify area of responsibility of each.
 - 2) Provide name and telephone number of local source of supply for parts and replacement.
 - 6. Table of Contents:
 - a. Neatly typewritten and arranged in systematic order with consecutive page numbers.
 - b. Identify each product, by product name and other identifying numbers or symbols as set forth in Contract Documents.
 - 7. Paper: 20-pound minimum, white for typed pages.
 - 8. Text: Manufacturer's printed data, or neatly typewritten.
 - 9. Three-hole punch data for binding and composition; arrange printing so that punched holes do not obliterate data.
 - 10. Material shall be suitable for reproduction, with quality equal to original. Photocopying of material will be acceptable, except for material containing photographs.

C. Data Compilation Format:

1. Compile all Engineer-accepted preliminary O&M data into a hard-copy, hard-bound set.
2. Each set shall consist of the following:
 - a. Binder: Commercial quality, permanent, three-ring or three-post binders with durable plastic cover.
 - b. Cover: Identify each volume with typed or printed title "OPERATION AND MAINTENANCE DATA, VOLUME NO. ____ OF ____", and list:
 - 1) Project title.
 - 2) Contractor's name, address, and telephone number.
 - 3) If entire volume covers equipment or system provided by one Supplier include the following:
 - a) Identity of general subject matter covered in manual.
 - b) Identity of equipment number and Specification section.
 - c) Identity of location.
 - c. Provide each volume with title page and typed table of contents with consecutive page numbers. Place contents of entire set, identified by volume number, in each binder.
 - d. Table of contents neatly typewritten, arranged in a systematic order:
 - 1) Include list of each product, indexed to content of each volume.
 - 2) Designate system or equipment for which it is intended.
 - 3) Identify each product by product name and other identifying numbers or symbols as set forth in Contract Documents.
 - e. Section Dividers:
 - 1) Heavy, 80-pound cover weight, tabbed with numbered plastic index tabs.
 - 2) Fly-Leaf:
 - a) For each separate product, or each piece of operating equipment, with typed description of product and major component parts of equipment.
 - b) List with Each Product:
 - (1) Name, address, and telephone number of Subcontractor, Supplier, installer, and maintenance contractor, as appropriate.
 - (2) Identify area of responsibility of each.
 - (3) Provide local source of supply for parts and replacement.
 - c) Identity of separate structure as applicable.
 - f. Assemble and bind material, as much as possible, in same order as specified in the Contract Documents.

D. Electronic Media Format:

1. Portable Document Format (PDF):
 - a. After all preliminary data has been found to be acceptable to Engineer, submit Operation and Maintenance data in PDF format submitted through eBuilder, or in a media format acceptable to the Owner.
 - b. Files to be exact duplicates of Engineer-accepted preliminary data. Arrange by specification number and name.
 - c. Files to be fully functional and viewable in most recent version of Adobe Acrobat.
 - d. PDF shall be bookmarked to match Table of Contents as described in 1.04.B.6.

1.05 EQUIPMENT DATA SHEETS

- A. In addition to the requirements of 1.04 above, the Contractor shall fill out an Owner furnished Excel based Equipment Data Sheet for installed equipment.

1.06 SUBMITTALS

A. Informational:

1. Preliminary Data:
 - a. Submit three copies for Engineer's review.
 - b. If data meets conditions of the Contract:
 - 1) One copy will be returned to Contractor.
 - 2) One copy will be forwarded to Resident Project Representative.
 - 3) One copy will be retained in Engineer's file.
 - c. If data does not meet conditions of the Contract:
 - 1) All copies will be returned to Contractor with Engineer's comments (on separate document) for revision.
 - 2) Engineer's comments will be retained in Engineer's file.
 - 3) Resubmit three copies revised in accordance with Engineer's comments.
2. Final Data: Submit four copies in format specified herein.

1.07 DATA FOR EQUIPMENT AND SYSTEMS

A. Content For Each Unit (or Common Units) and System:

1. Product Data:
 - a. Include only those sheets that are pertinent to specific product.
 - b. Clearly annotate each sheet to:
 - 1) Identify specific product or part installed.

- 2) Identify data applicable to installation.
 - 3) Delete references to inapplicable information.
 - c. Function, normal operating characteristics, and limiting conditions.
 - d. Performance curves, engineering data, nameplate data, and tests.
 - e. Complete nomenclature and commercial number of replaceable parts.
 - f. Original manufacturer's parts list, illustrations, detailed assembly drawings showing each part with part numbers and sequentially numbered parts list, and diagrams required for maintenance.
 - g. Spare parts ordering instructions.
 - h. Where applicable, identify installed spares and other provisions for future work (e.g., reserved panel space, unused components, wiring, terminals).
2. As-installed, color-coded piping diagrams.
3. Charts of valve tag numbers, with the location and function of each valve.
4. Drawings: Supplement product data with Drawings as necessary to clearly illustrate:
 - a. Format:
 - 1) Provide reinforced, punched, binder tab; bind in with text.
 - 2) Reduced to 8-1/2 inches by 11 inches, or 11 inches by 17 inches folded to 8-1/2 inches by 11 inches.
 - 3) Where reduction is impractical, fold and place in 8-1/2-inch by 11-inch envelopes bound in text.
 - 4) Identify Specification section and product on Drawings and envelopes.
 - b. Relations of component parts of equipment and systems.
 - c. Control and flow diagrams.
 - d. Coordinate drawings with Project record documents to assure correct illustration of completed installation.
5. Instructions and Procedures: Within text, as required to supplement product data.
 - a. Format:
 - 1) Organize in consistent format under separate heading for each different procedure.
 - 2) Provide logical sequence of instructions for each procedure.
 - 3) Provide information sheet for Owner's personnel, including:
 - a) Proper procedures in event of failure.
 - b) Instances that might affect validity of guarantee or Bond.
 - b. Installation Instructions: Including alignment, adjusting, calibrating, and checking.

- c. Operating Procedures:
 - 1) Startup, break-in, routine, and normal operating instructions.
 - 2) Test procedures and results of factory tests where required.
 - 3) Regulation, control, stopping, and emergency instructions.
 - 4) Description of operation sequence by control manufacturer.
 - 5) Shutdown instructions for both short and extended duration.
 - 6) Summer and winter operating instructions, as applicable.
 - 7) Safety precautions.
 - 8) Special operating instructions.
- d. Maintenance and Overhaul Procedures:
 - 1) Routine maintenance.
 - 2) Guide to troubleshooting.
 - 3) Disassembly, removal, repair, reinstallation, and re-assembly.
- 6. Guarantee, Bond, and Service Agreement: In accordance with Section 01 77 00, Contract Closeout.

B. Content for Each Electric or Electronic Item or System:

- 1. Description of Unit and Component Parts:
 - a. Function, normal operating characteristics, and limiting conditions.
 - b. Performance curves, engineering data, nameplate data, and tests.
 - c. Complete nomenclature and commercial number of replaceable parts.
 - d. Interconnection wiring diagrams, including control and lighting systems.
- 2. Circuit Directories of Panelboards:
 - a. Electrical service.
 - b. Control requirements and interfaces.
 - c. Communication requirements and interfaces.
 - d. List of electrical relay settings, and control and alarm contact settings.
- 3. Electrical interconnection wiring diagram, including as applicable, single-line, three-line, schematic and internal wiring, and external interconnection wiring.
- 4. As-installed control diagrams by control manufacturer.
- 5. Operating Procedures:
 - a. Routine and normal operating instructions.
 - b. Startup and shutdown sequences, normal and emergency.
 - c. Safety precautions.
 - d. Special operating instructions.
- 6. Maintenance Procedures:
 - a. Routine maintenance.
 - b. Guide to troubleshooting.

- c. Adjustment and checking.
- d. List of relay settings, control and alarm contact settings.
- 7. Manufacturer's printed operating and maintenance instructions.
- 8. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.

C. Maintenance Summary:

- 1. Compile individual Maintenance Summary for each applicable equipment item, respective unit or system, and for components or sub-units.
- 2. Format:
 - a. Use Maintenance Summary Form bound with this section or electronic facsimile of such.
 - b. Each Maintenance Summary may take as many pages as required.
 - c. Use only 8-1/2-inch by 11-inch size paper.
 - d. Complete using typewriter or electronic printing.
- 3. Include detailed lubrication instructions and diagrams showing points to be greased or oiled; recommend type, grade, and temperature range of lubricants and frequency of lubrication.
- 4. Recommended Spare Parts:
 - a. Data to be consistent with manufacturer's Bill of Materials/Parts List furnished in O&M manuals.
 - b. "Unit" is the unit of measure for ordering the part.
 - c. "Quantity" is the number of units recommended.
 - d. "Unit Cost" is the current purchase price.

1.08 DATA FOR MATERIALS AND FINISHES

A. Content for Architectural Products, Applied Materials, and Finishes:

- 1. Manufacturer's data, giving full information on products:
 - a. Catalog number, size, and composition.
 - b. Color and texture designations.
 - c. Information required for reordering special-manufactured products.
- 2. Instructions for Care and Maintenance:
 - a. Manufacturer's recommendation for types of cleaning agents and methods.
 - b. Cautions against cleaning agents and methods that are detrimental to product.
 - c. Recommended schedule for cleaning and maintenance.

B. Content for Moisture Protection and Weather Exposed Products:

1. Manufacturer's data, giving full information on products:
 - a. Applicable standards.
 - b. Chemical composition.
 - c. Details of installation.
2. Instructions for inspection, maintenance, and repair.

1.09 SUPPLEMENTS

- A. The supplements listed below, following "End of Section," are part of this Specification.

1. Forms: Maintenance Summary Form.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

MAINTENANCE SUMMARY FORM

PROJECT: _____ CONTRACT NO.: _____

1. EQUIPMENT ITEM: _____

2. MANUFACTURER: _____

3. EQUIPMENT/TAG NUMBER(S): _____

4. SERIAL NUMBER(S): _____

5. WEIGHT OF INDIVIDUAL COMPONENTS (OVER 100 POUNDS): _____

6. OPERATING PARAMETERS/NAMEPLATE DATA (hp, voltage, speed, TDH, gpm, impeller size/type, copy of pump curve, seal type and size, etc.): _____

7. EQUIPMENT MSRP: _____

8. DATE OF SERVICE: _____

9. WARRANTY INFORMATION (time period and contact information): _____

10. LUBRICANT LIST (include environmentally friendly products, if applicable): _____

11. MANUFACTURER'S LOCAL REPRESENTATIVE: _____

a. Name _____ Telephone No. _____

b. Address _____

12. ALTERNATIVE PARTS SUPPLIER (if applicable): _____

13. MAINTENANCE REQUIREMENTS:

Maintenance Operation Comments	Frequency	Lubricant (If Applicable)
List briefly each maintenance operation required and refer to specific information in manufacturer's standard maintenance manual, if applicable. (Reference to manufacturer's catalog or sales literature is not acceptable.)	List required frequency of each maintenance operation.	Refer by symbol to lubricant required.

14. LUBRICANT LIST

[illegible]

15. RECOMMENDED SPARE PARTS FOR OWNER'S INVENTORY.

Part No.	Description	Unit	Quantity	Unit Cost

Note: Identify parts provided by this Contract with two asterisks.

16. EQUIPMENT SUMMARY CHART FOR OWNER'S INVENTORY.

Equipment	Tag Number	Serial Number	MSRP

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 78 39 PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Record Specifications
 - 2. Record Product Data
- B. AlexRenew Standards for Record Documents will be provided to the Contractor at the pre-construction meeting.

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. Store Contract Documents and samples in Contractor's field office apart from documents used for construction.
 - 1. Provide files and racks for storage of documents
 - 2. Provide secure storage space for storage of samples
- B. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.
- C. Within one day's notice, during the course of the work, current record documents shall be made available for inspection by Owner.

1.03 RECORDING "AS BUILT RECORD" MODIFICATIONS

- A. Label each document "As Built Record" in neat, large printed letters.
- B. Record information concurrently with construction progress.
 - 1. Do not conceal any work until required information is recorded.
 - 2. Accurately record information in an understandable drawing technique.
 - 3. Mark Record Prints to show the actual installation where installation varies from that shown originally.
- C. Project Manual: Legibly mark each section to record:
 - 1. Changes made by addenda.
 - 2. Changes made by written field order or by change order.

3. Products actually used where choices are indicated or where substitutions are accepted.
4. Mark Specifications to indicate the actual product installations where installation varies from that indicated in Specifications, Addenda and contract modifications.
 - a. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - b. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 - c. Record the name of manufacturer, supplier, installer, and other information necessary to provide a record of selections made.
 - d. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.

1.04 RECORD PRODUCT DATA

- A. Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
- B. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
- C. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.

1.05 CERTIFICATION

- A. Certify as a part of each application for payment that project record documents are current at time application is submitted.

1.06 SUBMITTAL: "AS BUILT RECORD" DOCUMENTS

- A. At completion of the project, the Contractor shall submit PDFs through eBuilder or in a media format acceptable to the Owner, Record Specifications to the Owner. Certify to their accuracy and completion. All modifications clearly marked for identification.
- B. Submit three (3) copies of each Product Data submittal. Where Record Product Data is required as part of operation and maintenance manuals; submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.

1.07 QUALITY ASSURANCE:

- A. Furnish qualified and experienced person, whose duty and responsibility shall be to maintain record documents.
- B. Accuracy of Records:
 - 1. Coordinate changes within record documents, making legible and accurate entries on each sheet of Drawings and other documents where such entry is required to show change.
 - 2. Purpose of Project record documents is to document factual information regarding aspects of the Work, both concealed and visible, to enable future modification of the Work to proceed without lengthy and expensive Site measurement, investigation, and examination.
- C. Make entries within 24 hours after receipt of information that a change in the Work has occurred.
- D. Prior to submitting each request for progress payment, request Engineer's review and approval of current status of record documents. Failure to properly maintain, update, and submit record documents may result in a deferral by Engineer to recommend whole or any part of Contractor's Application for Payment, either partial or final.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 RECORDING AND MAINTENANCE

- A. General:
 - 1. Promptly following commencement of Contract Times, secure from Engineer at no cost to Contractor, one complete set of Contract Documents. Drawings will be full size.
 - 2. Delete Engineer title block and seal from all documents.
 - 3. Record information concurrently with construction progress and within 24 hours after receipt of information that change has occurred. Do not cover or conceal Work until required information is recorded.
- B. Recording:
 - 1. Maintain one (1) copy of each submittal during the construction period for Project Record Document purposes.
 - 2. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of the Project.

3. Digital Records: entries on the PDF drawings, using a program such as BlueBeam, clearly describe change by graphic line and note as required.
4. Color Coding:
 - a. Green when showing information deleted from Drawings.
 - b. Red when showing information added to Drawings.
 - c. Blue and circled in blue to show notes.
5. Date entries: call attention to entry by “cloud” drawn around area or areas affected.
6. Legibly mark to record actual changes made during construction, including, but not limited to:
 - a. Depths of various elements of foundation in relation to finished first floor data if not shown or where depth differs from that shown.
 - b. Horizontal and vertical locations of existing and new Underground Facilities and appurtenances, and other underground structures, equipment, or Work. Reference to at least two measurements to permanent surface improvements.
 - c. Location of internal utilities and appurtenances concealed in the construction referenced to visible and accessible features of the structure.
 - d. Locate existing facilities, piping, equipment, and items critical to the interface between existing physical conditions or construction and new construction.
 - e. Changes made by Addenda and Field Orders, Work Change Directive, Change Order, and Engineer’s written interpretation and clarification using consistent symbols for each and showing appropriate document tracking number.
7. Dimensions on Schematic Layouts: Show on record drawings, by dimension, the centerline of each run of items such as are described in previous subparagraph above.
 - a. Clearly identify the item by accurate note such as “cast iron drain,” “galv. water,” and the like.
 - b. Show, by symbol or note, vertical location of item (“under slab,” “in ceiling plenum,” “exposed,” and the like).
 - c. Make identification so descriptive that it may be related reliably to Specifications.

C. Maintenance:

1. Store Record Documents and Samples apart from the Contract Documents used for construction.
2. Do not use Project Record Documents for construction purposes.
3. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss.

4. Provide access to Project Record Documents for Owner's reference during normal working hours.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 79 26 WARRANTIES

PART 1 GENERAL

1.01 SUMMARY

- A. Work specified in this Section includes but is not limited to the following:
 - 1. Administrative and procedural requirements for warranties required by the Contract Documents, including manufacturers standard warranties on products and special warranties.
- B. Refer to the General Conditions for terms of the Contractor's period for correction of the Work.

1.02 DISCLAIMERS AND LIMITATIONS

- A. Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products.
- B. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.03 DEFINITIONS

- A. Standard product warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.
- B. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1.04 WARRANTY REQUIREMENTS

- A. Related Damages and Losses
 - 1. When correcting failed or damaged warranted construction, Contractor shall remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.

B. Reinstatement of Warranty:

1. When Work covered by a warranty has failed and been corrected by replacement or rebuilding, Contractor shall reinstate the warranty by written endorsement
2. The reinstated warranty shall be equal to the original warranty.

C. Replacement Cost:

1. Upon determination that Work covered by a warranty has failed, Contractor shall replace or rebuild the Work to an acceptable condition complying with requirements of the Contract Documents.
2. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. The Owner's Recourse:

1. Expressed warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law.
2. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights, or remedies.
 - a. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

E. Where the Contract Documents require a special warranty, or similar commitment on the Work or part of the Work, the Owner reserves the right to refuse to accept the Work, until the Contractor presents evidence that entities required to countersign such commitments are willing to do so.

F. Contractor shall guarantee all materials and workmanship for a period of 12 months from the date of final acceptance of Work.

1.05 WARRANTY PERIOD

- A. Date of beginning of time of warranty will be the date of Substantial Completion or date of Beneficial Occupancy if equipment is put to use by the Owner at date of Beneficial Occupancy.
- B. No warranty shall start prior to equipment being put into operation.
- C. Equipment warranty period: Manufacturer's standard warranty, minimum 1 year from above date of beginning of warranty, except as stated elsewhere.

1.06 SUBMITTALS

- A. Contractor shall submit written warranties to the Owner prior to the date certified for Final Inspection.
 - 1. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, Contractor shall submit properly executed warranties to the Owner within 15 days of completion of that designated portion of the Work.
- B. When the Contract Documents require the Contractor, or the Contractor and a subcontractor, supplier or manufacturer to execute a special warranty, Contractor shall prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner, through the Engineer, for approval prior to final execution.
 - 1. Refer to Divisions 2 through 50 for specific content requirements and particular requirements for submitting special warranties.
- C. Warranties and Bonds in Operations and Maintenance Manual:
 - 1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation.
 - 2. Provide a typed description of the product or installation, including the name of the product, and the name, address, and telephone number of the Installer.
 - 3. Identify each binder on the front with the typed or printed title "WARRANTIES".

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 LIST OF WARRANTIES

- A. Refer to individual Sections for required product warranty information.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01 88 15 ANCHORAGE AND BRACING

PART 1 GENERAL

1.01 SUMMARY

- A. This section covers requirements for anchorage and bracing of equipment, distribution systems, and other nonstructural components required in accordance with the ICC 2012 International Building Code (IBC), for seismic, wind, gravity, soil, and operational loads.

1.02 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
 - 1. American Institute of Steel Construction (AISC) 360, Specification for Structural Steel Buildings.
 - 2. American Society of Civil Engineers (ASCE): ASCE 7, Minimum Design Loads for Buildings and Other Structures.
 - 3. International Code Council (ICC): International Building Code (IBC).
 - 4. National Fire Protection Association (NFPA): 13, Standard for the Installation of Sprinkler Systems.

1.03 DEFINITIONS

- A. Authority Having Jurisdiction (AHJ): Permitting building agency; may be a federal, state, local, or other regional department, or individual including building official, fire chief, fire marshal, chief of a fire prevention bureau, labor department, or health department, electrical inspector; or others having statutory authority. AHJ may be Owner when authorized to be self-permitting by governmental permitting agency or when no governmental agency has authority.
- B. Designated Seismic System: Architectural, electrical, and mechanical system or their components for which component importance factor is greater than 1.0.

1.04 DESIGN AND PERFORMANCE REQUIREMENTS

- A. General:
 - 1. Anchorage and bracing systems shall be designed by a qualified professional engineer registered in the Commonwealth of Virginia.

2. Design anchorage into concrete including embedment in accordance with ACI 318-11, Appendix D (or other industry standard approved by Engineer), and Project Specifications.
 - a. Unless otherwise noted, design for cracked concrete condition.
3. Design anchorage and bracing of architectural, mechanical, and electrical components and systems in accordance with this section, unless a design is specifically provided within Contract Documents or where exempted hereinafter.
4. Design attachments, braces, and anchors for equipment, components, and distribution systems to structure for gravity, seismic, wind, and operational loading.
5. Anchor and brace piping and ductwork, whether exempt or not exempt for this section, so that lateral or vertical displacement does not result in damage or failure to essential architectural, mechanical, or electrical equipment.
6. Architectural Components: Includes, but are not limited to, nonstructural walls and elements, partitions, cladding and veneer, access flooring, signs, cabinets, suspended ceilings, and glass in glazed curtain walls and partitions.
7. Provide supplementary framing where required to transfer anchorage and bracing loads to structure.
8. Adjust equipment pad sizes or provide additional anchorage confinement reinforcing to provide required anchorage capacities.
9. Design anchorage and bracing for:
 - a. Equipment and components that weigh more than 400 pounds and are mounted 5 feet or less above adjacent finished floor.
 - b. Equipment weighing more than 75 pounds that is mounted more than 5 feet above adjacent finished floor.
 - c. Distribution systems that weigh more than 5 pounds per foot that are mounted more than 5 feet above adjacent finished floor.
10. For components exempted from design requirements of this section, provide bolted, welded, or otherwise positively fastened attachments to supporting structure.

B. Design Loads:

1. Gravity: Design anchorage and bracing for self-weight and superimposed loads on components and equipment.
2. Wind: Design anchorage and bracing for wind criteria provided on General Structural Notes on Drawings for exposed architectural components and exterior and wind-exposed mechanical and electrical equipment. Alternately, manufacturer certification may be provided for components such as roofing and flashing to verify attachments meet Project-specific design criteria.

3. Operational:
 - a. For loading supplied by equipment manufacturer for IBC required load cases.
 - b. Loads may include equipment vibration, torque, thermal effects, effects of internal contents (weight and sloshing), water hammer, and other load-inducing conditions.
 - c. Locate braces to minimize vibration to or movement of structure.
 - d. For vibrating loads, use anchors meeting requirements of Section 05 05 19, Post-Installed Anchors, for anchors with designated capacities for vibratory loading per manufacturer's ICC-ES report.
4. Seismic:
 - a. In accordance with 2012 IBC, Section 1613, and Chapter 13 of ASCE 7.
 - b. Design anchorage and bracing for design criteria listed on General Structural Notes on Drawings.
 - c. Design forces for anchors in concrete or masonry shall be in accordance with ASCE 7, Section 13.4.2, or IBC Section 1905.1.9 as applicable for Project Seismic Design Category.

C. Seismic Design Requirements:

1. Analyze local region of body of nonstructural component for load transfer of anchorage attachment if component $I_p = 1.5$.
2. The following are exempt from requirements for provision of seismic anchorages and bracing, in addition to those items specifically exempted in ASCE 7, Part 13.5 for architectural components and Part 13.6 for electrical and mechanical equipment:
 - a. Furniture, except storage cabinets and bookshelves over 6 feet tall.
 - b. Temporary or movable equipment.
3. Fire protection sprinkler systems designed and constructed in accordance with NFPA 13 shall be considered to meet requirements of Chapter 13 of ASCE 7.
4. Provide support drawings and calculations for electrical distribution components if any of the following conditions apply:
 - a. Conduit diameter is greater than 2.5-inch trade size.
 - b. Total weight of bus duct, cable tray, or conduit supported by trapeze assemblies exceeds 10 pounds per foot.
5. Existing components, systems, and equipment in their final condition that are modified by Project requirements and are not exempted by above paragraph require the same anchorage and bracing drawing and calculation submittals as new equipment. Field verify existing conditions.

6. Other seismic design and detailing information identified in ASCE 7, Chapter 13, is required to be provided for new and modified or noted architectural, mechanical and electrical components, systems, or equipment.

1.05 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
 - a. List of architectural, mechanical, and electrical equipment requiring Contractor-designed anchorage and bracing, unless specifically exempted.
 - b. Manufacturers' engineered seismic and non-seismic hardware product data.
 - c. Attachment assemblies' drawings including seismic attachments; include connection hardware, braces, and anchors or anchor bolts for nonexempt components, equipment, and systems.
 - d. List of existing architectural, mechanical, and electrical equipment or components to be modified in Project requiring Contractor-designed anchorage and bracing in final retrofitted condition.
 - e. Drawings for seismic attachment assemblies include connection hardware, braces, and anchors (or anchor bolts) for modified, nonexempt existing components, equipment, and systems where a combination of new and existing systems or components' final condition would require anchorage or bracing under this specification for new equipment.
 - f. Submittal will be rejected if proposed anchorage method would create excessive stress to supporting member. Revise anchorages and strengthen structural support to eliminate overstressed condition.

B. Informational Submittals:

1. Anchorage and Bracing Calculations: For attachments, braces, and anchorages, include IBC and Project-specific criteria as noted on General Structural Notes on Drawings, in addition to manufacturer's specific criteria used for design; sealed by a civil engineer registered in the Commonwealth of Virginia.
2. Manufacturer's hardware installation requirements.

C. Deferred Submittals:

1. Submitted seismic anchorage drawings and calculations for Designated Seismic Systems are identified as IBC deferred submittals and will be

- submitted to and must be accepted by AHJ prior to installation of component, equipment, or distribution system.
2. Submit deferred Action Submittals such as Shop Drawings with supporting deferred informational submittals such as calculations no less than 4 weeks in advance of installation of component, equipment or distribution system to be anchored to structure.

1.06 SOURCE QUALITY CONTROL

- A. Contractor and supplier responsibilities to accommodate Owner-furnished shop fabrication related special inspections and testing are provided in Project's Statement of Special Inspections on Drawings, and Section 01 45 33, Special Inspection, Observation, and Testing.
- B. Provide all other specified, regulatory required, or required repair verification inspection and testing that is not listed in Statement of Special Inspections in accordance with Section 01 45 16, Contractor Quality Control.

PART 2 PRODUCTS

2.01 GENERAL

- A. Design and construct attachments and supports transferring seismic and non-seismic loads to structure of materials and products suitable for application and in accordance with design criteria shown on Drawings and nationally recognized standards.
- B. Provide anchor bolts of the size, minimum embedment, and spacing designated in calculations submitted by Contractor and accepted by Engineer.
- C. Provide post-installed anchors of the size, minimum embedment, and spacing designated in calculations submitted by Contractor and accepted by Engineer.
- D. Do not use powder-actuated fasteners or sleeve anchors for seismic attachments and anchorage where resistance to tension loads is required. Do not use expansion anchors, other than undercut anchors, for non-vibration isolated mechanical equipment rated over 10 horsepower.

PART 3 EXECUTION

3.01 GENERAL

- A. Make attachments, bracing, and anchorage in such a manner that component lateral force is transferred to lateral force resisting system of structure through a complete load path.

- B. Design, provide, and install overall seismic anchorage system to provide restraint in all directions, including vertical, for each component or system so anchored.
- C. Provide snubbers in each horizontal direction and vertical restraints for components mounted on vibration isolation systems where required to resist overturning.
- D. Provide piping anchorage that maintains design flexibility and expansion capabilities at flexible connections and expansion joints.
 - 1. Piping and ductwork suspended more than 12 inches below supporting structure shall be braced for seismic effects to avoid significant bending of hangers and their attachments unless high-deformability piping is used per ASCE 7, Section 13.6.8 or HVAC ducts have a cross-sectional area of less than 6 square feet or weigh 17 pounds per foot or less.
- E. Anchor tall and narrow equipment such as motor control centers and telemetry equipment at base and within 12 inches from top of equipment, unless approved otherwise by Engineer.
- F. Do not attach architectural, mechanical, or electrical components to more than one element of a building structure at a single restraint location where such elements may respond differently during a seismic event. Do not make such attachments across building expansion and contraction joints.

3.02 INSTALLATION

- A. Do not install components or their anchorages or restraints prior to review and acceptance by Engineer and AHJ.
- B. Notify Engineer upon completion of installation of seismic restraints in accordance with Section 01 45 33, Special Inspection, Observation, and Testing.

3.03 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

- A. Owner-Furnished Quality Assurance, in accordance with IBC Chapter 17 requirements, is provided in Statement of Special Inspections Plan on Drawings. Contractor responsibilities and related information are included in Section 01 45 33, Special Inspections, Observation, and Testing.
- B. Provide any other specified, regulatory required, or required repair verification inspection and testing that is not listed in Statement of Special Inspections in accordance with Section 01 45 16, Contractor Quality Control.

END OF SECTION

SECTION 01 91 00 EQUIPMENT SYSTEMS COMMISSIONING

PART 1 GENERAL

1.01 DEFINITIONS

- A. Commissioning: The series of activities required of the Contractor necessary to bring components or systems from installation to readiness, to startup and completion of Operational Demonstration.
- B. Facility: Entire Project, or an agreed upon portion, including all of its unit processes.
- C. Operational Demonstration:
 - 1. A demonstration, conducted by Contractor, with assistance of Owner, to demonstrate and document the performance of the entire operating facility, both manually and automatically (if required), based on criteria developed in conjunction with Owner and as accepted by Engineer.
 - 2. Such demonstration is for the purposes of (i) verifying to Owner entire facility performs as a whole, and (ii) documenting performance characteristics of completed facility for Owner's records. Neither the demonstration nor the evaluation is intended in any way to make performance of a unit process or entire facility the responsibility of Contractor, unless such performance is otherwise specified.
- D. Equipment Tests: tests in presence of Engineer and Owner to demonstrate that installed equipment meets manufacturer's installation, calibration, and adjustment requirements and other requirements as specified.
- E. Performance Test: Wet-Test or tests performed after any required functional test in presence of Engineer and Owner to demonstrate and confirm individual equipment meets performance requirements specified in individual sections.
- F. Unit Process: As used in this section, a unit process is a portion of the facility that performs a specific process function, such as production of chilled water and pumping.

1.02 SUPERVISION AND MANAGEMENT OF TESTING PROGRAM

- A. Contractor shall assign a dedicated Testing and Checkout Coordinator to supervise, manage, and oversee the testing requirements of this Section.

B. Testing and Checkout Coordinator Duties and Responsibilities:

1. Develop the testing plans including the scheduling of all testing and inspection activities.
2. Submit start-up requests for vendor and subcontractor checkouts of all equipment.
3. Coordinate with the Owner for the testing and start-up of all equipment.
4. Submission of all test reports for authority review and approval.
5. Submission of the completed testing manual, including all test documentation to the Owner.
6. Participate in all Operational Demonstrations required by contract and submit the final report including all documentation.

1.03 SUBMITTALS

A. Informational Submittals:

1. Qualifications:
 - a. Submit resumes, including three outside references, for each team member proposed for testing, startup, and commissioning at least 60 days before the functional testing, start-up, and commissioning operations are to begin. At a minimum, include the following staffing, as appropriate for the equipment/systems being tested and commissioned:
 - 1) Startup manager.
 - 2) Electrical Systems Start-up Engineer, Technician, or Specialist.
 - 3) HVAC Systems and Ducting Start-up Engineer, Technician, or Specialist.
 - b. The Owner will review resumes. Based upon review of resumes, and contacts with references, the Owner will approve, request additional information, or reject proposed startup and commissioning team members.
 - c. If a proposed startup and commissioning team member is rejected, submit resume and references for a replacement team member for consideration
2. Facility Operational Demonstration Plan.
 - a. Contractor shall have an approved testing plan at least 30 days prior to beginning testing.
3. Functional and performance test results.
4. Completed Operational Demonstration/Certification Form.
5. Record Drawings: Test, adjustment, and balancing data shall be recorded on the Record Drawings documents as specified in the Submittals section.
6. Baseline Commissioning Report.

1.04 COMMISSIONING PLAN

- A. The Commissioning Plan consists of the equipment testing plan, training of Owner's staff, and startup and operational demonstration plan.
- B. The Commissioning Plan is prepared by the Contractor and submitted to the Engineer for approval. The plan is intended to outline the equipment and system test sequence and coordination requirements, data collection requirements during the Equipment Testing and Operational Demonstration, and test report(s) submittals.
- C. Any changes or adjustments to the Commissioning Plan by the Contractor after it has originally been submitted and approved, must be submitted and approved by the Owner or Engineer prior to the Contractor starting the Functional Testing.

1.05 EQUIPMENT TESTING PLAN

- A. The equipment testing plan shall include the sequential requirements of Installation Review, Functional and Performance Testing, and Equipment and System Check-out.
- B. Installation Review: Ready-to-test determination will be made by the Resident Engineer after verifying that the installation is in accordance with Contract requirements and manufacturer's recommendations.
- C. Functional and Performance Testing:
 - 1. Equipment testing shall not commence until after the installation review is complete and the Resident Engineer's Ready-to-test determination is given.
 - 2. Test equipment as specified, or required to prove conformance with design and manufacturer, or required to develop equipment baseline data shall be completed and documentation submitted prior to proceeding to Equipment and System Checkout.
 - 3. The Contractor shall submit a schedule defining when the testing (both startup point and duration) for each piece of equipment will occur.
 - 4. The Contractor shall identify the need for auxiliary systems, such as ventilation, cooling, and lubricating systems, so that the equipment can be tested safely.
 - 5. The Engineer shall identify interfacing equipment and system that may not be part of the Work but are necessary for the design intent to be satisfied.
 - 6. Testing shall demonstrate that equipment is ready for equipment and unit process systems startup.
 - a. If any equipment or unit process systems does not comply with the testing requirements, make the necessary corrections or

- replacements and repeat the test until equipment testing requirements are met.
 - b. Do not start up or place into service equipment and unit process systems until the testing is completed.
 - c. Modify the equipment and unit process systems to meet testing requirements and retest at no additional cost to the Owner.
 - d. Submit reporting documentation prior to proceeding to Operational Demonstration.
 - e. Complete calibrations and submit calibration reports prior to proceeding to Operational Demonstration.
 - 7. The minimum testing period for any piece of equipment shall be 2 consecutive hours with no equipment failure. In the event that a failure occurs in the test period, remedy the cause of the failure and start a new testing period.
 - 8. Perform equipment related testing on power actuated (oil hydraulic, water hydraulic, pneumatic, or electric motor) valves and slide gates and their related power actuation systems before commencing the testing of the associated equipment, piping and duct systems, or unit processes or mechanical systems.
 - 9. Complete installation and wiring of control panels, and pre-loop I/O testing and continuity checks.
 - 10. Paint and label pipes, conduits, wires, equipment, and panels prior to Operational Demonstration.
- D. Equipment and System Check-out:
- 1. Complete loop I/O points testing prior.
 - 2. Submit Manufacturers' certifications.
 - 3. Complete Training of Owner's staff as defined in Section 01 43 33, Manufacturers' Field Services.
 - 4. Completed the above requirements prior to the request for Operational Demonstration.
 - 5. The Resident Engineer will observe performance in a site walk-through and attempt to confirm that there are no issues that would carry through to an incomplete work list. Issues identified during the walk through shall be resolved prior to proceeding to Operational Demonstration.

1.06 FACILITY STARTUP AND OPERATIONAL DEMONSTRATION PLAN

- A. Develop a written plan, in conjunction with Owner's operations personnel; to include the following:
- 1. Step-by-step instructions for startup of each unit process and the complete facility.

- B. On demonstrating successful completion of Operational Demonstration of equipment or system, the Owner will issue Beneficial Occupancy of the tested equipment or system.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Contractor shall supply all materials and equipment used in testing, adjusting, and balancing.
- B. Materials and equipment used shall be of good quality and suitable for the intended service. The use of miscellaneous items found at the job site is not acceptable.
- C. Select capacity or range of test equipment to provide meaningful test results. For example, select pressure or differential pressure gauges so that test pressure is 50 percent to 75 percent of the gauge capacity.
- D. Contractor shall provide or fabricate temporary equipment required for testing.

2.02 SOURCE QUALITY CONTROL

- A. All instruments shall be calibrated to recognized standards, by the instrument manufacturer or a qualified independent calibration laboratory. Retain instrument calibration data at the Contractor's site office for the Owner's review.

PART 3 EXECUTION

3.01 GENERAL

- A. Facility Startup and Commissioning Meetings: Schedule, in accordance with requirements of Section 01 31 19, Project Meetings, to discuss test schedule, test methods, materials, facilities operations interface, and Owner involvement.
- B. Contractor's Testing and Startup Representative:
 - 1. Designate and furnish one or more personnel to coordinate and expedite testing and facility startup.
 - 2. Representative(s) shall be present during startup meetings and shall be available at all times during testing and startup.
- C. Provide temporary valves, gauges, piping, test equipment and other materials and equipment required for testing and startup.

- D. Provide Subcontractor and equipment manufacturers' staff adequate to prevent delays. Schedule ongoing work so as not to interfere with or delay testing and startup.
- E. Owner will:
 - 1. Provide power, and other items as required for startup, unless otherwise indicated.

3.02 EQUIPMENT TESTING

- A. Preparation:
 - 1. Complete installation before testing.
 - 2. Furnish qualified manufacturers' representatives, when required by individual Specification sections.
 - 3. Equipment Test Report Form: Provide written test report for each item of equipment to be tested, to include the minimum information:
 - a. Owner/Project Name.
 - b. Equipment or item tested.
 - c. Date and time of test.
 - d. Type of test performed (Functional or Performance).
 - e. Test method.
 - f. Test conditions.
 - g. Test results.
 - h. Signature spaces for Contractor and Engineer as witness.
 - 4. Cleaning and Checking: Prior to beginning functional testing:
 - a. Calibrate testing equipment in accordance with manufacturer's instructions.
 - b. Inspect and clean equipment, devices, connected piping, and structures to ensure they are free of foreign material.
 - c. Lubricate equipment in accordance with manufacturer's instructions.
 - d. Turn rotating equipment by hand when possible to confirm that equipment is not bound.
 - e. Open and close valves by hand and operate other devices to check for binding, interference, or improper functioning.
 - f. Check power supply to electric-powered equipment for correct voltage.
 - g. Adjust clearances and torque.
 - h. Test piping for leaks.
 - 5. Ready-to-test determination will be by Engineer based at least on the following:
 - a. Acceptable Operation and Maintenance Data.
 - b. Notification by Contractor of equipment readiness for testing.

- c. Receipt of Manufacturer's Certificate of Proper Installation, if so specified.
- d. Adequate completion of work adjacent to, or interfacing with, equipment to be tested, including items to be furnished by Owner.
- e. Availability and acceptability of manufacturer's representative, when specified, to assist in testing of respective equipment.
- f. Satisfactory fulfillment of other specified manufacturer's responsibilities.
- g. Equipment and electrical tagging complete.
- h. Delivery of all spare parts and special tools.

B. Functional Testing:

- 1. Conduct as specified in individual Specification sections.
- 2. Notify Owner and Engineer in writing at least 14 days prior to scheduled date of testing.
- 3. Prepare Equipment Test Report summarizing test method and results.
- 4. When, in Engineer's opinion, equipment meets functional requirements specified, such equipment will be accepted for purposes of advancing to performance testing phase, if so required by individual Specification sections. Such acceptance will be evidenced by Engineer/Owner's signature as witness on Equipment Test Report.

C. Performance Testing:

- 1. Conduct as specified in individual Specification sections.
- 2. Notify Engineer and Owner in writing at least 10 days prior to scheduled date of test.
- 3. Performance testing shall not commence until equipment has been accepted by Engineer as having satisfied functional test requirements specified.
- 4. Type of fluid, gas, or solid for testing shall be as specified.
- 5. Unless otherwise indicated, furnish labor, materials, and supplies for conducting the test and taking samples and performance measurements.
- 6. Prepare Equipment Test Report summarizing test method and results.
- 7. When, in Engineer's opinion, equipment meets performance requirements specified, such equipment will be accepted as to conforming to Contract requirements. Such acceptance will be evidenced by Engineer's signature on Equipment Test Report.
- 8. For all rotating machinery/equipment with a motor horsepower of more than 40, and with a rotational speed of the driven shaft in excess of 200 rpm, wet testing shall include:
 - a. Constant speed equipment: operate equipment through a range of conditions (e.g., various suction/discharge pressures for pumps and measure volts, amps, and kilowatts consumed).

- b. Variable speed equipment: operate equipment at a range of speeds and other conditions (varying wet well level, etc.) and measure (ahead of the VFD) volts, amps, and kilowatts consumed.
- c. Owner vibration data templates to be completed and signed off by the engineer and forwarded to the DMS Reliability Group at least 14 calendar days prior to the beginning of Facilities Startup and Operational Demonstration.

3.03 FACILITY START UP AND OPERATIONAL DEMONSTRATION

- A. Prior to unit process startup, equipment within unit process shall be accepted by Engineer as having met functional and performance testing requirements specified.
- B. Make adjustments, repairs, and corrections necessary to complete unit process startup.
- C. Operational Demonstration shall be considered complete when, in opinion of Engineer, unit process has operated in manner intended for a minimum of 5 continuous days without significant interruption. This period is in addition to functional or performance test periods specified elsewhere.
- D. Significant Interruption: May include any of the following events:
 - 1. Failure of Contractor to provide and maintain qualified onsite startup personnel as scheduled.
 - 2. Failure to meet specified functional operation for more than 2 consecutive hours.
 - 3. Failure of any critical equipment or unit process that is not satisfactorily corrected within 5 hours after failure.
 - 4. Failure of any noncritical equipment or unit process that is not satisfactorily corrected within 8 hours after failure.
 - 5. As determined by Engineer.
- E. A significant interruption will require startup then in progress to be stopped. After corrections are made, startup test period to start from beginning again.

3.04 OPERATIONAL DEMONSTRATION CERTIFICATION

- A. Demonstrate proper operation of required interfaces within and between individual equipment.
- B. After equipment is operating, complete performance testing of equipment and systems not previously tested.
- C. Certify, on the Operational Demonstration/Certification Form, that facility is capable of performing its intended function(s).

3.05 BASELINE STANDARD COMMISSIONING REPORT

- A. Following the conclusion of all testing adjusting and balancing work for each equipment component, manufacturer and contractor shall prepare and submit a baseline standard commissioning report to include documentation of the following:
 - 1. Vibration testing.
 - 2. Infrared analysis.
 - 3. Ultrasound measurements.
 - 4. Power usage under different operating conditions.
 - 5. Flow, head and pressure.
 - 6. Laser alignment.
 - 7. Dynamic field balancing.
- B. Provide separate reports for each separate equipment component.
- C. Reports for equipment components of the same type, style, purpose, etc. shall be submitted as a complete group following the testing, adjusting and balancing of the last component in each group.

3.06 SUPPLEMENTS

- A. Supplements listed below, following “End of Section,” are a part of this Specification:
 - 1. Unit Process Startup Form.
 - 2. Operational Demonstration/Certification Form.

END OF SECTION

UNIT PROCESS STARTUP FORM

OWNER: Alexandria Renew Enterprises _____ **PROJECT:** Building G1 & IPS Roof Replacement

Unit Process Description: (Include description and equipment number of all equipment and devices):

Startup Procedure (Describe procedure for sequential startup and evaluation, including valves to be opened/closed, order of equipment startup, etc.):

Startup Requirements (Water, power, chemicals, etc.): _____

Evaluation Comments: _____

OPERATIONAL DEMONSTRATION/CERTIFICATION FORM

OWNER: Alexandria Renew Enterprises

PROJECT: Building G1 & IPS Roof Replacement

Unit Processes Description (List unit processes involved in facility startup):

Unit Processes Startup Sequence (Describe sequence for startup, including computerized operations, if any):

Contractor Certification that Facility is capable of performing its intended function(s), including fully automatic operation:

Contractor: _____

Date: _____, 20____

Engineer: _____

Date: _____, 20____

(Authorized Signature)

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 02 41 00
DEMOLITION

PART 1 GENERAL

1.01. SECTION INCLUDES

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

1.02. SUBMITTALS FOR REVIEW

- A. Submit submittals in accordance with Conditions of the Contract.
- B. Demolition Methods
 - 1. Submit for approval proposed means, methods, equipment, and operating sequences to be utilized for demolition. Include coordination for possible shut-off, capping, temporary services, continuation of utility services, and other applicable items to ensure no unanticipated interruption of the operations of the OWNER.
- C. Notification
 - 1. At least ten (10) business days prior to commencement of demolition, notify OWNER and ENGINEER in writing of the proposed schedule. Do not commence demolition without the written permission of the OWNER and ENGINEER.

1.03. REGULATORY REQUIREMENTS

- A. Conform to all applicable federal, state, and local laws and codes for demolition Work, dust control, and products requiring electrical power removal.
- B. Obtain any required permit(s) from regulatory authorities as necessary.
- C. Do not close or obstruct egress width to any building or Site exit.
- D. Do not disable or disrupt building fire or life safety systems without giving five (5) days prior written notice to the OWNER.
- E. Conform to procedures applicable when hazardous or contaminated materials are discovered.

1.04. SEQUENCE OF WORK

- A. The CONTRACTOR shall submit a sequence of work for demolition activities as specified herein and as noted on the Contract Drawings.

1.05. SCHEDULING

- A. Schedule demolition Work to coincide with new construction.
- B. The CONTRACTOR shall coordinate the demolition Work with the OWNER.
- C. Carry out operations so as to avoid interference with operations and work in and near adjacent facilities.
- D. No shutdown of any kind shall occur without the written consent of the OWNER.

1.06. PROJECT CONDITIONS

- A. Cease operations immediately if the structure appears to be in danger and notify the ENGINEER. Do not resume operations until directed by the ENGINEER.
- B. If the CONTRACTOR believes that the location on which the current structure or apparatus being demolished is contaminated, based on casual visual observation or detection of atypical conditions, operations shall be ceased immediately at that location. The condition shall be brought to the attention of the ENGINEER. If it is determined that there is contamination at this Site, do not continue Work until directed by the ENGINEER.
 - 1. If so directed by the ENGINEER, the CONTRACTOR shall employ a testing lab to take samples for analyses and determination of the hazard. The testing laboratory shall include recommendations pertaining to the potential hazard of the sampled substances. All costs for this Work shall be in addition to the Contract Value.
- C. The CONTRACTOR is cautioned that asbestos containing materials, including caulking, tiling, insulation, etc. do exist within the Project Site. Testing, removal, and disposal of such material that takes place under this Contract shall be performed in accordance with all local, state, and federal regulations. An asbestos survey has been completed as part of this design and has been made available to the CONTRACTOR in Appendix I of this document. A work plan shall be submitted prior to commencement of activities and all work shall be completed by a licensed and certified CONTRACTOR.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01. PREPARATION

- A. Provide, erect, and maintain temporary barriers and security devices in accordance with this Specification.
- B. Erect and maintain weatherproof closures for exterior openings.
- C. Erect and maintain, as directed by the ENGINEER or as necessary, temporary partitions to prevent spread of dust, odors, and noise to permit continued OWNER occupancy.
- D. Protect existing materials, structures, and equipment that are not to be demolished.
- E. Prevent movement of the structure; provide bracing and shoring.
- F. Notify affected utility companies before starting Work and comply with their requirements.
- G. Mark the location and termination of all utilities.
- H. Provide appropriate temporary signage including signage for exit or building egress.

3.02. GENERAL

- A. Disconnect, remove, cap, and identify designated utilities in demolition areas.
- B. Demolish in an orderly and careful manner. Protect existing remaining structures, equipment, piping, valves, etc. from the demolition Work.
- C. No materials shall be burned on Site.
- D. The use of explosives for demolition shall not be allowed.
- E. Conduct operations with minimum interference to Site access.
- F. Obtain written permission from adjacent property owners when demolition equipment will traverse, infringe upon, or limit access to their property.
- G. Incorporate provisions for sedimentation control during and after demolition, if applicable.
- H. Perform all demolition and removal Work to prevent damage or injury to adjacent structures, occupants thereof, and features which might result from falling debris or other causes and so as not to interfere with the use and free and safe passage to and from adjacent structures.
- I. Closing or obstructing of public roadways, sidewalks, and passageways adjacent to the Work by the placement or storage of materials shall not be permitted and all

operations shall be conducted with a minimum interference to vehicular and/or pedestrian traffic on these ways.

- J. Erect and maintain barriers, lights, sidewalk sheds, and other necessary protective devices when applicable.
- K. Repair damage to facilities that are to remain or to any property belonging to the OWNER or occupants of adjacent facilities.

3.03. POLLUTION CONTROLS

- A. Use water sprinkling, temporary enclosures, and other suitable methods to limit the amount of dust and dirt rising and scattering in the air to the lowest practical level. Comply with governing regulations pertaining to environmental protection.
 - 1. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, or pollution.
 - 2. Clean adjacent structures, facilities, and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to conditions existing prior to the start of Work.

3.04. STRUCTURAL REMOVAL

- A. Remove structures to the limits indicated on the Contract Drawings. The removal of structures beyond those indicated limits shall be at the expense of the CONTRACTOR. Excess removal shall be reconstructed to the satisfaction of the ENGINEER, with no additional compensation to the CONTRACTOR.
- B. All concrete, brick, tile, concrete block, roofing materials, reinforcement, structural or miscellaneous metals, plaster, wire mesh, and other items contained in or upon the structure shall be removed and taken from the Site, unless otherwise approved by the ENGINEER.
- C. The surfaces of walls, floors, ceilings, or other areas that are exposed by any of the removals specified, indicated, or required and which will remain as architecturally finished surfaces shall be repaired and re-finished by the CONTRACTOR. Utilize the same or matching materials as the existing adjacent surface or as otherwise approved by the ENGINEER.
- D. Unless otherwise approved by the ENGINEER, building demolition shall proceed from the top of the structure to the ground. The CONTRACTOR shall complete demolition work above each floor or tier prior to disturbing the supporting members of the lower levels.
 - 1. Demolish roofing and light weight insulated concrete in small sections.

2. Carefully position demolition equipment so as not to impose excessive loads or undue stress on remaining walls, floors, or framing.
3. Remove demolition refuse immediately so as not to impose excessive loads on floors, walls, or framing.

3.05. REFUSE REMOVAL, HANDLING, AND OWNERSHIP

- A. Any item that has been deemed salvageable and is to remain the property of the OWNER shall be carefully removed, so as not to be damaged, from the existing work by the CONTRACTOR and shall be placed in an OWNER designated protected and secure location within the Site.
 1. If an item is to be retained by the OWNER and stored off-Site, it shall be so noted in the Specifications or Contract Drawings. The CONTRACTOR shall include the costs associated with loading, securing, transporting, and unloading.
- B. Remove materials as the Work progresses. Upon completion of the Work, leave areas in a clean condition. All demolished materials shall be removed from the Site without delay.
- C. All materials, equipment, and debris shall be transported and disposed of in an appropriate manner at the expense of the CONTRACTOR and in compliance with all existing and governing laws and regulations.

3.06. ALTERATIONS AND CLOSINGS

- A. Alterations shall conform to all applicable Specifications, the Contract Drawings, and the directions and approvals of the ENGINEER.
- B. Where alterations require cutting or drilling into existing floors, walls, and roofs, the holes shall be repaired in an approved manner. The CONTRACTOR shall repair such openings with the same or matching materials as the existing floor, wall, or roof or as otherwise approved by the ENGINEER.
- C. Openings in existing concrete slabs, ceilings, masonry walls, floors, and partitions shall be closed and sealed as indicated or otherwise directed by the ENGINEER. New work shall be keyed into the existing work in an acceptable manner. New reinforcing steel shall be welded to the existing reinforcing steel. Welding shall conform to AWS D12.1, Reinforcing Steel Welding Code. In general, use the same or matching materials as the existing adjacent surface. The finished closure shall be a smooth, tight, sealed, permanent closure acceptable to the ENGINEER.

3.07. CLEANUP

- A. Remove all temporary structures, barriers, and security devices upon completion of the Work.

- B. The CONTRACTOR shall remove from the Site all debris resulting from the demolition operations as it accumulates. Upon completion of the Work, all materials, equipment, waste, and debris of every sort shall be removed and premises shall be left, clean, neat, and orderly.

END OF SECTION

SECTION 04 01 20
MASONRY RESTORATION AND CLEANING

PART 1 GENERAL

1.01. RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02. SUMMARY

- A. This Section includes restoration and cleaning of brick and cast stone masonry as follows:
 - 1. Repointing clay brick mortar joints.
 - 2. Cleaning exposed clay masonry surfaces.
 - 3. Cleaning and Restoration of Cast Stone.

1.03. DEFINITIONS

- A. Low-Pressure Spray: 100 to 400 psi; 4 to 6 gpm.

1.04. SUBMITTALS

- A. Product Data and Cleaning Schedule: Product data for each type of product indicated and include recommendations for application. Schedule of cleaning products and their areas of application in the project. Include test data substantiating that products comply with requirements.
- B. Cleaning Program: Describe cleaning process in detail for each type of masonry, including materials, methods, and equipment to be used and protection of surrounding materials on building and Project site, and control of runoff during operations.
 - 1. If materials and methods other than those indicated are proposed for cleaning work, provide a written description, including evidence of successful use on comparable projects, and a testing program to demonstrate their effectiveness for this Project.

1.05. QUALITY ASSURANCE

- A. Restoration Specialist Qualifications: Engage an experienced masonry restoration and cleaning firm to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance.
 - 1. Field Supervision: Restoration specialist firms shall maintain experienced full-time supervisors on Project site during times that clay masonry restoration and cleaning are in progress. Supervisors shall not be changed during Project except for causes beyond the control of restoration specialist firm.

2. Restoration Worker Qualifications: Persons who are experienced and specialize in restoration work of types they will be performing.
- B. Chemical Manufacturer Qualifications: A firm regularly engaged in producing masonry cleaners that have been used for similar applications with successful results, and with factory-trained representatives who are available for consultation and Project-site inspection and assistance at no additional cost.
- C. Source Limitations: Obtain each type of material for masonry restoration (face brick, cement, sand, etc.) from one source with resources to provide materials of consistent quality in appearance and physical properties.
- D. Mockups: Prepare mockups of restoration and cleaning as follows to demonstrate aesthetic effects and qualities of materials and execution. Prepare mockups on existing walls under same weather conditions to be expected during remainder of the Work.
 1. Clean an area approximately 25 sq. ft. in area for each type of clay masonry and surface condition.
 - a. Test cleaners and methods on samples of adjacent materials for possible adverse reactions unless cleaners and methods are known to have deleterious effect.
 - b. Allow a waiting period of not less than seven days after completion of sample cleaning to permit a study of sample panels for negative reactions.
 2. Rake out joints in two separate areas approximately 36 inches high by 48 inches wide for each type of repointing required and repoint one of the two areas.

1.06. DELIVERY, STORAGE, AND HANDLING

- A. Deliver masonry units to Project site strapped together in suitable packs or pallets or in heavy-duty cartons.
- B. Deliver other materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.
- C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- D. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.
- E. Store lime putty covered with water in sealed containers.
- F. Store sand where grading and other required characteristics can be maintained and contamination avoided.

1.07. PROJECT CONDITIONS

- A. Repoint mortar joints and repair masonry only when air temperature is between and 40 and 90 deg F and is predicted to remain so for at least 7 days after completion of work.

- B. Hot-Weather Requirements: Protect masonry repair and mortar-joint pointing when temperature and humidity conditions produce excessive evaporation of water from mortar and repair materials. Provide artificial shade and wind breaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 90 deg F and above.
 - C. Clean masonry surfaces only when air temperature is 40 deg F and above and is predicted to remain so for at least 7 days after completion of cleaning.
- 1.08. SEQUENCING AND SCHEDULING
- A. Order replacement materials at earliest possible date, to avoid delaying completion of the Work.
 - B. Perform masonry restoration work in the following sequence:
 - 1. Clean masonry surfaces.
 - 2. Rake out joints that are to be repointed.
 - 3. Point mortar joints.
 - 4. Final cleaning of masonry surfaces where necessary.

PART 2 PRODUCTS

2.01. MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
 - 1. Products: Subject to compliance with requirements, provide one of the products specified.
 - 2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.02. MORTAR MATERIALS

- A. Portland Cement: ASTM C 150, Type I or Type II.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Mortar Sand: ASTM C 144, unless otherwise indicated.
 - 1. Color: Provide natural sand; of color necessary to produce required mortar color to match existing
 - 2. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands, if necessary, to achieve suitable match.
- D. Mortar Pigments: Natural and synthetic iron oxides, compounded for mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortars.
- E. Water: Potable.

2.03. CLEANING MATERIALS

- A. Water for Cleaning: Potable.
- B. Nonacidic Liquid Cleaner: Manufacturer's standard mildly alkaline liquid cleaner formulated for removing mold, mildew, and other organic soiling from ordinary building materials, including polished stone, brick, aluminum, plastics, and wood.
- C. At soiling and hard to remove deposits at selective areas provide a non-fuming, low-odor and safe for use cleaner for removing stubborn atmospheric and carbon staining that is intended for restoration and for easy rinsing away.
- D. Concentrated acidic cleaner for brick masonry surfaces that are subject to efflorescence through calcium, manganese and other metallic stains. This will be selectively utilized only at existing mild and potential efflorescence.
 - 1. Products: Non-acidic
 - a. Dominion Restoration Products, Inc.; Bio-Cleanse.
 - b. Dumond Chemicals, Inc.; Safe n' Easy Architectural Cleaner/Restorer.
 - c. Price Research, Ltd.; Price Non-Acid Masonry Cleaner.
 - d. PROSOCO; Enviro Klean 2010 All Surface Cleaner.
 - e. American Building Restoration Products, Inc.
 - f. Or equal.
 - 2. Products: Restoration
 - a. PROSOCO Enviro Klean SafRestorer
 - b. American Building Restoration ABR 635 & 600B
 - c. Or equal at selective areas per Paragraph 2.03, C
 - 3. Products:
 - a. PROSOCO Sure Klean Vana Trol.
 - b. American Building Restoration, ABR 600 Pre-Thickened Efflorescence & Lime Dissolver
 - c. Or equal at selective areas per Paragraph 2.03, D

2.04. MISCELLANEOUS MATERIALS

- A. Liquid Strippable Masking Agent: Manufacturer's standard liquid, film-forming, strippable masking material for protecting glass, metal, and polished stone surfaces from damaging effects of acidic and alkaline masonry cleaners.
 - 1. Products:
 - a. American Building Restoration Products, Inc.; LM 130 Acid Shield.
 - b. Diedrich Technologies Inc.; Diedrich Acid Guard.
 - c. Price Research, Ltd.; Price Mask.

d. ProSoCo; Sure Klean Strippable Masking.

2.05. MORTAR MIXES

- A. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.
 - 1. Mixing Pointing Mortar: Thoroughly mix cementitious materials and sand together before adding any water. Then mix again adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 15 to 30 minutes. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within one hour of final mixing; do not retemper or use partially hardened material.
- B. Colored Mortar: Produce mortar of color required by using selected ingredients. Do not alter specified proportions without Engineer's approval.
 - 1. Mortar Pigments: Where mortar pigments are indicated, do not exceed a pigment-to-cement ratio of 1:10 by weight.
- C. Do not use admixtures of any kind in mortar, unless otherwise indicated.
- D. Mortar Proportions: Mix mortar materials in the following proportions:
 - 1. Pointing Mortar for Brick: 1 part portland cement, 2 parts lime, and 6 parts sand.
 - a. Add mortar pigments to produce mortar colors required.
 - 2. Rebuilding (Setting) Mortar: Same as pointing mortar.

2.06. CHEMICAL CLEANING SOLUTIONS

- A. Dilute chemical cleaners with water to produce solutions not exceeding concentration recommended by chemical cleaner manufacturer.

PART 3 EXECUTION

3.01. PROTECTION

- A. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm resulting from masonry restoration work.
 - 1. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during course of restoration and cleaning work.
- B. Comply with chemical cleaner manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent chemical cleaning solutions from coming into contact with pedestrians, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.

1. Cover adjacent surfaces with materials that are proven to resist chemical cleaners used unless chemical cleaners being used will not damage adjacent surfaces. Use materials that contain only waterproof, UV-resistant adhesives. Apply masking agents to comply with manufacturer's written instructions. Do not apply liquid masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
 2. Keep wall wet below area being cleaned to prevent streaking from runoff.
 3. Do not clean masonry during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
 4. Neutralize and collect alkaline and acid wastes for disposal off Owner's property.
 5. Dispose of runoff from cleaning 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.
- C. Prevent mortar from staining face of surrounding masonry and other surfaces.
1. Cover sills, ledges, and projections to protect from mortar droppings.
 2. Keep wall area wet below rebuilding and pointing work to discourage mortar from adhering.
 3. Immediately remove mortar in contact with exposed masonry and other surfaces.
 4. Clean mortar splatters from scaffolding at end of each day.

3.02. CLEANING MASONRY, GENERAL

- A. Proceed with cleaning in an orderly manner; work from top to bottom of each scaffold width and from one end of each elevation to the other.
- B. Use only those cleaning methods indicated for each masonry material and location.
1. Do not use wire brushes or brushes that are not resistant to chemical cleaner being used. Do not use plastic-bristle brushes if natural-fiber brushes will resist chemical cleaner being used.
 2. Use spray equipment that provides controlled application at volume and pressure indicated, measured at spray tip. Adjust pressure and volume to ensure that cleaning methods do not damage masonry.
 - a. Equip units with pressure gages.
 3. For water spray application, use fan-shaped spray tip that disperses water at an angle of 25 to 50 degrees.
- C. Perform each cleaning method indicated in a manner that results in uniform coverage of all surfaces, including corners, moldings, and interstices, and that produces an even effect without streaking or damaging masonry surfaces.
- D. Preliminary Cleaning: Before beginning general cleaning, remove extraneous substances that are resistant to cleaning methods being used. Extraneous substances include paint, caulking, asphalt, and tar.

1. Carefully remove heavy accumulations of material from surface of masonry with a sharp chisel. Do not scratch or chip masonry surface.
 2. Remove paint and calking with alkaline paint remover.
 - a. Comply with requirements for paint removal.
 - b. Repeat application up to two times if needed.
 3. Remove asphalt and tar with solvent-type paint remover.
 - a. Apply only to asphalt and tar by brush without prewetting.
 - b. Allow paint remover to remain on surface for 10 to 30 minutes.
 - c. Rinse off with water using low-pressure spray.
 - d. Repeat application if needed.
- E. Water Spray Applications: Unless otherwise indicated, hold spray nozzle at least 6 inches from surface of masonry and apply water in horizontal back and forth sweeping motion, overlapping previous strokes to produce uniform coverage.
- F. Chemical Cleaner Application Methods: Apply chemical cleaners to masonry surfaces to comply with chemical cleaner manufacturer's written instructions; use brush or spray application methods, at Contractor's option. Do not spray apply at pressures exceeding 50 psi. Do not allow chemicals to remain on surface for periods longer than those indicated or recommended by manufacturer.
- G. Rinse off chemical residue and soil by working upward from bottom to top of each treated area at each stage or scaffold setting. Periodically during each rinse, test pH of rinse water running off of cleaned area to determine that chemical cleaner is completely removed.
1. Apply neutralizing agent and repeat rinse, if necessary, to produce tested pH of between 6.7 and 7.5.
- H. After cleaning is complete, remove protection no longer required. Remove tape and adhesive marks.

3.03. CLEANING BRICKWORK

A. Nonacidic Liquid Chemical Cleaning:

1. Wet masonry with cold water applied by low-pressure spray.
2. Apply cleaner to masonry in two applications by brush or low-pressure spray. Let cleaner remain on surface for period indicated below:
 - a. As recommended by chemical cleaner manufacturer.
3. Rinse with cold water applied by low-pressure spray to remove chemicals and soil.
4. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam wash.

B. Concentrated acidic cleaner application:

1. Using a soft masonry-washing brush or low pressure spray, 50 psi max, apply diluted solution freely. Do not apply diluted cleaning solution with pressure spray.
2. Leave cleaning solution on the wall and depending on absorption rate of masonry and drying conditions. Do not let cleaner dry into the masonry.
3. Reapply cleaning solution and scrape off heavy buildup of excess mortar. Take care to avoid damaging the masonry surface. Do not use metal scrapers, which may contribute to metallic staining.
4. Rinse thoroughly with fresh water, removing all cleaning compound, free sand and loose material. Thorough rinsing is extremely important to ensure that all residues are removed from the porous masonry.

3.04. REPOINTING MASONRY

A. Rake out and repoint mortar joints to the following extent:

1. Joints where mortar is missing or where they contain holes.

B. Do not rake out and repoint joints where not required. This is spot repointing.

C. Rake out joints as follows:

1. Remove mortar from joints to depth of 2-1/2 times joint width, but not less than 3/4 inch or not less than that required to expose sound, unweathered mortar.
2. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
3. Do not spall edges of masonry units or widen joints. Replace or patch damaged masonry units as directed by Engineer.
 - a. Cut out center of mortar bed joints using angle grinders with diamond-impregnated metal blades. Remove remaining mortar by hand with chisel and mallet. Strictly adhere to written quality-control program. Quality-control program shall include provisions for demonstrating ability of operators to use tools without damaging masonry, supervising performance, and preventing damage due to worker fatigue.

D. Notify Engineer of unforeseen detrimental conditions including voids in mortar joints, cracks, loose masonry units, rotted wood, rusted metal, and other deteriorated items.

E. Point joints as follows:

1. Rinse masonry-joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen masonry-joint surfaces before pointing.
2. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8 inch until a

uniform depth is formed. Fully compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.

3. After low areas have been filled to same depth as remaining joints, point all joints by placing mortar in layers not greater than 3/8 inch. Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing bricks have worn or rounded edges, slightly recess finished mortar surface below face of masonry to avoid widened joint faces. Take care not to spread mortar over edges onto exposed masonry surfaces or to feather edge mortar.
 4. When mortar is thumbprint hard, tool joints to match original appearance of joints. Remove excess mortar from edge of joint by brushing.
- F. Cure mortar by maintaining in thoroughly damp condition for at least 72 hours including weekends and holidays.

3.05. FINAL CLEANING

- A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water, spray applied at low pressure.
 1. Do not use metal scrapers or brushes.
 2. Do not use acidic or alkaline cleaners.
- B. Wash adjacent woodwork and other nonmasonry surfaces. Use detergent and soft brushes or cloths.
- C. Clean masonry debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.
- D. Sweep and rake adjacent pavement and grounds to remove masonry debris. Where necessary, pressure wash surfaces to remove mortar, dust, dirt, and stains.

END OF SECTION

**THIS PAGE
LEFT BLANK**

SECTION 05 50 00
MISCELLANEOUS METALS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Shop-fabricated ferrous and non-ferrous metal and fiberglass items, including miscellaneous framing, custom fabrications, shelf angles, anchor bolts, ladders, wall brackets, etc. and a protective cover over the Influent Channel.

1.02. REFERENCES

ANSI A14.3	Ladders, Fixed, Safety Requirements
ASTM A36	Structural Steel shapes (36 ksi)
ASTM A53	Pipe, Steel, Black and Hot-Dip Galvanized
ASTM A123	Zinc Coating (Hot-Dip Galvanized) on Steel Products
ASTM A153	Zinc Coating (Hot-Dip Galvanized) on Steel Hardware
ASTM A276	Stainless and Heat-Resisting Steel Bars and Shapes
ASTM A307	Carbon Steel Bolts and Studs, 60 ksi Tensile Strength
ASTM A325	Structural Bolts, Heat Treated, 120/105 ksi Tensile Strength
ASTM A500	Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A992	Structural Steel Shapes (50 ksi)
ASTM B209	Aluminum and Alloy Sheet and Plate
ASTM B221	Aluminum and Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B308	Aluminum-Alloy 6061-T6 Standard Structural Shapes
ASTM B632	Aluminum Tread Plate
ASTM F593	Stainless Steel Bolts, Hex Cap Screws, and Studs
AWS A2.0	Standard Welding Symbols
AWS D1.1	Welding Code - Steel
AWS D1.2	Welding Code - Aluminum
AWS D1.6	Welding Code – Stainless Steel
SSPC	Society for Protective Coatings

1.03. SUBMITTALS

- A. Shop Drawings:
1. Indicate profiles, sizes, connections, attachments, reinforcing, anchorage, size and type of welds, holes, fasteners, and accessories.

2. Shop drawings shall be submitted in sets of similar fabricated items. Large submittals, generally over 10 sheets, consisting of several different fabricated items will be returned to the Contractor unreviewed.
 3. Resubmittals of shop drawings shall have all revisions/corrections clearly highlighted to the Engineer (e.g., labeled, clouded, etc.).
- B. Include detailed fabrication drawings with erection drawings, bill of materials, finishes, and applicable details such that each piece is easily identifiable and located on the project for both review/approval and installation.
 - C. Submit manufacturer's product data to include details of manufactured product with installation instructions.

1.04. COORDINATION

- A. Field verify all dimensions prior to submittal of shop drawings.
- B. Coordinate work of this section where required to tie into the work of other sections.

1.05. QUALIFICATIONS

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

PART 2 PRODUCTS

2.01. MATERIALS

- A. Steel Channels, Angles, and Plates: ASTM A36.
- B. Rectangular and Square Hollow Structural Sections (HSS): ASTM A500, Grade B.
- C. Aluminum Sections: ASTM B308 Alloy 6061-T6. Use Aluminum Association shapes.
- D. Fiberglass Fabrications: All structural shapes shall be manufactured using the pultrusion process with a minimum glass content of 45 percent. Use extra corrosion-resistant vinyl ester resin material for all shapes and plates. All fiberglass resin shall contain an integral UV inhibitor and be produced with a resin-rich surface to protect against exposure and wear.
- E. Bolts: ASTM F593 stainless steel, Type 316; ASTM A325 carbon steel; galvanized bolts as a manufactured assembly to ASTM A153; ASTM A489 steel eyebolts.

All bolt accessories including nuts, washers, etc. shall be of the same material as the bolt.

- F. Bolted Attachment to Concrete and Masonry: For structural loads, use minimum 5/8-inch diameter stainless steel adhesive anchors. Expansion anchors are not allowed unless specifically requested by Contractor for a particular application and approved by Engineer.
- G. Cast-In Anchor Rods (Bolts): ASTM F1554 anchor rods galvanized to ASTM A153. Anchor rods shall be as shown on Contract Drawings.
- H. Welding Materials: AWS D1.1 and D1.2; type required for materials being welded.
- I. Touch-Up Primer for Galvanized Surfaces: Zinc-rich paint.
- J. Bearing plates with minimum two 5/8-inch diameter by 4-inch long welded studs to be embedded in grout-filled masonry bond beams.
- K. Anchorage for metal items cast in concrete shall have welded-on strap anchors 2 feet o.c., made from 1/4-inch thick x 1-inch wide x 6-inch long bar stock with each end bent 90 degrees.
- L. Ladders: General
 - 1. Rungs
 - a. Square or rectangular in profile with ridged or serrated non-slip top surface, capable of supporting a 300-lb. concentrated load at any point along the length of the rung without failure or permanent deformation.
 - b. Vertical spacing of rungs to be equal, from floor to upper landing, and not to exceed 12 inches.
 - c. Centerline of rungs to be 7 inches from wall or other surface or obstruction opposite climber.
 - d. Material to match side rails.
 - 2. Ladders to conform in all respects to the requirements of OSHA 1910.27.
 - 3. Side rails shall be supported by brackets with a maximum vertical spacing of 48 inches on center. Secure brackets to wall with 5/8-inch diameter adhesive anchors, 4-inch minimum embedment.
 - 4. Bolts to be Type 316 stainless steel, minimum 5/8-inch diameter.

M. Aluminum Ladders

1. 6061-T6 or 6063-T5 mill finish aluminum.
2. All welds and sharp edges to be ground smooth.
3. Side rails shall be minimum 1 1/2-inch diameter, schedule 40 pipe.

2.02. FINISHES

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

PART 3 EXECUTION

3.01. EXAMINATION

- A. Ensure that field conditions are acceptable and are ready to receive work. Measurements and dimensions to be field verified.
- B. Beginning of installation means Contractor accepts existing conditions.

3.02. FABRICATION

- A. Fit and shop assemble in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Welds shall be continuous unless noted otherwise.
- D. Exposed Mechanical Fastenings: Unobtrusively located, consistent with design of component.
- E. Supply components required for anchorage of fabrications. Aluminum and fiberglass fabrications require stainless steel fasteners.
- F. Fiberglass Fabrications: All cuts and drilled holes shall be sealed with clear vinyl ester resin to provide maximum corrosion resistance.

3.03. FABRICATION TOLERANCES

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

3.04. INSTALLATION

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

3.05. INSTALLATION TOLERANCES

- A. Maximum Variation From Plumb: 1/4-inch.

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

END OF SECTION

SECTION 06 10 00 CARPENTRY

PART 1 GENERAL

1.01 SUMMARY

- A. This Section includes the following:
1. Wood blocking and nailers.
 2. Roof Sheathing.
 3. Plywood backing panels.
 4. Structural glued-laminated lumber.

1.02 DEFINITIONS

- A. Lumber grading agencies, and the abbreviations used to reference them, include the following:
1. NELMA - Northeastern Lumber Manufacturers Association.
 2. NLGA - National Lumber Grades Authority.
 3. WCLIB - West Coast Lumber Inspection Bureau.
 4. WWPA - Western Wood Products Association.

1.03 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
 2. Delete first subparagraph below if fire-retardant-treated wood is not required.
 3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
- B. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the American Lumber Standards Committee Board of Review.

- C. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:

1. Preservative-treated wood.

1.04 QUALITY ASSURANCE

- A. Source Limitations for Engineered Wood Products: Obtain each type of engineered wood product through one source from a single manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber, plywood, and other panels; place spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 PRODUCTS

2.01 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.
1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. Provide dressed lumber, S4S, unless otherwise indicated.
 3. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.

2.02 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. General: Where lumber or plywood is indicated as preservative treated or is specified to be treated, comply with applicable requirements of AWPAC2 (lumber) and AWPAC9 (plywood). Mark each treated item with the Quality Mark Requirements of an inspection agency approved by ALSC's Board of Review.
1. Do not use chemicals containing chromium or arsenic.
- B. Pressure treat above ground items with waterborne preservatives to a minimum retention of 0.25 lb./cu. ft. After treatment, kiln-dry lumber and plywood to a maximum moisture content of 19 and 15 percent, respectively. Treat indicated items and the following:
1. Wood sills, blocking, and similar concealed members in contact with masonry or concrete.

2.03 DIMENSION LUMBER

- A. General: Provide dimension lumber of grades indicated according to the American Lumber Standards Committee National Grading Rule provisions of the grading agency indicated.
- B. Wood Framing: No. 2 grade or better and the following species:
 - 1. Spruce-pine-fir (south); NELMA, WCLIB, or WWPA.
 - 2. Spruce-pine-fir; NLGA.
- C. Species and grade with a modulus of elasticity of at least 1,300,000 psi and an extreme fiber stress in bending of at least 1100 psi for 2-inch nominal thickness and 4-inch nominal width.

2.04 ROOF SHEATHING

- A. Plywood Roof Sheathing: APA Rated Sheathing, Exterior, CCX.
 - 1. Span Rating: Not less than 40/20.
 - 2. Nominal Thickness: Not less than 23/32 inch.

2.05 PLYWOOD BACKING PANELS

- A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2 inch thick.

2.06 STRUCTURAL GLUED-LAMINATED TIMBER

- A. General: Provide structural glued-laminated timber as sill-plates that comply with AITC A190.1 and AITC 117 or research/evaluation reports acceptable to authorities having jurisdiction.
 - 1. Factory mark each piece of structural glued-laminated timber with AITC Quality Mark or APA-EWS trademark. Place mark on surfaces that are not exposed in the completed Work.
 - 2. Provide structural glued-laminated timber made from single species.
 - 3. Provide structural glued-laminated timber made from solid lumber laminations; do not use laminated veneer lumber.
 - 4. Provide structural glued-laminated timber made with wet-use adhesive complying with AITC A190.1.
 - 5. Adhesive shall not contain urea-formaldehyde resins.
- B. Species and Grades for Structural Glued-Laminated Timber: Alaska Cedar, Douglas Fir or Southern Pine in grades needed to comply with "Performance Requirements" Article.

- C. Appearance Grade: Industrial, complying with AITC 110.
- D. 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. Microllam LVL by Weyerhaeuser NR Company.

2.07 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: CABO NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1.
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

2.08 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.

PART 3 EXECUTION

3.01 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Do not use materials with defects that impair quality of rough carpentry or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- C. Apply field treatment complying with AWWA M4 to cut surfaces of preservative-treated lumber and plywood.
- D. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in the International Building Code.

- E. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; predrill as required.
- F. Use finishing nails for exposed work, unless otherwise indicated. Countersink nail heads and fill holes with wood filler.

3.02 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Build anchor bolts into masonry during installation of masonry work. Where possible, secure anchor bolts to formwork before concrete placement.
- C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.03 PLYWOOD BACKING PANELS INSTALLATION

- A. Fastening Methods: Fasten panels as indicated below:
 - 1. Plywood Backing Panels: Nail or screw to supports.

END OF SECTION

**THIS PAGE
LEFT BLANK**

SECTION 07 32 16
CONCRETE ROOF TILE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete tile roofing.
- B. Roof board insulation (for installation below roof tile).

1.02 RELATED SECTIONS

- A. Section 01 33 00 (Submittal Procedures)
- B. Section 01 61 00 (Common Product Requirements)

1.03 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM A 641 - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
 - 2. ASTM C 1492 - Standard Specification for Concrete Roof Tile.
 - 3. ASTM D 226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 1997a.
 - 4. ASTM D 249 - Standard Specification for Asphalt Roll roofing (Organic Felt) Surfaced with Mineral Granules: 1989 (reapproved 1996).
 - 5. ASTM D 1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
 - 6. ASTM D 2626 - Standard Specification for Asphalt-Saturated and Coated Organic Felt Base Sheet Used in Roofing; 1997b.
 - 7. ASTM D 4798 - Standard Practice for Accelerated Weathering Test Conditions and Procedures for Bituminous Materials (Xenon-Arc Method).
 - 8. ASTM D 4869 - Standard Specification for Asphalt-Saturated Organic Felt Underlayment Used in Steep Slope Roofing.
- B. CAN/CSA-A220. 1-Series-06 Concrete Roof Tiles.
- C. City of Los Angeles Research Report - LA RR 25021.FRSA/TRI - Concrete and Clay Roof Tile Installation Manual Fifth Edition Revised (For Outside HVHZ Wind Zones).
- D. High Wind Applications: Florida Refer RAS 118, 119, 120.
- E. IAPMO ER 1900.

- F. IAPMO ER 2015 Concrete and Clay Roof Tile Installation Manual.
- G. ICC AC 180 - Acceptance Criteria for Clay and Concrete Roof Tiles. August 2007.
- H. ICC ER ESR 1787 Flex Seal, Flex Flash, Flex Vent.
- I. Concrete and Clay Roof Tile Installation Manual (TRI) - Concrete and Clay Design Criteria for Cold and Snow Regions.

1.04 DESIGN REQUIREMENTS

- A. Roofing tile materials and installation shall conform to the requirements of IAPMO ER 1900 and LA RR 25021, and the 2015 Concrete and Clay Roof Tile Installation Manual.
- B. Roofing tile materials and installation shall conform to the requirements of the Applicable Building Code.

1.05 SUBMITTALS

- A. Submit under provisions of Section 01 33 00 (Submittal Procedures).
- B. Product Data: Manufacturer's data for each product to be used including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings: Indicate metal flashing profiles, joint locations, fastening locations and installation details. Indicate tile layout with location of cut and special shaped tiles identified.
- D. Selection Samples: For each finish product specified, submit samples indicating manufacturer's full range of available colors and patterns.
- E. Verification Samples: Submit two representative samples of each material specified indicating visual characteristics and finish. Include range samples if variation of finish is anticipated.
- F. Certificates of Compliance: Submit to certify compliance with referenced standards.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Member of the Tile Roofing Institute.
- B. Installer Qualifications: License by the local/state authority and have the proper insurance to operate in your area.

- C. Installation: Refer to the Concrete and Clay Roof Tile Installation Manual ER 2015, FRSA/TRI Concrete and Clay Roof Tile Installation Manual Fifth Edition Revised, TAS 101 and RAS 118,119,120 for High Wind Zones (HVHZ).
- D. Product Requirements:
 - 1. Comply with governing codes and regulations. Provide products of acceptable manufacturers, which have been in satisfactory use in similar service for three years.
- E. Mock-Up:
 - 1. Provide mock-up as required to demonstrate quality of workmanship.
 - 2. Finish areas designated by Engineer.
 - 3. Do not proceed with remaining work until material and workmanship are approved by Engineer.
 - 4. Modify mock-up area as required to produce acceptable work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store materials in accordance with manufacturer's instructions.
 - 1. Refer to the FRSA TRI 07320/8-05 Concrete and Clay Roof Tile Installation Manual Fifth Edition Revised section #1.04.
 - 2. Refer to roof loading guide MC-09 of the Concrete and Clay Roof Tile Installation Manual IAPMO ER 2015.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Maintain dry storage area for products of this section until installation of products.

1.08 PROJECT CONDITIONS

- A. Anticipate environmental conditions (temperature, humidity, and ventilation) to schedule work within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.09 WARRANTY

- A. Manufacturer shall warrant the products against manufacturing defects and shall include material and labor to repair or replace defective materials as specified in manufacturer's warranty.

1. Warranty Period - Concrete Roof Tile: Lifetime Transferable Limited Product Warranty for concrete roof tile.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturer:

1. Eagle Roofing Products Florida LLC – Bel Air
2. Boral Roofing LLC
3. Bartile
4. Vande Hey Raleigh Mfg., Inc.
5. Or Equal

B. Requests for substitutions will be considered in accordance with provisions of Section 01 61 00 (Common Product Requirements).

2.02 TILE

A. Concrete Roof Tile: As manufactured by Eagle Roofing Products.

B. Standard Concrete Tile:

1. Bel Air Flat Profile Tile:
 - a. Weight: Standard Weight.
 - b. Trim Tile: Flat type.
 - c. Hip Starters: Flat smooth.
 - d. Colors to be selected by Engineer from manufacturer's full color range.

2.03 RELATED MATERIALS

A. Decking: Comply with FRSA/TRI 07320/8.05 Concrete and Clay Roof Tile Installation Manual.

B. Underlayment: Comply with FRSA/TRI Manual Fifth Edition Revised 07320/8-05, Concrete and Clay Roof Tile Installation Manual.

C. Roof Board Insulation: Extruded-Polystyrene Board Insulation ASTM C 578, of type and minimum compressive strength indicated below, with minimum flame-spread and smoke- development indexes of 25 and 450 respectively, per ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the /work include, but not limited to, the following:
 - a. Diversifoam Products.

- b. Dow Chemical Company (The).
 - c. Owens Corning.
 - d. Or Equal.
- 2. Type IV, 25 psi.
- D. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.
- E. Arched Battens:
 - 1. Nominal 1 inch by 1-3/16 inches complying with IBC Chapter 23, section 2302.
 - 2. Comply with Section #3.11 pages #16-#17 and #82 of the FRSA/TRI 07320/8-05 Concrete and Clay Roof Tile Installation Manual Fifth Edition Revised.
 - 3. The Arched Batten as manufactured by Eagle Roofing Products. Product for elevating battens off of the roof deck.
- F. Eave Closure/Riser/Bird Stop: Comply with MC 10, MC-10A, 10B, 10C & or 10D (Concrete and Clay Roof Tile Installation Manual Installation Guide IAPMO ER 2015).
 - 1. Eave Riser for Flat Profile Tiles:
 - a. Color: Gray
- G. Rake and Ridge Flashing: Flashing shall be a minimum No. 26 gauge Galvanized steel G90 or equal.
 - 1. Standard Metal Rake for Flat Profile Tiles:
 - a. Color: Gray
- H. Wall Trays (Pans) Flashing:
 - 1. No. 26 Gauge (G90) Galvanized minimum 6 inches (152 mm) trough.
 - 2. Comply with Concrete and Clay Roof Tile Installation Manual MC 12B.
 - 3. Comply with FRSA/TRI 07320/8-08 Fifth Edition Revised Installation Guide.
- I. Roof to Wall Flashing: No. 26 Gauge (G90) Galvanized or flexible flashing to provide minimum 3 inches (76 mm) coverage.
- J. Pipe Flashing:
 - 1. No. 26 Gauge (G90) Galvanized deck flashing installed with underlayment.
 - 2. Flat tile flashing - No. 26 Gauge (G90) Galvanized.
- K. In Wall Counter Flashing:

1. No. 26 Gauge (G90) Galvanized Z-Bar flashing recommended or surface mountringlet (pin) flashing for reroofing applications.

L. Tile Fasteners:

1. Corrosive resistant fastener meeting ASTM A641 Class I or approved equal. Number 11 gauge diameter and of sufficient length to penetrate 3/4 inch (19 mm) into or through the thickness of the deck or the batten. Comply with Concrete and Clay Roof Tile Installation Manual Table 1A and 1B.
2. Comply with FRSA/TRI 07320/8-05 Fifth Edition Revised Installation Guide.
3. Screw Fasteners:
 - a. Corrosion resistant meeting ASTM A641 Class 1 and/or corrosion resistance equal (according to ASTM B 117). Screws shall be 2-1/2 inches (64 mm) in length or penetrate a minimum 3/4 inch (19 mm) into the deck or batten. ASTM A641 Class 1 is a nail specification that can be converted to screw fasteners through performance testing (ASTM B 117). Each fastener manufacturer is responsible for supplying this support this data. Minimum #8 course thread.

M. Adhesive/Sealant: Tile adhesive formulated for use with concrete roof tile.

N. Ventilation: Per local building code requirement.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine areas to receive tile to verify conditions. Do not commence tile installation until unsatisfactory conditions are corrected.

3.02 TILE INSTALLATION

- A. Install in accordance with manufacturer's instructions and the following standards as applicable to the location of the project:
 1. Concrete and Clay Roof Tile Installation Manual IAPMO ER 2015 (TRI Guide).
 2. TRI/WSRCA Standard Installation Guides for Concrete and Clay Tile in Cold Weather Applications.
 3. FRSA/TRI 07320/8-05 Fifth Edition Revised Installation Guide IAPMO ER 2015.
 4. Florida High Wind Applications. RAS 118, 119, 120.
 5. CAN/CSA-A220. 1-Series-06 Concrete Roof Tiles.
 6. FRSA/TRI 07320/8-05 Fifth Edition Revised Installation Guide.

- B. Roof Layout: Layout according to TRI Guide MC 07, MC 08, MC 08A, MC 09. Roof Layout: Layout according to FRSA/TRI 07320/8-05 Fifth Edition Revised. Refer to section # (3.08, 3.12).
- C. Battens: Install according to TRI Guide Table 1, Table 2, Table 3, MC 04 or MC-05, MC 06, MC 06A. FRSA/TRI 07320/8-05 Fifth Edition Revised. Refer to section #3.11 pages 16-17 and 82.
- D. Underlayment: Install according to TRI Guide MC 01A, MC 01B and manufacturer's instructions. FRSA/TRI 07320/8-05 Fifth Edition Revised. Quick Reference charts on pages 2, 23, 45, 67 and manufacturer's instructions.
- E. Vent Pipes: Install according to TRI Guide MC 02. FRSA/TRI Fifth Edition Revised. See drawings 11, 12, 12, 14 and 11-b, 12-b, and 14-b.
- F. Eave/Gable: Install according to MC 10, MC 10A, MC 10B, MC 20, MC 20A. FRSA/TRI 07320/8-05 Fifth Edition Revised. Refer to section 3.03 for eave and refer to sections 3.05, 3.15 and 4.09 for gable.
- G. Venting: Install according to TRI Guide MC 21, manufacturer's instructions and local code requirements.
- H. Hip and Ridge: Install according to TRI Guide MC 18, MC 18A, MC 18B. FRSA/TRI 07320/8-05 Fifth Edition Revised.
- I. Rake: Install according to TRI Guide MC 19, MC 19A, MC 19B. FRSA/TRI 07320/8-05 Fifth Edition Revised, refer to sections 4.09, 3.14 and 3.18.
- J. Side Wall Flashing: Install according to TRI Guide MC 12, MC 12A, MC 13, MC 13A. FRSA/TRI 07320/8-05 Fifth Edition Revised drawing 7.
- K. Head and Apron Flashing: Install according to TRI Guide MC 11, MC 11A. FRSA/TRI 07320/8-05 Fifth Edition Revised drawings 8, 9, and 10.

3.03 SPECIAL APPLICATIONS

- A. Spaced Sheathing - Refer to TRI Guide Appendix B.
- B. Adhesive Fastening - Refer to TRI Guide Appendix B.
- C. Adhesive Fastening Set Tile Guidelines:
 - 1. FRSA/TRI 07320/8-05 Fifth Edition Revised. System four underlayment Option "A". And system Four Underlayment Option "B".
- D. Design for High Wind - Refer to TRI Guide Appendix B. RAS 118, 199, 120.

3.04 CLEAN-UP

- A. Remove all debris, including any cut dust, from roof daily.

3.05 REPAIR AND REPLACEMENT

- A. Comply with requirements of TRI Guide MC 24.

3.06 PROTECTION

- A. Protect material and take precautions to prevent other trades from damaging roof materials during and after installation.

END OF SECTION

SECTION 07 54 23
THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. Furnish and install thermoplastic polyolefin (TPO) roofing products and accessories in accordance with the Contract Documents, including, but not limited to, the following:

1. Fully Adhered TPO Membrane Roofing System
2. Cover Board
3. Tapered Roof Insulation
4. Vapor Retarder

1.02 RELATED SECTIONS

1.03 SECTION 01 33 00 (SUBMITTAL PROCEDURES) DEFINITIONS

- A. TPO: Thermoplastic polyolefin.
- B. Roofing Terminology: See ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

1.04 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and base flashings shall remain watertight.
1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
 2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.
- C. Roofing System Design:

1. Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7.
 - a. Corner Uplift Pressure: 106 lb./sq. ft.
 - b. Perimeter Uplift Pressure: 78 lb./sq. ft.
 - c. Field-of-Roof Uplift Pressure: 59 lb./sq. ft.
 2. Also provide membrane roofing system that the warranty maximum wind speed coverage shall be peak gust of 115 mph measured at 10 meters above ground level.
- D. Energy Performance: Provide roofing system with initial Solar Reflectance Index not less than 78 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.

1.05 SUBMITTALS

- A. Provide in accordance with Section 01 33 00 (Submittal Procedures) and as supplemented herein. Submittals shall include, but not be limited to, the following:
1. Shop Drawings: Supplementing other requirements, also include the following:
 - a. Product Data: For each type of product indicated.
 - b. Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.
 - 1) Base flashings and membrane terminations.
 - 2) Tapered insulation, including slopes.
 - 3) Roof plan showing orientation of steel roof deck and orientation of membrane roofing and fastening spacings and patterns for mechanically fastened membrane roofing.
 - 4) Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
 - c. Qualification Data: For qualified Installer and manufacturer.
 - d. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - 1) Submit evidence of compliance with performance requirements.
 - e. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of membrane roofing system.
 - f. Research/Evaluation Reports: For components of membrane roofing system, from the ICC-ES.
 2. Field quality-control reports.
 3. Operations and maintenance manuals.
 4. Warranty.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is UL listed for membrane roofing system identical to that used for this Project. Manufacturer to provide inspections 3x per week and include a detailed report.
- B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by membrane roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty. Installer to have at least 5 years experience in installing specified system.
- C. Roofing Inspector Qualifications: A full-time technical representative with a minimum 5 years' experience in commercial roofing of the manufacturer experienced in the installation and maintenance of the specified roofing system and qualified to perform roofing observation 3 days a week while work is being performed. Technical representative shall determine the CONTRACTOR's compliance with the requirements of this Project.
 - 1. If manufacturer does not employ full-time technical personnel, inspection personnel shall be certified as a Registered Roof Observer by the Roof Consultants Institute and shall be experienced in the installation and maintenance of the specified roofing system and qualified to determine Installer's compliance with the requirements of this Project.
- D. Provide installer's field supervision. CONTRACTOR shall maintain full-time supervisor/foreman on job-site during times that roofing work is in progress. Supervisor must have a minimum of 5 years' experience in roofing work similar to nature and scope of specified roofing.
- E. Source Limitations: Obtain components including vapor retarder, roof insulation, roof board, adhesives, sealants, metal flashings for membrane roofing system from same manufacturer as membrane roofing.
- F. Exterior Fire-Test Exposure: ASTM E 108, Class A; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.

1.07 WARRANTIES AND SPECIAL GUARANTEES

- A. The Supplier shall provide the following warranties and special guarantees in accordance with Section 01 33 00 (Submittal Procedures).
 - 1. Warranty: Manufacturer's standard or customized form, without monetary limitation, in which manufacturer agrees to repair or replace components (both labor and material) of membrane roofing system that fail in materials or workmanship within specified warranty period.

- a. Warranty includes membrane roofing, base flashings, roof insulation, fasteners, cover boards, roofing accessories, metal flashings and other components of membrane roofing system.
 - b. The maximum wind speed coverage shall be peak gust of 115 mph measured at 10 meters above ground level.
 - c. Warranty Period: 30 years from date of Substantial Completion.
2. Manufacturer to perform annual inspections.

PART 2 PRODUCTS

2.01 TPO MEMBRANE ROOFING

- A. Fabric-Reinforced Thermoplastic Polyolefin Sheet: ASTM D 6878, internally fabric or scrim reinforced, uniform, flexible TPO sheet.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Carlisle SynTec Incorporated (Basis of Design)
 - b. Tremco
 - c. GAF
 - d. Johns Manfield
 - 2. Thickness: 80 mils, nominal
 - 3. Exposed Face Color: White

2.02 AUXILIARY MEMBRANE ROOFING MATERIALS

- A. General: Auxiliary membrane roofing materials recommended by roofing system manufacturer for intended use, and compatible with membrane roofing.
- 1. Liquid-type auxiliary materials shall comply with Virginia's VOC limits.
- B. Sheet Flashing: Use manufacturer's 60 mil reinforced thermoplastic polyolefin sheet for flashing and limit the use of the manufacturer's standard unreinforced thermoplastic polyolefin sheet flashing. Use color that is the same color as sheet membrane.
- C. Drain Flashing :Manufacturer's non-reinforced white non-fleece-backed, 60 mil TPO membrane for use at drains.
- D. Bonding Adhesive: Manufacturer's standard VOC-compliant water-based bonding adhesive for use at fleece backed membrane. Manufacturer's standard VOC compliant bonding adhesive for use at flashing locations. Retain first paragraph below if slip sheets are required. See roofing system manufacturer's specifications for requirements.

- E. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.
- F. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
- G. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.03 VAPOR RETARDER

- A. Self Adhering Vapor Retarder: A 40 mil thick composite consisting of 32 mil self adhering rubberized asphalt membrane laminated to an 8 mil sun bonded polyester fabric which has a permeability rating (ASTM E-96) of 0.05 perms and is fully compatible with urethane based insulation adhesive.
- B. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into roofing systems.
- C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Carlisle SynTec Incorporated. (725 TR Self Adhering Air and Vapor Barrier 7 CCW 702 Primer)
 - 2. Temco. (Provide equivalent product)
 - 3. GAF. (Provide equivalent product)
 - 4. Johns Manfield. (Provide equivalent product)

2.04 ROOF INSULATION

- A. General: Preformed roof insulation boards manufactured by TPO membrane roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated on drawings.
- B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class I, Grade 3, felt or glass-fiber mat facer on both major surfaces.
- C. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches.
- D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.
- E. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Carlisle SynTec Incorporated. (HP-H Polyisocyanurate Insulation)
2. Tremco. (Provide equivalent product)
3. GAF. (Provide equivalent product)
4. Johns Manfield. (Provide equivalent product)

2.05 INSULATION ACCESSORIES

- A. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with membrane roofing.
- B. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:
 1. Full-spread, spray applied, low-rise, two-component urethane adhesive.

2.06 COVER BOARD

- A. Cover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/4 inch thick.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Georgia-Pacific Corporation; Dens Deck.
 - b. USG; Securock Glass Mat Roof Board.
 - c. Johns Manville; InvinSA FR Roof Board.
 - d. or equal product acceptable to the roof membrane manufacturer.

PART 3 EXECUTION

3.01 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
 1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

- D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

3.02 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

3.03 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
 - 1. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
 - 2. Verify that materials that will impair adhesion of roofing components to roof deck have been removed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.04 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.05 VAPOR-RETARDER INSTALLATION

- A. Clean concrete substrate in accordance with manufacturer's recommendations in preparation for vapor retarder.
- B. Install self-adhering vapor retarder in accordance with manufacturer's published instructions.

3.06 INSULATION INSTALLATION

- A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with membrane roofing system and insulation manufacturer's written instructions for installing roof insulation.
- C. Install tapered insulation under area of roofing to conform to slopes indicated.
- D. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.
- E. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.
 - 1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
- F. Adhere all layers of insulation to vapor retarder and subsequent insulation layers according to SPRI's Directory of Roof Assemblies listed roof assembly requirements for specified Wind Uplift Load Capacity and FM Global Property Loss Prevention Data Sheet 1-29, as follows:
 - 1. Set Insulation in uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
 - a. Adhere insulation to resist uplift pressure at corners, perimeter, and field of roof and to meet 30 year warranty requirements.

3.07 COVERBOARD INSTALLATION

- A. Install cover boards over insulation. Loosely butt cover boards together.
- B. Adhere coverboard to substrate using adhesive according to SPRI's Directory of Roof Assemblies listed roof assembly requirements for specified Wind Uplift Load Capacity and FM Global Property Loss Prevention Data Sheet 1-29, as follows:
 - 1. Set cover board in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
 - a. Adhere cover boards to resist uplift pressure at corners, perimeter, and field of roof and to meet 30 year warranty requirements.

3.08 ADHERED MEMBRANE ROOFING INSTALLATION

- A. Adhere membrane roofing over area to receive roofing and install according to membrane roofing system manufacturer's written instructions.
- B. Start installation of membrane roofing in presence of membrane roofing system manufacturer's technical personnel.
- C. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- D. Bonding Adhesive: Apply to substrate and underside of membrane roofing at rate required by manufacturer and allow to partially dry before installing membrane roofing. Do not apply to splice area of membrane roofing.
- E. In addition to adhering, mechanically fasten membrane roofing securely at terminations, penetrations, and perimeter of roofing.
- F. Apply membrane roofing with side laps shingled with slope of roof deck where possible.
- G. Seams: Clean seam areas, overlap membrane roofing, and hot-air weld side and end laps of membrane roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.
 - 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.
 - 2. Verify field strength of seams a minimum of twice daily; repair seam sample areas.
 - 3. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.
- H. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

3.09 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.

- E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.10 FIELD QUALITY CONTROL

- A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
- B. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.
- C. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.11 PROTECTING AND CLEANING

- A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Engineer and Owner.
- B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements; repair substrates; and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 07 62 00
SHEET METAL FLASHING AND METAL WALL PANELS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Formed low-slope roof sheet metal fabrications.
 - 2. Formed equipment support flashing.
 - 3. Metal wall panels, Perforated
 - 4. Shop-fabricated ferrous and non-ferrous metal including miscellaneous framing, custom fabrications, bearing plates, anchor bolts, etc.
- B. Related Requirements:
 - 1. Section 07 92 00 (Joint Sealants)

1.03 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.04 SUBMITTALS

- A. Product Data: For each of the following:
 - 1. Underlayment materials.
 - 2. Elastomeric sealant.
 - 3. Butyl sealant.
 - 4. Epoxy seam sealer.
 - 5. Secondary metal framing
- B. Shop Drawings: For sheet metal flashing and trim:
 - 1. Include plans, elevations, sections, and attachment details.

2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
 3. Include identification of material, thickness, weight, and finish for each item and location in Project.
 4. Include details for forming, including profiles, shapes, seams, and dimensions.
 5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
 6. Include details of termination points and assemblies.
 7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
 8. Include details of roof-penetration flashing.
 9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, flashings, and counterflashings.
 10. Include details of special conditions.
 11. Include details of connections to adjoining work.
 12. Detail formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches.
- C. Samples: For each exposed product and for each color and texture specified, 12 inches long by actual width.
- D. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.
- E. Samples for Verification: For each type of exposed finish:
1. Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
 2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.
 3. Unit-Type Accessories and Miscellaneous Materials: Full-size Sample.
 4. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.

1.05 SUBMITTALS

- A. Metal wall panels, Shop Drawings: Provide shop drawings and include full elevations showing openings and penetrations. Include details of each condition of installation including secondary support steel and attachment. Provide details at required trim and extrusions needed for a complete installation.
1. Indicate points of supporting structure that must coordinate with metal wall panel assembly installation.

2. Note locations where separation of dissimilar materials is required and indicate method to be used.
 3. Indicate adjacent material types and methods to be used to prevent staining effect on metal wall panels caused by water runoff.
- B. Miscellaneous steel Fabrications: Shop Drawings:
1. Indicate detailed fabrication drawings with profiles, sizes, connections, attachments, reinforcing, anchorage, size and type of welds, holes, fasteners, and accessories.
 2. Secondary support steel for metal wall panels and their connections to existing building shall not be performed without written approval by the Engineer. All proposed changes shall be designed and validated by a licensed Engineer (Commonwealth of Virginia) hired and paid by the Contractor.
- C. Samples for Initial Selection and verification: For each product specified. Provide representative color charts, finishes of manufacturer's full range of colors.

1.06 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Product Certificates: For each type of coping and roof edge flashing that is ANSI/SPRI/FM 4435/ES-1 tested.
- C. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- D. Evaluation Reports: For copings and roof edge flashing, from ICC-ES showing compliance with ANSI/SPRI/FM 4435/ES-1.
- E. Sample Warranty: For special warranty.

1.07 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.
- B. Special warranty.

1.08 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1. For copings and roof edge flashings that are ANSI/SPRI/FM 4435/ES-1 tested, shop shall be listed as able to fabricate required details as tested and approved.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
 1. Build mockup of typical roof edge, including fascia, fascia trim and apron flashing, approximately 10 feet long, including supporting construction cleats, seams, attachments, underlayment, and accessories.
 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations in writing.
 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.
 1. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
 2. Protect stored sheet metal flashing and trim from contact with water.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.10 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta units when tested in accordance with ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Finish Warranty Period: 30 years from date of Substantial Completion.

- B. Special Manufacturer's Warranty on metal wall panels: On manufacturer's standard form, in which manufacturer agrees to repair or replace components of metal wall panel assemblies that fail in materials and workmanship within five years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet metal flashing shall not obstruct moisture from exiting the wall cavity within the masonry.
- C. Contractor shall ensure sheet metal flashing complies with the roofing manufacturer specifications and is covered under the roof manufacturer's warranty.
- D. Sheet Metal Standard for Flashing and Trim: Comply with SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- E. Sheet Metal Standard for Copper: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.
- F. SPRI Wind Design Standard: Manufacture and install roof edge flashings tested in accordance with ANSI/SPRI/FM 4435/ES-1 and capable of resisting the following design pressure:
 - 1. Design Pressures:
 - a. Zone 1 (Roof Area Field): 59 lbf/sq. ft.
 - b. Zone 2 (Roof Area Perimeter): 78 lbf/sq. ft.
 - c. Zone 3 (Roof Area Corners): 106 lbf/sq. ft.
- G. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.02 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Aluminum Sheet: ASTM B209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
 - 1. Exposed Coil-Coated Finish:
 - a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 2. Color: As selected by Engineer from manufacturer's full range.
 - 3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.
- C. Stainless Steel Sheet: ASTM A240/A240M, Type 304, dead soft, fully annealed; with smooth, flat surface.
 - 1. Finish: ASTM A480/A480M, No. 2D (dull, cold rolled).
 - a. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
 - b. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - 1) Run grain of directional finishes with long dimension of each piece.
 - 2) When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

2.03 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
 - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

- a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: High-strength aluminum or stainless steel rivets suitable for metal being fastened.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
- 2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
- 3. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.
- C. Solder:
 - 1. For Stainless Steel: ASTM B32, Grade Sn60, with acid flux of type recommended by stainless steel sheet manufacturer.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- E. Elastomeric Sealant: ASTM C920, elastomeric polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- H. Asphalt Roofing Cement: ASTM D4586, asbestos free, of consistency required for application.

2.04 FABRICATION, GENERAL

- A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.
 - 1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
 - 2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.

3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
4. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances:

1. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
2. Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified.

C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.

E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard and by FM Global Property Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

G. Seams:

1. Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
2. Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
3. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

H. Do not use graphite pencils to mark metal surfaces.

2.05 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof Edge Flashing (Gravel Stop) and Fascia Cap: Fabricate in minimum 96-inch-long, but not exceeding 12-foot-long sections. Furnish with 6-inch-wide, joint cover plates. Shop fabricate interior and exterior corners.
 - 1. Joint Style: Overlapped, 4 inches wide.
 - 2. Fabricate from the following materials:
 - a. Aluminum: 0.050 inch thick.
 - b. Stainless Steel: 0.019 inch thick.
- B. Base Flashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
 - 1. Stainless Steel: 0.019 inch thick.
- C. Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
 - 1. Stainless Steel: 0.019 inch thick.
- D. Roof-Penetration Flashing: Fabricate from the following materials:
 - 1. Stainless Steel: 0.019 inch thick.
- E. Roof-Drain Flashing: Fabricate from the following materials:
 - 1. Stainless Steel: 0.016 inch thick.

2.06 MISCELLANEOUS SHEET METAL FABRICATIONS

- A. Equipment Support Flashing: Fabricate from the following materials:
 - 1. Stainless Steel: 0.019 inch thick.

2.07 PERFORATED METAL WALL PANELS

- A. Factory-formed, Aluminum, exposed fastener panels with interconnecting side joints, fastened to supports with exposed fasteners
- B. Panel Profile: Ribbed profile with lap joint
 - 1. Panel coverage: 36 inches minimum
 - 2. Panel Depth: 1-5/8 inches minimum, 3 inches maximum
 - 3. Perforations, 6 mm, maximum
- C. MANUFACTURERS
 - 1. Construction Specialties

2. Centria
3. Or equal.

D. Basis of Design: Centria, EcoScreen: MR3-36, Horizontal Profile

2.08 PERFORATED METAL WALL PANELS ACCESSORIES

- A. Provide complete metal wall panel assembly incorporating trim, copings, fascia, caps, sills, inside and outside corners, and miscellaneous flashings. Fabricate accessories in accordance with SMACNA Manual.
- B. Secondary metal framing: Framing components, Cold-formed metallic-coated steel sheet, ASTM A 653/A 653M

2.09 PERFORATED METAL WALL PANELS FINISHES

- A. Fluoropolymer Two-Coat Mica System: 0.20-mil nominal primer with 0.8-mil nominal 70 percent PVDF fluoropolymer color coat providing a pearlescent appearance.
- B. Color: Exterior surface: As selected by Engineer from manufacturer's standard colors. Interior Surface: Same as Exterior.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
 1. Verify compliance with requirements for installation tolerances of substrates.
 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION OF UNDERLAYMENT

- A. Install slip sheet, wrinkle free, directly on substrate before installing sheet metal flashing and trim.

3.03 INSTALLATION, GENERAL

- A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.
 - 1. Install fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder.
 - 3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
 - 5. Install continuous cleats with fasteners spaced not more than 12 inches o.c.
 - 6. Space individual cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 - 7. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
 - 8. Do not field cut sheet metal flashing and trim by torch.
 - 9. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
 - 1. Coat concealed side of uncoated-aluminum and stainless steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.
 - 1. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
 - 2. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
 - 3. Use lapped expansion joints only as indicated on Drawings.
- D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.
 - 1. Use sealant-filled joints unless otherwise indicated.
 - a. Embed hooked flanges of joint members not less than 1 inch into sealant.
 - b. Form joints to completely conceal sealant.
 - c. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way.
 - d. Adjust setting proportionately for installation at higher ambient temperatures.
 - 1) Do not install sealant-type joints at temperatures below 40 deg F.
 - 2. Prepare joints and apply sealants to comply with requirements in Section 07 92 00 (Joint Sealants).
- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter.
 - 1. Pretin edges of sheets with solder to width of 1-1/2 inches; however, reduce pretinning where pretinned surface would show in completed Work.
 - 2. Do not solder metallic-coated steel and aluminum sheet.
 - 3. Do not pretin zinc-tin alloy-coated copper.
 - 4. Do not use torches for soldering.
 - 5. Heat surfaces to receive solder, and flow solder into joint.
 - a. Fill joint completely.
 - b. Completely remove flux and spatter from exposed surfaces.
 - 6. Stainless Steel Soldering:
 - a. Tin edges of uncoated sheets, using solder for stainless steel and acid flux.
 - b. Promptly remove acid-flux residue from metal after tinning and soldering.
 - c. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
 - 7. Copper Soldering: Tin edges of uncoated sheets, using solder for copper.
 - 8. Copper-Clad Stainless Steel Soldering: Tin edges of uncoated sheets, using solder for copper-clad stainless steel.
- H. Rivets: Rivet joints in where necessary for strength.

3.04 INSTALLATION OF ROOF FLASHINGS

- A. Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard.
 - 1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.
 - 2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Roof Edge Flashing:
 - 1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.
 - 2. Anchor to resist uplift and outward forces in accordance with recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch centers.
 - 3. Anchor to resist uplift and outward forces in accordance with recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for FM Approvals' listing for required windstorm classification.
- C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless steel draw band and tighten.
- D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing.
 - 1. Insert counterflashing in reglets or receivers and fit tightly to base flashing.
 - 2. Extend counterflashing 4 inches over base flashing.
 - 3. Lap counterflashing joints minimum of 4 inches.
 - 4. Secure in waterproof manner by means of snap-in installation and sealant or lead wedges and sealant unless otherwise indicated.
- E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.05 INSTALLATION OF WALL FLASHINGS

- A. Install sheet metal wall flashing to intercept and exclude penetrating moisture in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

- B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.

3.06 INSTALLATION OF MISCELLANEOUS FLASHING

- A. Equipment Support Flashing:
 - 1. Coordinate installation of equipment support flashing with installation of roofing and equipment.
 - 2. Weld or seal flashing with elastomeric sealant to equipment support member.

3.07 INSTALLATION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.08 CLEANING

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.

3.09 PROTECTION

- A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended in writing by sheet metal flashing and trim manufacturer.
- C. Maintain sheet metal flashing and trim in clean condition during construction.
- D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Engineer.

END OF SECTION

SECTION 07 92 00 JOINT SEALANTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Extent of each form and type of joint sealer is indicated on drawings and schedules.
- B. This Section includes joint sealers for the following locations:
 - 1. Exterior joints in vertical surfaces and nontraffic horizontal surfaces as indicated below.
 - a. Flashing, coping, fascia, and other roofing accessory terminations.
 - b. Other joints as indicated.

1.03 SYSTEM PERFORMANCES

- A. Provide joint sealers that have been produced and installed to establish and maintain watertight and airtight continuous seals.

1.04 SUBMITTALS

- A. Product Data from manufacturers for each joint sealer product required, including instructions for joint preparation and joint sealer application.
- B. Samples for Initial Selection Purposes: Manufacturer's standard bead samples consisting of strips of actual products showing full range of colors available, for each product exposed to view.

1.05 QUALITY ASSURANCE

- A. Single Source Responsibility for Joint Sealer Materials: Obtain joint sealer materials from a single manufacturer for each different product required.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.

- B. Store and handle materials in compliance with manufacturers' recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.07 PROJECT CONDITIONS

- A. Environmental Conditions: Do not proceed with installation of joint sealers under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealer manufacturers.
- B. Joint Width Conditions: Do not proceed with installation of joint sealers where joint widths are less than allowed by joint sealer manufacturer for application indicated.
- C. Joint Substrate Conditions: Do not proceed with installation of joint sealers until contaminants capable of interfering with their adhesion are removed from joint substrates.

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealers, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- B. Colors: Provide color of exposed joint sealers indicated or, if not otherwise indicated, as selected by Engineer from manufacturer's standard colors.

2.02 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated which complies with ASTM C 920 requirements, including those referenced for Type, Grade, Class, and Uses.
- B. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT and M.
- C. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:
 - 1. Single-Component, Nonsag, Urethane Sealant for Use NT:
 - a. "Dynatrol I-XL"; Pecora Corp.

- b. "Sikaflex-1a"; Sika Corp.
- c. "Dymonic"; Tremco Inc.
- d. Or equal.

2.03 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material and type, which are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonwaxing, nonextruding strips of flexible, nongassing plastic foam of material indicated below; nonabsorbent to water and gas; and of size, shape and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
 - 1. Either open-cell polyurethane foam or closed-cell polyethylene foam, unless otherwise indicated, subject to approval of sealant manufacturer, for cold-applied sealants only.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.04 MISCELLANEOUS MATERIALS

- A. Primer: Provide type recommended by joint sealer manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealer-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Provide nonstaining, chemical cleaners of type, which are acceptable to manufacturers of sealants and sealant backing materials, which are not harmful to substrates and adjacent nonporous materials, and which do not leave oily residues or otherwise have a detrimental effect on sealant adhesion or in-service performance.
- C. Masking Tape: Provide nonstaining, nonabsorbent type compatible with joint sealants and to surfaces adjacent to joints.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine joints indicated to receive joint sealers, with Installer present, for compliance with requirements for joint configuration, installation tolerances

and other conditions affecting joint sealer performance. Do not proceed with installation of joint sealers until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealers to comply with recommendations of joint sealer manufacturers and the following requirements:
 - 1. Remove all foreign material from joint substrates, which could interfere with adhesion of joint sealer, including dust; paints, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer; old joint sealers; oil; grease; waterproofing; water repellants; water; surface dirt; and frost.
 - 2. Clean concrete, masonry, unglazed surfaces of ceramic tile and similar porous joint substrate surfaces, by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealers. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
 - 3. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile; and other nonporous surfaces by chemical cleaners or other means which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealers.
- B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealer manufacturer based on preconstruction joint sealer-substrate tests or prior experience. Apply primer to comply with joint sealer manufacturer's recommendations. Confine primers to areas of joint sealer bond; do not allow spillage or migration onto adjoining surfaces.

3.03 INSTALLATION OF JOINT SEALERS

- A. General: Comply with joint sealer manufacturers' printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
- B. Elastomeric Sealant Installation Standard: Comply with recommendations of ASTM C 962 for use of joint sealants as applicable to materials, applications and conditions indicated.
- C. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability.

- D. Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
 - 1. Provide concave joint configuration per Figure 6A in ASTM C 962, unless otherwise indicated.

3.04 CLEANING

- A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.

3.05 PROTECTION

- A. Protect joint sealers during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealers immediately and reseal joints with new materials to produce joint sealer installations with repaired areas indistinguishable from original work.

3.06 JOINT SEALER SCHEDULE

- A. Description of joint construction and location where joint sealer is typically applied.
 - 1. Nonsag Urethane Sealant: Exterior joints between masonry and metal; and all other exterior joints not indicated otherwise.

END OF SECTION

**THIS PAGE
LEFT BLANK**

SECTION 08 62 00
SKYLIGHTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manufactured unit skylights to replace existing skylights.
- B. Curb-mount configuration with thermal break aluminum frames with triple plastic dome as needed to meet performance requirements.
 - 1. Skylights are to be mounted to rebuilt existing curbs. Raise curbs, if necessary, to meet building code.

1.02 REFERENCES

- A. References cited in Article 1.03 are to be the edition cited in the building or energy code in effect at project location.

Fenestration & Glazing Industry Alliance (FGIA). Formerly: American Architectural Manufacturers Association (AAMA)	
AAMA/WDMA/C SA 101/I.S.2/A440	NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Unit Skylights
AAMA 1503-09	Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors, and Glazed Wall Sections
AAMA 2605	Voluntary Specifications, Performance Requirements and Test Procedures for Superior Organic Coatings on Aluminum Extrusions & Panels
ASTM International	
ASTM E283	Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen
Consumer Product Safety Commission (CSPC)	
16 CFR Part 1201	Safety Standard for Architectural Glazing Material
New York State (NYS)	
2020 BCNYS	2020 Building Code of New York State
2020 ECCCNY	2020 Energy Conservation Construction Code of New York State
National Fenestration Rating Council, Inc. (NFRC) Publications	
NFRC 100	Procedure for Determining Fenestration Products U-factors
NFRC 200	Procedure for Determining Fenestration Product Solar Heat Gain Coefficients and Visible Transmittance at Normal Incidence

NFRC 400	Procedure for Determining Fenestration Product Air Leakage
United States Department of Labor Occupational Safety and Health Administration (OSHA)	
1910.28(b)(3)(i)	Holes, fall protection, including skylights

1.03 PERFORMANCE REQUIREMENTS

- A. Performance values to be calculated or certified in accordance with applicable NFRC standard.
 - 1. U-value not to exceed 0.50.
 - 2. Solar Heat Gain Coefficient (SHGC) not to exceed 0.40.
 - 3. Air leakage not to exceed 0.20 cfm/ft².
- B. Fall protection barrier to meet the requirements of OSHA 1910.28(b)(3)(i).

1.04 SUBMITTALS

- A. Submit product data for proposed skylight unit. Include details of construction and performance data:
 - 1. Materials and geometry of frame components including aluminum extrusions, thermal breaks, gasketing and fasteners.
 - 2. Shop drawings including dimensions.
 - 3. Dome materials and configuration.
 - 4. Performance data for the assembled skylight system demonstrating compliance with the requirements of 1.04.A. of this Section.
 - 5. Materials, geometry, and method of attachment of the proposed fall protection barrier.
- B. Submit sample copies of all manufacturers' standard warranties.

1.05 COORDINATION

- A. Coordinate with frame suppliers. Window suppliers to ensure compatibility and performance of glazing with overall window assemblies.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Do not install glazing when ambient temperature is less than 40 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.07 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings and instructed by the manufacturer. Start of work implies acceptance of substrates.

PART 2 PRODUCTS

2.01 UNIT SKYLIGHTS

- A. EcoSky3 CLC3 by Wasco Skylights (part of the Velux Group, Wells, ME)
 - 1. Curb mount configuration.
 - 2. Thermal break frame with extruded aluminum and PVC components.
 - 3. Triple dome glazing: SatinSky2/Clear/Clear.
 - 4. Curved dome, square plan: standard size nearest to 48-inch x 48-inch inside curb dimension.
 - 5. Frame finish: 70% PVDF meeting AAMA 2605.
 - a. Submit chart of standard colors for selecting by Engineer and approval by Owner.
- B. Equal product meeting all code and performance requirements.

2.02 FALL PROTECTION BARRIER

- A. Type 304 stainless steel welded wire fabric.
 - 1. 4-inch by 4-inch square wire grid layout.
 - 2. 0.25" wire diameter.
 - 3. McNichols Item 3804260041 or equal.
- B. Formed to a barrel vault configuration, arching over the top of the skylight without touching the dome glazing, and secured to two opposite sides of the skylight frame without compromising the weathertightness of the frame.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that curbs are secured, square, and plumb with level top surfaces.
- B. Verify that curb dimensions are within acceptable tolerances to receive skylights.

3.02 INSTALLATION

- A. Install skylights in conformance with manufacturer's instructions and applicable industry standards.
- B. Install fall protection barriers in a manner acceptable to skylight manufacturer.

3.03 GLAZING

- A. Install products using the recommendations of manufacturers for glass, sealants, gaskets, and other glazing materials except where more stringent requirements are indicated, including those in FGMA Glazing Manual.
- B. Protect glass from edge damage during handling and installation.
- C. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter
- D. Remove and replace glass that is broken, chipped, cracked or damaged in any way.

3.04 INSTALLATION

- A. Factory installation of glass materials is acceptable for Sliding Concession Windows.
- B. Field installation of glass materials is to be in strict accordance with glass material and frame manufacturers' recommendations.

3.05 PROTECTION OF FINISHED WORK

- A. Protect work from damage from construction activities.

END OF SECTION

SECTION 23 05 29
HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01. RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02. SUMMARY

- A. Section Includes:
 - 1. Metal pipe hangers and supports.
 - 2. Thermal-hanger shield inserts.
 - 3. Fastener systems.

1.03. DEFINITIONS

- A. MSS: Manufacturers Standardization Society of the Valve and Fittings Industry Inc.

1.04. ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.05. QUALITY ASSURANCE

- A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 PRODUCTS

2.01. METAL PIPE HANGERS AND SUPPORTS

- A. Pipe Hangers and Supports:
 - 1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
 - 2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
 - 3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
 - 4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.

5. Hanger Rods: Continuous-thread rod, nuts, and washer made of galvanized carbon steel.

2.02. THERMAL-HANGER SHIELD INSERTS

- A. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength and vapor barrier.
- B. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig, ASTM C 552, Type II cellular glass with 100-psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength.
- C. For Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- E. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.03. FASTENER SYSTEMS

- A. Powder-Actuated Fasteners: Not allowed.
- B. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated or stainless- steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.04. MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.
- B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
 1. Properties: Nonstaining, noncorrosive, and nongaseous.
 2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 EXECUTION

3.01. HANGER AND SUPPORT INSTALLATION

- A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

- B. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- C. Fastener System Installation:
 - 1. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- D. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- E. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- F. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- G. Install lateral bracing with pipe hangers and supports to prevent swaying.
- H. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- I. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- J. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
- K. Insulated Piping:
 - 1. Attach clamps and spacers to piping.
 - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
 - 2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

- a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
- 3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
- 4. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
- 5. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.02. ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.03. PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.04. HANGER AND SUPPORT SCHEDULE

- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use galvanized carbon-steel pipe hangers and supports and attachments for general service applications.

- F. Use copper-plated pipe hangers and attachments for copper piping and tubing.
- G. Use padded hangers for piping that is subject to scratching.
- H. Use thermal-hanger shield inserts for insulated piping and tubing.
- I. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
 - 2. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
 - 3. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
 - 4. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
 - 5. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
 - 6. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur.
 - 7. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction might occur.
 - 8. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.
- J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
 - 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.
- K. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
 - 2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
 - 3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
 - 4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.

5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.
- L. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
 2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
 3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
 4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
 5. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
 6. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
 7. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
- M. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
 2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
 3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

END OF SECTION

SECTION 23 05 53
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01. RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02. SUMMARY

- A. Section Includes:
 - 1. Equipment labels.
 - 2. Warning signs and labels.
 - 3. Pipe labels.
 - 4. Duct labels.
 - 5. Valve tags.
 - 6. Warning tags.

1.03. ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For color, letter style, and graphic representation required for each identification material and device.
- C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.
- D. Valve numbering scheme.
- E. Valve Schedules: For each piping system to include in maintenance manuals.

PART 2 PRODUCTS

2.01. EQUIPMENT LABELS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Brady Corporation.
 - 2. Kolbi Pipe Marker Co.
 - 3. Lem Products.
 - 4. Seton Identification Products.

B. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch 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 deg F.
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
7. Fasteners: Stainless-steel self-tapping screws.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.

D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number, and identify Drawing numbers where equipment is indicated (plans, details, and schedules) and the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.02. WARNING SIGNS AND LABELS

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
- B. Letter Color: White.
- C. Background Color: Red.
- D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.

- G. Fasteners: Stainless-steel self-tapping screws.
- H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- I. Label Content: Include caution and warning information plus emergency notification instructions.

2.03. PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction according to ASME A13.1.
- B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
- C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; also include pipe size and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
 - 2. Lettering Size: At least 1/2 inch for viewing distances up to 72 inches and proportionately larger lettering for greater viewing distances].

2.04. DUCT LABELS

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
- B. Letter Color: White.
- C. Background Color: Black.
- D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.

- G. Fasteners: Stainless-steel self-tapping screws.
- H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- I. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings; also include duct size and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions or as separate unit on each duct label to indicate flow direction.

2.05. VALVE TAGS

- A. Description: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.
 - 1. Tag Material: Brass, 0.032-inch stainless steel, 0.025-inch aluminum, 0.032-inch or anodized aluminum, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
 - 2. Fasteners: Brass wire-link chain or beaded chain.
- B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
 - 1. Valve-tag schedule shall be included in operation and maintenance data.

2.06. WARNING TAGS

- A. Description: Preprinted or partially preprinted accident-prevention tags of plasticized card stock with matte finish suitable for writing.
 - 1. Size: 3 by 5-1/4 inches minimum.
 - 2. Fasteners: Brass grommet and wire.
 - 3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
 - 4. Color: Safety-yellow background with black lettering.

PART 3 EXECUTION

3.01. PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.02. GENERAL INSTALLATION REQUIREMENTS

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

3.03. EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

3.04. PIPE LABEL INSTALLATION

- A. Pipe Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
 - 1. Near each valve and control device.
 - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 - 3. Near penetrations and on both sides of through walls, floors, ceilings, and inaccessible enclosures.
 - 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 - 5. Near major equipment items and other points of origination and termination.
 - 6. On piping above removable acoustical ceilings. Omit intermediately spaced labels.
- B. Directional Flow Arrows: Arrows shall be used to indicate direction of flow in pipes, including pipes where flow is allowed in both directions.
- C. Pipe Label Color Schedule:
 - 1. Match colors with existing

3.05. DUCT LABEL INSTALLATION

- A. Install duct labels with permanent adhesive on air ducts in the following color codes:
 - 1. Match colors with existing
- B. Locate labels near points where ducts enter into and exit from concealed spaces and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system.

3.06. VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, shutoff valves, faucets, convenience and lawn-watering hose connections, and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
 - 1. Valve-Tag Size and Shape: 1-1/2 inch round.

3.07. WARNING-TAG INSTALLATION

- A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION

SECTION 23 05 93
TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01. RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

1.02. SUMMARY

- A. Section Includes:
 - 1. Balancing Air Systems:
 - a. Constant-volume air systems.
 - 2. Testing, Adjusting, and Balancing Equipment:
 - a. Motors.
 - b. Condensing units.
 - 3. Testing, adjusting, and balancing existing systems and equipment.
 - 4. Control system verification.

1.03. DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. BAS: Building automation systems.
- C. NEBB: National Environmental Balancing Bureau.
- D. TAB: Testing, adjusting, and balancing.
- E. TABB: Testing, Adjusting, and Balancing Bureau.
- F. TAB Specialist: An independent entity meeting qualifications to perform TAB work.
- G. TDH: Total dynamic head.

1.04. INFORMATIONAL SUBMITTALS

- A. Certified TAB reports.

1.05. QUALITY ASSURANCE

- A. TAB Specialists Qualifications: Certified by AABC, NEBB or TABB.
 - 1. TAB Field Supervisor: Employee of the TAB specialist and certified by AABC, NEBB or TABB.

2. TAB Technician: Employee of the TAB specialist and certified by AABC, NEBB or TABB as a TAB technician.
- B. Instrumentation Type, Quantity, Accuracy, and Calibration: Comply with requirements in ASHRAE 111, Section 4, "Instrumentation."
- C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
- D. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

1.06. FIELD CONDITIONS

- A. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.01. EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.
- B. Examine installed systems for balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.
- E. Examine equipment performance data including fan and pump curves.
 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
 2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems,

use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.

- F. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- G. Examine test reports specified in individual system and equipment Sections.
- H. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, filters are clean, and equipment with functioning controls is ready for operation.
- I. Examine strainers. Verify that startup screens have been replaced by permanent screens with indicated perforations.
- J. Examine control valves for proper installation for their intended function of throttling, diverting, or mixing fluid flows.
- K. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- L. Examine system pumps to ensure absence of entrained air in the suction piping.
- M. Examine operating safety interlocks and controls on HVAC equipment.
- N. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.02. PREPARATION

3.03. GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in ASHRAE 111, NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems, SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
 - 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
 - 2. After testing and balancing, install test ports and duct access doors.
 - 3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish.

- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.04. GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Cross-check the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. For variable-air-volume systems, develop a plan to simulate diversity.
- D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.
- F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- G. Verify that motor starters are equipped with properly sized thermal protection.
- H. Check dampers for proper position to achieve desired airflow path.
- I. Check for airflow blockages.
- J. Check condensate drains for proper connections and functioning.
- K. Check for proper sealing of air-handling-unit components.
- L. Verify that air duct system is sealed as called for.

3.05. 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 total airflow.
 - a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
 - b. Where duct conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.
 - c. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.

- d. If a reliable Pitot-tube traverse or coil traverse is not possible, measure airflow at terminals and calculate the total airflow.
 2. Measure fan static pressures as follows:
 - a. Measure static pressure directly at the fan outlet or through the flexible connection.
 - b. Measure static pressure directly at the fan inlet or through the flexible connection.
 - c. Measure static pressure across each component that makes up the air-handling system.
 - d. Report artificial loading of filters at the time static pressures are measured.
 3. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
 4. Obtain approval from Owner's representative for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
 5. 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 occurs. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows.
 1. Measure airflow of submain and branch ducts.
 2. Adjust submain and branch duct volume dampers for specified airflow.
 3. Re-measure each submain and branch duct after all have been adjusted.
- C. Adjust air inlets and outlets for each space to indicated airflows.
 1. Set airflow patterns of adjustable outlets for proper distribution without drafts.
 2. Measure inlets and outlets airflow.
 3. Adjust each inlet and outlet for specified airflow.
 4. Re-measure each inlet and outlet after they have been adjusted.
- D. Verify final system conditions.
 1. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to design if necessary.
 2. Re-measure and confirm that total airflow is within design.
 3. Re-measure all final fan operating data, rpms, volts, amps, and static profile.
 4. Mark all final settings.
 5. Test system in economizer mode. Verify proper operation and adjust if necessary.
 6. Measure and record all operating data.

7. Record final fan-performance data.

3.06. PROCEDURES FOR TESTING, ADJUSTING, AND BALANCING EXISTING SYSTEMS

- A. Perform a preconstruction inspection of existing duct coils that are associated with the new air handling units to be installed.
 1. Check the condition of coils.
 2. Report on the operating condition of the equipment and the results of the measurements taken. Report deficiencies.
- B. Before performing testing and balancing of existing systems, inspect existing equipment that is to remain and be reused to verify that existing equipment has been cleaned and refurbished. Verify the following:
 1. Coils are clean and fins combed.
 2. Deficiencies noted in the preconstruction report are corrected.
- C. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.
 1. Compare the indicated airflow of the renovated work to the measured fan airflows and determine the new fan speed and the face velocity of filters and coils.
 2. Verify that the indicated airflows of the renovated work result in filter and coil face velocities and fan speeds that are within the acceptable limits defined by equipment manufacturer.
 3. If calculations increase or decrease the airflow rates and water flow rates by more than 5 percent, make equipment adjustments to achieve the calculated rates. If increase or decrease is 5 percent or less, equipment adjustments are not required.
 4. Balance each air outlet.

3.07. CONTROLS VERIFICATION

- A. In conjunction with system balancing, perform the following:
 1. Verify temperature control system is operating within the design limitations.
 2. Confirm that the sequences of operation are in compliance with Contract Documents.
 3. Verify that controllers are calibrated and function as intended.
 4. Verify that controller set points are as indicated.
 5. Verify the operation of lockout or interlock systems.
 6. Verify the operation of valve and damper actuators.
 7. Verify that controlled devices are properly installed and connected to correct controller.

8. Verify that controlled devices travel freely and are in position indicated by controller: open, closed, or modulating.
 9. Verify location and installation of sensors to ensure that they sense only intended temperature, humidity, or pressure.
- B. Reporting: Include a summary of verifications performed, remaining deficiencies, and variations from indicated conditions.

3.08. TOLERANCES

- A. Set HVAC system's airflow rates and water flow rates within the following tolerances:
1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
 2. Air Outlets and Inlets: Plus or minus 10 percent.
 3. Heating-Water Flow Rate: Plus or minus 10 percent.
 4. Cooling-Water Flow Rate: Plus or minus 10 percent.
- B. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.

3.09. FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
 2. Include a list of instruments used for procedures, along with proof of calibration.
 3. Certify validity and accuracy of field data.
- B. Final Report Contents: In addition to certified field-report data, include the following:
1. Fan curves.
 2. Manufacturers' test data.
 3. Field test reports prepared by system and equipment installers.
 4. Other information relative to equipment performance; do not include Shop Drawings and Product Data.
- C. General Report Data: In addition to form titles and entries, include the following data:
1. Title page.
 2. Name and address of the TAB specialist.
 3. Project name.
 4. Project location.
 5. Architect's name and address.

6. Engineer's name and address.
 7. Contractor's name and address.
 8. Report date.
 9. Signature of TAB supervisor who certifies the report.
 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
 11. Summary of contents including the following:
 - a. Indicated versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
 12. Nomenclature sheets for each item of equipment.
 13. Data for terminal units, including manufacturer's name, type, size, and fittings.
 14. Notes to explain why certain final data in the body of reports vary from indicated values.
 15. Test conditions for fans and pump performance forms including the following:
 - a. Settings for outdoor-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Face and bypass damper settings at coils.
 - e. Fan drive settings including settings and percentage of maximum pitch diameter.
 - f. Inlet vane settings for variable-air-volume systems.
 - g. Settings for supply-air, static-pressure controller.
 - h. Other system operating conditions that affect performance.
- D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of outdoor, supply, return, and exhaust airflows.
 2. Water and steam flow rates.
 3. Duct, outlet, and inlet sizes.
 4. Pipe and valve sizes and locations.
 5. Terminal units.
 6. Balancing stations.
 7. Position of balancing devices.
- E. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:
1. Unit Data:
 - a. Unit identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and unit size.
 - e. Manufacturer's serial number.
 - f. Unit arrangement and class.
 - g. Discharge arrangement.

- h. Number, type, and size of filters.
- 2. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
- 3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm.
 - b. Total system static pressure in inches wg .
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg .
 - e. Filter static-pressure differential in inches wg.
 - f. Preheat-coil static-pressure differential in inches wg.
 - g. Cooling-coil static-pressure differential in inches wg.
 - h. Heating-coil static-pressure differential in inches wg.
 - i. Outdoor airflow in cfm.
 - j. Return airflow in cfm.
 - k. Outdoor-air damper position.
 - l. Return-air damper position.
 - m. Vortex damper position.

F. Apparatus-Coil Test Reports:

- 1. Coil Data:
 - a. System identification.
 - b. Location.
 - c. Coil type.
 - d. Number of rows.
 - e. Fin spacing in fins per inch o.c.
 - f. Make and model number.
 - g. Face area in sq. ft.
 - h. Tube size in NPS.
 - i. Tube and fin materials.
 - j. Circuiting arrangement.
- 2. Test Data (Indicated and Actual Values):
 - a. Airflow rate in cfm.
 - b. Average face velocity in fpm.
 - c. Air pressure drop in inches wg.
 - d. Outdoor-air, wet- and dry-bulb temperatures in deg F.
 - e. Return-air, wet- and dry-bulb temperatures in deg F.
 - f. Entering-air, wet- and dry-bulb temperatures in deg F.
 - g. Leaving-air, wet- and dry-bulb temperatures in deg F.
 - h. Water flow rate in gpm.
 - i. Water pressure differential in feet of head or psig.
 - j. Entering-water temperature in deg F.
 - k. Leaving-water temperature in deg F.
 - l. Refrigerant expansion valve and refrigerant types.
 - m. Refrigerant suction pressure in psig.

- n. Refrigerant suction temperature in deg F.
- G. Fan Test Reports: For supply, return, and exhaust fans, include the following:
 - 1. Fan Data:
 - a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and size.
 - e. Manufacturer's serial number.
 - f. Arrangement and class.
 - 2. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - 3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.
 - e. Suction static pressure in inches wg.
- H. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
 - 1. Report Data:
 - a. System and air-handling-unit number.
 - b. Location and zone.
 - c. Traverse air temperature in deg F.
 - d. Duct static pressure in inches wg.
 - e. Duct size in inches.
 - f. Duct area in sq. ft.
 - g. Indicated airflow rate in cfm.
 - h. Indicated velocity in fpm.
 - i. Actual airflow rate in cfm.
 - j. Actual average velocity in fpm.
 - k. Barometric pressure in psig.

3.10. ADDITIONAL TESTS

- A. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION

SECTION 23 07 13 DUCT INSULATION

PART 1 GENERAL

1.01. RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02. SUMMARY

- A. Section includes insulating the following duct services:
 - 1. Indoor, outdoor, concealed and exposed ductwork.

1.03. ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any).

1.04. QUALITY ASSURANCE

- A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 - 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.05. COORDINATION

- A. Coordinate sizes and locations of supports, hangers, and insulation shields.
- B. Coordinate clearance requirements for insulation application. Before preparing ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.
- C. Coordinate insulation selection based on existing adjacent insulation type in portions of ductwork where not the entire length is to be replaced or reinstalled.

PART 2 PRODUCTS

2.01. INSULATION MATERIALS

- A. Comply with requirements in “Exhibit I - Duct Insulation Materials”.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- D. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. ASTM C 1290, with factory applied jacket.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corp.
 - b. Johns Manville.
 - c. Knauf.
 - d. Owens Corning.
- E. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation, factory-applied jacket.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corp.
 - b. Johns Manville.
 - c. Knauf.
 - d. Owens Corning.

2.02. ADHESIVES AND MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

2.03. FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
 - 1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
 - 2. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
 - 3. Vinyl Jacket: White vinyl with a permeance of 1.3 perms when tested according to ASTM E 96/E 96M, Procedure A, and complying with NFPA 90A and NFPA 90B.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
 - 1. Verify that systems to be insulated have been tested and are free of defects.
 - 2. Verify that surfaces to be insulated are clean and dry.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02. PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.03. GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.
- B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Keep insulation materials dry during application and finishing.
- G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- H. Install insulation with least number of joints practical.
- I. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- J. Install insulation with factory-applied jackets as follows:
 - 1. Draw jacket tight and smooth.
 - 2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.

3. Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap.
 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.
- K. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

3.04. INSTALLATION OF MINERAL-FIBER INSULATION

- A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 50 percent coverage of duct and plenum surfaces.
- B. Board Insulation Installation on Ducts and Plenums: Secure with insulation pins.

3.05. DUCT INSULATION SCHEDULE, GENERAL

- A. Plenums and Ducts Requiring Insulation: See Exhibit.
- B. Items Not Insulated:
1. Fibrous-glass ducts.
 2. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
 3. Factory-insulated flexible ducts.
 4. Factory-insulated plenums and casings.
 5. Flexible connectors.
 6. Vibration-control devices.
 7. Factory-insulated access panels and doors.

3.06. EXISTING WORK

- A. Insulate existing ductwork as per same service in Exhibit for new work.
- B. Taper and seal at junction with existing insulation.

EXHIBIT I – DUCT INSULATION MATERIALS (Notes are at end of Exhibit I)			
SERVICE	INSULATION MATERIAL	THICKNESS	REMARKS
Air conditioning supply	Exposed: Rigid mineral fiber	1½"	See Note 2
	Concealed: Flexible mineral fiber blanket	2"	
Air conditioning return	Exposed: Rigid mineral fiber	1½"	See Note 1
	Concealed: Flexible mineral fiber	2"	
Outside air ducts and plenums, connections, and mixing boxes	Exposed: Rigid mineral fiber	2"	Provide neat fit at plenums
	Concealed: Flexible mineral fiber blanket	2"	
Exhaust, relief, or vent ducts and plenums	Exposed: Rigid mineral fiber	1"	Insulate 15' from exterior opening and plenums.
	Concealed: Flexible mineral fiber	1½"	

Notes For Exhibit I:

Note 1: Return air ducts within air-conditioned spaces, or above lay-in ceilings of air conditioned spaces, or in return air plenums are not to be insulated.

Note 2: Air conditioning supply ductwork insulation includes all equipment, plenums and accessories in duct system.

END OF SECTION

**THIS PAGE
LEFT BLANK**

SECTION 23 07 19 HVAC PIPING INSULATION

PART 1 GENERAL

1.01. RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.02. SUMMARY

- A. Section includes insulating the following HVAC piping systems:
 - 1. Condensate drain piping.
 - 2. Heating hot-water piping.
 - 3. Refrigerant suction and hot-gas piping.

1.03. ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory and field applied if any).

1.04. QUALITY ASSURANCE

- A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 - 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.05. COORDINATION

- A. Coordinate sizes and locations of supports, hangers, and insulation shields.
- B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

PART 2 PRODUCTS

2.01. INSULATION MATERIALS

- A. Comply with requirements in Exhibit I Piping Insulation Materials.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- D. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Certainteed Corp.
 - 2. Johns Manville.
 - 3. Armaflex
 - 4. Owens Corning.
- E. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.
- F. Mineral-Fiber, Preformed Pipe Insulation:
 - 1. Type I, 850 deg F (454 deg C) Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied jacket.
 - 2. Type II, 1200 deg F (649 deg C) Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type II, Grade A, with factory-applied jacket.

2.02. ADHESIVES AND MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
 - 1. Verify that systems to be insulated have been tested and are free of defects.
 - 2. Verify that surfaces to be insulated are clean and dry.
 - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02. PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.03. GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 - 1. Install insulation continuously through hangers and around anchor attachments.
 - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
 - 1. Draw jacket tight and smooth.
 - 2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 - 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches o.c.
 - a. For below-ambient services, apply vapor-barrier mastic over staples.
 - 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
 - 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- P. For above-ambient services, do not install insulation to the following:
 - 1. Vibration-control devices.
 - 2. Testing agency labels and stamps.
 - 3. Nameplates and data plates.
 - 4. Manholes.
 - 5. Handholes.
 - 6. Cleanouts.

3.04. GENERAL PIPE INSULATION INSTALLATION

- A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
 2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
 3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
 4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
 5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
 6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
 7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
 8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
 9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

- D. Install removable insulation covers at locations indicated. Installation shall conform to the following:
1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
 2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
 3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
 4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
 5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.05. INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

- A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- B. Insulation Installation on Pipe Flanges:
1. Install pipe insulation to outer diameter of pipe flange.
 2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
 4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- C. Insulation Installation on Pipe Fittings and Elbows:
1. Install mitered sections of pipe insulation.
 2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.06. INSTALLATION OF MINERAL-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward-clinched staples at 6 inches (150 mm) o.c.
4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch (25 mm), and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.07. FINISHES

- A. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.
- B. Do not field paint aluminum or stainless-steel jackets.

3.08. PIPING INSULATION SCHEDULE, GENERAL

- A. See Exhibit.
- B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
 1. Drainage piping located in crawl spaces.
 2. Underground piping.
 3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.09. EXISTING WORK

- A. Insulate existing piping as per same service in Exhibit for new work.
 1. Taper and seal at junction with existing insulation

EXHIBIT "I" - PIPE INSULATION MATERIALS (Notes are at end of Exhibit I)			
SERVICE	INSULATION MATERIAL	THICKNESS	REMARKS
Hot water and glycol (up to 250°)	Glass fiber or Flexible Elastomeric	4" and larger: 3" Less than 4": 2½"	-----
Hot water and glycol (251° to 350°)	Glass fiber or Flexible Elastomeric	1½" and larger: 4.5" 1" to 1¼": 4" 1" and smaller: 3"	-----
Refrigeration	Glass fiber or Flexible Elastomeric	1½" and larger: 1" 1" and smaller: ½"	See Note 1

EXHIBIT "I" - PIPE INSULATION MATERIALS (Notes are at end of Exhibit I)			
SERVICE	INSULATION MATERIAL	THICKNESS	REMARKS
AC unit drains overflows, condensate	Glass fiber or Flexible Elastomeric	1½" and larger: 1" 1" and smaller: ½"	-----

NOTES FOR EXHIBIT I:

Note 1:Outdoor Use: Provide 1½ in. thick "Flexible" with two coats of recommended finish. Cover piping and fittings with aluminum or PVC jacket. Install in accordance with manufacturer's recommendations.

END OF SECTION

**THIS PAGE
LEFT BLANK**

SECTION 23 23 00
REFRIGERANT PIPING

PART 1 GENERAL

1.01. RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 23 05 29 (Hangers and Supports for HVAC Piping and Equipment)
- C. Section 23 05 53 (Identification for HVAC Piping and Equipment)

1.02. SUMMARY

- A. Section Includes:
 - 1. Refrigerant pipes and fittings.
 - 2. Refrigerant piping valves and specialties.
 - 3. Refrigerants.

1.03. ACTION SUBMITTALS

- A. Product Data: For each type of valve and refrigerant piping specialty.
 - 1. Include pressure drop, based on manufacturer's test data, for the following:
 - a. Thermostatic expansion valves.
 - b. Solenoid valves
 - c. Hot-gas bypass valves.
 - d. Filter dryers.
 - e. Strainers.
 - f. Pressure-regulating valves.
- B. Shop Drawings:
 - 1. Show piping size and piping layout, including oil traps, double risers, specialties, and pipe and tube sizes to accommodate, as a minimum, equipment provided, elevation difference between compressor and evaporator, and length of piping to ensure proper operation and compliance with warranties of connected equipment.

1.04. CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For refrigerant valves and piping specialties to include in maintenance manuals.

1.05. QUALITY ASSURANCE

- A. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."
- B. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

1.06. PRODUCT STORAGE AND HANDLING

- A. Store piping with end caps in place to ensure that piping interior and exterior are clean when installed.

PART 2 PRODUCTS

2.01. COPPER TUBE AND FITTINGS

- A. Copper Tube: ASTM B 88, Type K or L.
- B. Wrought-Copper Fittings: ASME B16.22.
- C. Wrought-Copper Unions: ASME B16.22.
- D. Solder Filler Metals: ASTM B 32. Use 95-5 tin antimony or alloy HB solder to join copper socket fittings on copper pipe.
- E. Brazing Filler Metals: AWS A5.8/A5.8M.
- F. Flexible Connectors:
 - 1. Body: Tin-bronze bellows with woven, flexible, tinned-bronze-wire-reinforced protective jacket.
 - 2. End Connections: Socket ends.
 - 3. Offset Performance: Capable of minimum 3/4-inch misalignment in minimum 7-inch- long assembly.
 - 4. Working Pressure Rating: Factory test at minimum 500 psig.
 - 5. Maximum Operating Temperature: 250 deg F.

2.02. REFRIGERANTS

- A. ASHRAE 34, R-410A: Pentafluoroethane/Difluoromethane.

PART 3 EXECUTION

3.01. PIPING APPLICATIONS FOR REFRIGERANT R-410A

- A. Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications: Copper, Type K or L, annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.

- B. Safety-Relief-Valve Discharge Piping: Copper, Type K or L, annealed- or drawn-temper tubing and wrought-copper fittings with brazed or soldered joints.

3.02. VALVE AND SPECIALTY APPLICATIONS

- A. Install service valves for gage taps at inlet and outlet of hot-gas bypass valves and strainers if they are not an integral part of valves and strainers.
- B. Install a check valve at the compressor discharge and a liquid accumulator at the compressor suction connection.
- C. Install thermostatic expansion valves as close as possible to distributors on evaporators.
 - 1. Install valve so diaphragm case is warmer than bulb.
 - 2. Secure bulb to clean, straight, horizontal section of suction line using two bulb straps. Do not mount bulb in a trap or at bottom of the line.
 - 3. If external equalizer lines are required, make connection where it will reflect suction-line pressure at bulb location.
- D. Install safety relief valves where required by 2010 ASME Boiler and Pressure Vessel Code. Pipe safety-relief-valve discharge line to outside according to ASHRAE 15.
- E. Install moisture/liquid indicators in liquid line at the inlet of the thermostatic expansion valve or at the inlet of the evaporator coil capillary tube.
- F. Install strainers upstream from and adjacent to the following unless they are furnished as an integral assembly for the device being protected:
 - 1. Solenoid valves.
 - 2. Thermostatic expansion valves.
 - 3. Hot-gas bypass valves.
 - 4. Compressor.
- G. Install filter dryers in liquid line between compressor and thermostatic expansion valve.

3.03. PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.
- B. Install refrigerant piping according to ASHRAE 15.
- C. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping adjacent to machines to allow service and maintenance.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Select system components with pressure rating equal to or greater than system operating pressure.
- J. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.
- K. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection.
- L. Install refrigerant piping in protective conduit where installed belowground.
- M. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.
- N. Slope refrigerant piping as follows:
 - 1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
 - 2. Install horizontal suction lines with a uniform slope downward to compressor.
 - 3. Liquid lines may be installed level.
- O. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.
- P. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.
- Q. Identify refrigerant piping and valves according to Section 23 05 53 (Identification for HVAC Piping and Equipment).
- R. Install sleeve seals for piping penetrations of concrete walls and slabs.
- S. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.04. PIPE JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Soldered Joints: Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook."
- D. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
 - 1. Use Type BCuP (copper-phosphorus) alloy for joining copper socket fittings with copper pipe.
 - 2. Use Type BAg (cadmium-free silver) alloy for joining copper with bronze or steel.

3.05. HANGERS AND SUPPORTS

- A. Comply with requirements for pipe hangers and supports specified in Section 23 05 29 (Hangers and Supports for HVAC Piping and Equipment).
- B. Install the following pipe attachments:
 - 1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet long.
 - 2. Roller hangers and spring hangers for individual horizontal runs 20 feet or longer.
 - 3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet or longer, supported on a trapeze.
 - 4. Spring hangers to support vertical runs.
 - 5. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.
- C. Support multifloor vertical runs at least at each floor.

3.06. SYSTEM CHARGING

- A. Charge system using the following procedures:
 - 1. Install core in filter dryers after leak test but before evacuation.
 - 2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers. If vacuum holds for 12 hours, system is ready for charging.
 - 3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.
 - 4. Charge system with a new filter-dryer core in charging line.

3.07. ADJUSTING

- A. Adjust thermostatic expansion valve to obtain proper evaporator superheat.
- B. Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.
- C. Adjust set-point temperature of air-conditioning or chilled-water controllers to the system design temperature.
- D. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:
 - 1. Open shutoff valves in condenser water circuit.
 - 2. Verify that compressor oil level is correct.
 - 3. Open compressor suction and discharge valves.
 - 4. Open refrigerant valves except bypass valves that are used for other purposes.
 - 5. Check open compressor-motor alignment and verify lubrication for motors and bearings.
- E. Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

END OF SECTION

SECTION 23 31 13 METAL DUCTS

PART 1 GENERAL

1.01. RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02. SUMMARY

- A. Section Includes:
 - 1. Single-wall rectangular ducts and fittings.
 - 2. Sheet metal materials.
 - 3. Sealants and gaskets.
 - 4. Hangers and supports.

1.03. ACTION SUBMITTALS

- A. Product Data: For each type of the following products:
 - 1. Sealants and gaskets.
- B. Shop Drawings:
 - 1. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.

PART 2 PRODUCTS

2.01. SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements,

materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.02. SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. If duct is damaged by equipment removal or reinstallation, ducts shall be replaced in kind.

2.03. SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
 - 1. Water-Based Joint and Seam Sealant
 - a. Application Method: Brush on.
 - b. Shore A Hardness: Minimum 20.
 - c. Water resistant.
 - d. Mold and mildew resistant.
 - e. VOC: Maximum 75 g/L (less water).
 - f. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
 - g. Service: Indoor or outdoor.
 - h. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
- B. One Part Tape System:
 - 1. Sealant shall be a 17 mil aluminum tape with butyl sealant, UL 181 listed.
 - 2. Flanged Joint Sealant: Comply with ASTM C 920.
 - 3. General: Single-component, acid-curing, silicone, elastomeric.
 - a. Type: S.
 - b. Grade: NS.
 - c. Class: 25.
 - d. Use: O.

4. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
5. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.04. HANGERS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts. Use locking double nuts.
- B. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."
- C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- D. Trapeze and Riser Supports:
 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.

PART 3 EXECUTION

3.01. DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.
- B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
- C. Install ducts with fewest possible joints.
- D. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- E. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- F. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- G. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

- H. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- I. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
- J. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

3.02. DUCT SEALING

- A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- B. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- C. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

3.03. HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."
- B. Building Attachments: Concrete inserts or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
- C. Where practical, install concrete inserts before placing concrete.
- D. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
- E. Hangers Exposed to View: Threaded rod and angle or channel supports.
- F. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at maximum intervals of 16 feet.
- G. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.04. CONNECTIONS

- A. Make connections to equipment with flexible connectors.
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.
- C. Branch connections to be 45 degree throated take-offs with volume damper unless shown otherwise.

3.05. PAINTING

- A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer.

3.06. SMOKE DETECTION

- A. Smoke detectors shall be furnished by "Electric". This Contractor shall install detectors located in ductwork.
- B. Increase duct size at smoke detectors by 20 sq. in. and make rectangular duct section 24 in. long minimum to allow installation of smoke detector.

3.07. DUCTWORK AT HUMIDIFIERS

- A. Solder duct seams and joints watertight within 5 ft. of humidifier, both sides. Provide 1-1/4 in. capped drain connection at low point.
- B. Where humidifiers are installed in ducts 8 in. and less in depth, increase duct size and provide expanded section in accordance with manufacturer's recommendations.

3.08. DUCT SCHEDULE

- A. See Exhibit.
- B. All ducts.
 - =
 - 1. Pressure Class: Positive 2-inch wg.
 - 2. Velocity

EXHIBIT I - DUCTWORK MATERIALS		
SERVICE	MATERIAL	SPECIAL REQUIREMENTS
Supply, return, vent, relief, and exhaust	Lock forming quality, galvanized steel ASTM 525 or 527	Joints and features as called for.

EXHIBIT I - DUCTWORK MATERIALS		
SERVICE	MATERIAL	SPECIAL REQUIREMENTS
Accessories, dampers, and air turns	Same or better as parent duct	-----

END OF SECTION

SECTION 23 33 00
AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01. RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02. SUMMARY

- A. Section Includes:
 - 1. Manual volume dampers.
 - 2. Control dampers.
 - 3. Turning vanes.
 - 4. Duct-mounted access doors.
 - 5. Duct accessory hardware.

1.03. ACTION SUBMITTALS

- A. Product Data: For each type of product.

PART 2 PRODUCTS

2.01. ASSEMBLY DESCRIPTION

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

2.02. MATERIALS

- A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G90.
 - 2. Exposed-Surface Finish: Mill phosphatized.
- B. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

- C. Materials to match duct material.

2.03. MANUAL VOLUME DAMPERS

- A. Standard, Steel, or Aluminum Manual Volume Dampers:
 - 1. Factory or Shop fabricated.
 - 2. Standard leakage rating.
 - 3. Suitable for horizontal or vertical applications.
 - 4. Frames:
 - a. Frame: Hat-shaped, 0.094-inch-thick, galvanized sheet steel.
 - b. Mitered and welded corners.
 - c. Flanges for attaching to walls and flangeless frames for installing in ducts.
 - 5. Blades:
 - a. Multiple or single blade.
 - b. Parallel- or opposed-blade design.
 - c. Stiffen damper blades for stability.
 - 6. Blade Axles: Galvanized steel.
 - 7. Constructed per SMACNA.

2.04. CONTROL DAMPERS

- A. Low-leakage rating and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.
- B. Blades:
 - 1. Multiple blades with maximum blade width of 6 inches.
 - 2. Opposed-blade design.
 - 3. 0.0747-inch-thick dual skin
 - 4. Blade Edging: Inflatable seal blade edging, or replaceable rubber seals. Blade Axles: 1/2-inch diameter; galvanized steel; blade-linkage hardware of zinc-plated steel and brass; ends sealed against blade bearings.
 - 5. Operating Temperature Range: From minus 40 to plus 200 deg F.
- D. Bearings:
 - 1. Oil-impregnated bronze, Molded synthetic, or oil-impregnated stainless-steel sleeve.
 - 2. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft
 - 3. Thrust bearings at each end of every blade.

2.05. TURNING VANES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries, Inc.
 2. Duro Dyne Corp.
 3. METALAIR, Inc.
 4. Ward Industries, Inc.
- B. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
- C. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 4-3, "Vanes and Vane Runners," and 4-4, "Vane Support in Elbows."

2.06. DUCT-MOUNTED ACCESS DOORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Ductmate Industries, Inc.
 2. Duro Dyne Corp.
 3. METALAIR, Inc.
 4. Ward Industries, Inc.
- B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 7-2, "Duct Access Doors and Panels," and 7-3, "Access Doors - Round Duct."
1. Door:
 - a. Double wall, rectangular.
 - b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
 - c. Hinges and Latches: 1-by-1-inch butt or piano hinge and cam latches.
 - d. Fabricate doors airtight and suitable for duct pressure class.
 2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
 3. Number of Hinges and Locks:
 - a. Access Doors Less Than 12 Inches Square: No hinges and two sash locks.
 - b. Access Doors up to 18 Inches Square: Two hinges [Continuous] and two sash locks.
 - c. Larger constructed per SMACNA.

2.07. FLEXIBLE CONNECTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Ductmate Industries, Inc.
 2. Duro Dyne Corp.

3. METALAIRE, Inc.
 4. Ward Industries, Inc.
- B. Materials: Flame-retardant or noncombustible fabrics.
- C. Coatings and Adhesives: Comply with UL 181, Class 1.
- D. Metal-Edged Connectors: Factory fabricated with a fabric strip [3-1/2 inches (89 mm)] 5-3/4 inches wide attached to two strips of 2-3/4-inch-wide, 0.028-inch-thick, galvanized sheet steel or 0.032-inch-thick aluminum sheets. Provide metal compatible with connected ducts.
- E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
1. Minimum Weight: 26 oz./sq. yd
 2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
 3. Service Temperature: Minus 40 to plus 200 deg F.

2.08. 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. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 EXECUTION

3.01. INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.
- B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
- C. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.
1. Install steel volume dampers in steel ducts.
 2. Install aluminum volume dampers in aluminum ducts.
- D. Set dampers to fully open position before testing, adjusting, and balancing.

- E. Install test holes at fan inlets and outlets and elsewhere as indicated.
- F. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
 - 1. On both sides of duct coils.
 - 2. Upstream from duct filters.
 - 3. At outdoor-air intakes and mixed-air plenums.
 - 4. At drain pans and seals.
 - 5. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
 - 6. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links shall be pressure relief access doors and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
 - 7. At each change in direction and at maximum 50-foot spacing.
 - 8. Upstream from turning vanes.
 - 9. Control Devices requiring inspection.
 - 10. Elsewhere as indicated.
- G. Install access doors with swing against duct static pressure.
- H. Access Door Sizes: 12 x 12 minimum
 - 1. Head and Hand Access: 18 by 10 inches.
- I. Label access doors to indicate the purpose of access door.
- J. Install duct test holes where required for testing and balancing purposes.

3.02. FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. Operate dampers to verify full range of movement.
 - 2. Inspect locations of access doors and verify that purpose of access door can be performed.
 - 3. Operate fire, smoke, and combination fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
 - 4. Inspect turning vanes for proper and secure installation.
 - 5. Operate remote damper operators to verify full range of movement of operator and damper.

END OF SECTION

**THIS PAGE
LEFT BLANK**

SECTION 26 00 00
ELECTRICAL - GENERAL

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Electrical-General is specifically applicable to Division 26 Sections, in addition to Division 1 - General Requirements, but is also applicable to other Divisions where electrical work may be specified or required.
 - 1. This Section includes the general work description and requirements for electrical work required by this Contract.

1.02. SCOPE OF WORK

- A. Furnish all materials, tools, supplies and equipment and provide all labor for the following:
 - 1. Electric power service and distribution.
 - 2. Conduit and wiring.
 - 3. Grounding systems.
 - 4. Electrical labeling, signs and nameplates.
 - 5. Contract closeout information to include record drawings, operation and maintenance manuals, final testing, inspection certificates, guarantees, and warranties as per Division 1.
 - 6. All Division 26 specifications.
- B. Demolition – refer to the Contract Drawings.

1.03. WORK COVERED UNDER OTHER DIVISIONS

- A. The following electrical-related work is specified in Specification Sections of other Divisions of the Contract Documents:
 - 1. Furnishing and installation of electrical equipment and miscellaneous controls specifically included under other Sections.
 - 2. Interior and exterior concrete equipment bases and pads, except for coordination.
 - 3. Instrumentation, power, and control cables furnished under other Sections or by equipment manufacturers.
 - 4. Furnishing and installing motor starting equipment and/or control panels specifically included under other sections.
 - 5. Finish caulking (caulking up to 1/2-inch below wall or floor surface is provided under the electrical work).

1.04. RELATED SECTIONS

- A. Division 1 specifications.
- B. All Division 26 specifications.

1.05. GENERAL REQUIREMENTS

- A. Contractor shall obtain all drawings and information required to properly install, connect, adjust, and electrically operate equipment.
- B. Where any device or part of equipment is referred to in these Specifications in the singular number (such as “the switch”), such reference shall apply to as many such devices as are required to complete the installation.

1.06. EXAMINATION OF PREMISES

- A. The Contractor shall examine the existing conditions per the Contract Documents affecting compliance with the plans and specifications before visiting site and/or buildings.
- B. During the site visit the Contractor shall verify all existing conditions so as to enable the completion of this project. Any variations shall be brought to the attention of the Engineer prior to bidding.
- C. The Contractor shall ascertain access to site, available storage and delivery facilities.
- D. Before commencing work, the Contractor shall verify all governing dimensions at site and/or buildings, and observe existing areas and work limits adjacent to where the work is to be performed.

1.07. WORK PERFORMANCE

- A. Schedule, coordinate and perform work to assure electrical service for each building at all times per Division 1.
- B. New work shall be installed and connected to existing work neatly and carefully. Disturbed or damaged areas, equipment and materials shall be replaced or repaired to its prior conditions.
- C. All work shall be installed in a neat, workmanlike and professional manner. All enclosures shall be installed level and plumb. All exposed raceway shall be level, plumb, and run parallel or at 90 degrees to all structural work.
- D. Coordinate location of equipment and conduit with other trades to minimize interferences.
- E. Perform field touch-up work and touch-up painting of electrical material and equipment.
- F. Repair or restore new and existing building components damaged or left open or bare as a result of the electrical work.

- G. It is the intent of the Contract Documents that only new, unused, current production equipment and supplies be used.

1.08. REFERENCES

- A. The following references comprise standards and codes applicable to this Contract.

ANSI/NFPA 70	National Electrical Code
ANSI	American National Standards Institute 1430 Broadway, New York, NY 10018
ASTM	American Society for Testing and Materials 1916 Race Street, Philadelphia, PA 19103
CSA	Canadian Standards Association 178 Rexdale Boulevard, Rexdale (Toronto) Ontario, Canada M9W 1R3
ETL	ETL Testing Laboratory, Inc. Industrial Park, Cortland, NY 13045
FM	Factory Mutual System 1151 Boston-Providence Turnpike, P.O. Box 688, Norwood, MA 02062
IEEE	Institute of Electrical and Electronics Engineers 345 East 47th Street, New York, NY 10017
NEMA	National Electrical Manufacturers Association 2101 "L" Street, N.W., Washington, DC 20037
NFPA	National Fire Protection Association Battery March Park, Quincy, MA 02269
UL	Underwriters' Laboratories, Inc. 333 Pfingston Road, Northbrook, IL 60062
IPCEA	Insulated Power Cable Engineers Association

- B. Contractor shall conform with all applicable codes and requirements as a minimum standard of performance.
- C. In the case of a discrepancy between the requirements of the Contract Documents and other regulating groups or agencies, the stricter requirements shall apply.
- D. U.L. Listed Equipment
1. All material and equipment of a type listed by Underwriters' Laboratories shall be so labeled (unless exempted in writing by the Engineer). All equipment labeling shall indicate the intended application of the equipment.
 2. Equipment and material not covered by UL Standards will be accepted provided equipment and material are listed, labeled, certified or otherwise determined to meet safety requirements by a nationally recognized third-party testing laboratory such as ETL, FM, or CSA. Equipment of a class not listed, labeled, certified or approved by any acceptable reviewing body will be considered only if inspected or tested in accordance with national industrial standards, such as NEMA or ANSI. Evidence of compliance shall include certified test reports and definitive shop drawings.

- E. The Contractor shall be held responsible for adherence to all rules, requirements and specifications as set forth above.

1. Any additional work or material necessary for adherence will not be allowed as an extra, but shall be included in the bid price. Ignorance of any rule, requirement or specification shall not be allowed as an excuse for non-conformity. Acceptance by the Owner or Engineer does not relieve the Contractor from the expense involved for the correction of any errors which may exist in the drawings submitted or in the satisfactory operation of any equipment.

1.09. REGULATORY REQUIREMENTS

- A. Conform to applicable Building Codes for the Commonwealth of Virginia.
- B. Conform to NFPA 70 - 2014 National Electric Code.
- C. Conform to ANSI C2 - National Electrical Safety Code.
- D. Obtain permits, and request inspections as required from local authority having jurisdiction. Contractor shall provide a final inspection certificate to the Owner from the inspecting agency.

1.10. DEFINITIONS

- A. Listed - Equipment is "listed" if of a kind mentioned in a list which:
 1. is published by a nationally recognized laboratory which makes periodic inspection of production of such equipment; and
 2. states that such equipment meets nationally recognized standards or has been tested and found safe for use in a specified manner.
- B. Labeled - Equipment is "labeled" if:
 1. it carries a valid label, symbol, or other identifying mark of an organization acceptable to the authority having jurisdiction and concerned with product evaluation that makes periodic inspections of the production of labeled equipment or materials; and
 2. whose labeling indicates compliance with appropriate standards or performance in a specified manner.
- C. Certified - Equipment is "certified" if:
 1. equipment has been tested and found by a nationally recognized testing laboratory to meet nationally recognized standards or to be safe for use in a specified manner; or
 2. production is periodically inspected by a nationally recognized testing laboratory; and
 3. it bears a label, tag, or other records of certification.

- D. Nationally recognized testing laboratory - A testing laboratory which is approved in accordance with OSHA regulations by the Secretary of Labor.

1.11. MANUFACTURED PRODUCTS

- A. Materials and equipment furnished shall be current products of manufacturers regularly engaged in the manufacture of such items and for which replacement parts are available.
- B. When more than one unit of the same class or type of equipment is required, such units shall be the product of a single manufacturer.
- C. Equipment Assemblies and Components:
 - 1. All components of an assembled unit need not be products of the same manufacturer.
 - 2. Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.
 - 3. Components shall be compatible with each other and with the total assembly for the intended service.
 - 4. Constituent parts which are similar shall be the product of a single manufacturer.
- D. All factory wiring shall be labeled and identified on or within the equipment being furnished and on all elementary, schematic and wiring diagrams, in accordance with these specifications
- E. When Factory Testing is Specified:
 - 1. The Engineer shall have the option of witnessing factory tests. The Contractor shall notify the Engineer a minimum of 15 working days prior to the manufacturer's making the factory tests.
 - 2. Four copies of certified test reports containing all test data shall be furnished to the Engineer prior to final inspection and not more than 90 days after completion of the tests.
 - 3. When equipment fails to meet factory test and reinspection is required, the Contractor shall be liable for all related additional expenses, including expenses of the Engineer.

1.12. REQUEST FOR APPROVAL OF "EQUAL" EQUIPMENT

- A. Requests for approval of "equal" equipment shall conform to guidelines set forth in Standard General Conditions.

1.13. EQUIPMENT PROTECTION

- A. Equipment and material shall be delivered to the site in new, unused condition in original packaging. Contractor shall be responsible to store equipment and protect against damage, theft, dirt, moisture and temperature extremes.

- B. All programmable logic controllers, variable frequency drives, and instrumentation to be transported under this contract shall be shipped to and from the site in enclosed, weather tight, sealed containers in a manner designed to protect the units against damaging stress caused by sudden acceleration or deceleration. An indicating meter such as “Drop-N-Tell,” designed to indicate any sudden impacts that exceed the unit’s rating shall be shipped with and fixed to each assembly or its packing crate. Upon arrival of each shipment at the project site, the meter shall be examined in the presence of representatives of the Engineer, the Contractor, and the equipment manufacturer. If the meter indicates the package exceeded the limits of the meter, the assembly or subassembly shall be dismantled and completely inspected. All damage shall be corrected before the equipment is incorporated into the work. The Contractor shall bear all cost arising out of dismantling, inspection, repair, and reassembly, including engineering costs.
- C. During installation equipment, controls, controllers, circuit protective devices, etc., shall be protected against entry of foreign matter and be vacuum cleaned both inside and outside before testing and operation.
- D. Damaged equipment, as determined by the Owner and/or the Engineer, shall either be repaired to new condition or replaced with new equipment as directed by the Engineer.
- E. Painted surfaces shall be protected with factory installed removable heavy craft paper, sheet vinyl or similar protective cover.

1.14. EQUIPMENT INSTALLATION AND REQUIREMENTS

- A. The locations of equipment, fixtures, outlets and similar devices shown on the Contract Drawings are approximate only.
 - 1. Equipment shall be installed as close as practical to locations shown on the Drawings. Where Contractor supplied equipment sizes differ from that anticipated on the Drawings, the Contractor shall prepare and submit to the Engineer new “to-scale” layouts showing new equipment locations for approval.
- B. Equipment Provided Under Other Divisions:
 - 1. Reasonable effort has been made to show the actual locations of the equipment to be provided under other Sections of the Specifications. These locations shall be considered approximate, but suitable for preparation of the Contractor’s bid. These locations are not necessarily final locations. Contractor shall verify equipment size and location before rough in and obtain the applicable shop drawing information to enable the electrical and control services to be provided to the equipment.
 - 2. The Contractor shall coordinate the exact locations of all equipment, receptacles, box-outs, sleeves and similar items required for the completion of electrical work with the structural, architectural, mechanical or other work.

3. The wiring configuration of equipment provided by other divisions will vary, depending on the manufacturer used. Specific wire connections to equipment provided by other divisions are not shown in these documents. The Contractor shall coordinate the wire connections with the division supplying the equipment.
4. No additional compensation will be made for relocations, reconnections or additional work required as a result of the failure of the Contractor to fully coordinate the work of this project.

C. Inaccessible Equipment:

1. Where the Engineer determines that the Contractor has installed equipment that is not conveniently accessible for operation and maintenance, said equipment shall be removed and reinstalled as directed by the Engineer at the Contractor's expense.
2. "Conveniently accessible" is defined as reachable without the use of ladders, without climbing over or crawling under obstacles such as equipment, structures, piping and ductwork. Equipment shall be installed at the heights as specified in other Sections of these Specifications, except any readout devices shall be installed so that the centerline of the readout is 5 feet 0 inches above finish floor.

D. Equipment and Material - Equipment and material shall be designed to assure satisfactory operation and operating life for the environmental conditions where being installed. These specifications, the NEC and other code requirements shall apply to the installation in areas requiring special protection; i.e., hazardous, wet or corrosive area/location, and weatherproof construction.

E. Classified Areas:

1. General - Enclosures for classified areas shall be as specified or shown on the contract drawings
2. Hazardous Areas:
 - a. In the areas designated as Hazardous and where explosion proof work is shown or specified, all work shall meet the requirements of the NEC for the classification of that location.
 - b. Equipment enclosures shall be approved for use in the atmosphere of the area in which they are installed for Class I, Division 1, Group D, and Class I, Division 2, Group D atmospheres.
3. Wet Locations - Where installed outdoors or in areas designated as wet locations, all work shall meet the requirements of these Specifications and of the NEC for wet locations.
4. Corrosive Areas - All equipment shall be corrosion resistant in areas so designated unless specified otherwise. All work shall meet the requirements of these specifications.

F. Rigging and Moving Equipment - Contractor and his subcontractors shall exercise extreme care and caution in moving and installing equipment. Skilled riggers shall be

employed to move any equipment over 300 pounds or of sufficient bulk. Proper falsework, skids, blocking, runways, supports of new or existing work, or other devices shall be employed when moving or placing equipment.

G. Diagrammatic Drawings:

1. Circuit diagrams shown are diagrammatic and functional only and are not intended to show exact circuit or wiring layouts, number of fittings or other installation details. The Contractor shall furnish all labor and materials necessary to install and place in satisfactory operation all power, lighting and other electrical systems shown.
2. Circuits beyond their pushbutton and control device and conduits containing lighting circuits beyond panelboards are not always scheduled.
3. The number of conductors shown is not necessarily the correct number required. Contractor shall install as many conductors as are required for the complete and satisfactory operation of all systems.

1.15. SUBMITTALS

- A. Submit shop drawings under provisions of Section 01 33 00 (Submittal Procedures).
- B. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal.
- C. Mark dimensions and values in units to match those specified.
- D. The shop drawing submittals shall include the following:
 1. Information that confirms compliance with contract requirements; i.e., the manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, pictures, nameplate data and test reports as required.
 2. Elementary and interconnection wiring diagrams for communication and signal systems, control system and equipment assemblies. All terminal points and wiring shall be identified on wiring diagrams.
 3. Parts list which shall include those replacement parts recommended by the equipment manufacturer, quantity of parts, current source and price of each part.
- E. After shop drawing approval and prior to installation, furnish the Engineer with one sample of each of the following:
 1. An 18-inch length of each type and size of wire and cable along with the tag from the coils of reels from which the samples were taken. Length of sample to include one complete wire or cable marking by manufacturer.
 2. Each type of conduit, coupling, bushing and termination fitting.
 3. Conduit hangers, clamps and supports.
 4. Duct sealing compound.

5. Each type of receptacle, toggle switch, outlet box, manual motor starter*, device plate, engraved nameplate, wire and cable splicing and terminating material and single pole molded case circuit breaker*.

*These will be returned to Contractor.

1.16. OPERATIONS AND MAINTENANCE MANUALS AND INSTRUCTIONS

- A. Manuals, both hard copy and electronic, shall be submitted in accordance with the Contract Documents, and as specified in this section.
- B. Information shall be sufficient to enable a qualified technician to perform normal first line maintenance and repair.
- C. Operation manuals shall describe, in detail, the information required to operate the equipment provided.

1.17. RECORD DRAWINGS

- A. Record drawings shall be provided in accordance with the contract documents. In addition, the Contractor shall prepare and submit to the Owner:
 1. One PDF (24-inch by 36-inch) of each of the marked-up field record drawings.
 2. One PDF (24-inch by 36-inch) showing all concealed conduit including ductbanks that cannot be shown clearly on the marked-up field set. All underground conduit routings and ductbanks shall be dimensioned from aboveground structures. All manholes, handholes, and pullboxes shall have at least two ties.
 3. Revised control schematics. Revised elementary wiring diagrams. Provide block diagrams for all equipment items. All schematics and diagrams shall be prepared on 24-inch x 36-inch size PDF and submitted through eBuilder, or in a format and media acceptable to the Owner. Drawings shall:
 - a. Be fully labeled; show all point-to-point connections; indicate conduit size and wire size, quantity and color; show junction boxes, pullboxes, panels, etc.
 - b. Indicate termination numbers at respective locations.
 - c. Contractor shall submit preliminary 8-1/2 x 11 sheets of these diagrams before final drafting.
 4. Sample block and interconnecting drawings are included at the end of this Section.
 5. Record drawings shall include all changes to the original documents, including addenda issued during bidding and change orders and other field changes issued during construction. Also, any alternates chosen shall be shown. Each drawing shall have the following information:

Prepared By: (name of Contractor)
Date Issued: _____
 6. All work, including notes, shall be revised to reflect actual construction.
 7. All drafting shall be professionally done following accepted drafting standards.

8. See other Division 26 sections for additional record drawing requirements.
9. Contractor shall submit all materials in PDF, through eBuilder, or in a format and media acceptable to the Owner. All drafting shall be AutoCAD 2012 as a minimum. The submitted files shall include a complete table of contents where the viewer can simply click on a title to go to that item.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 26 05 05
ELECTRICAL DEMOLITION, REMOVALS, AND RELOCATIONS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Disconnect and removal of the existing electrical equipment and components associated with HVAC and ventilation equipment.
- B. Disconnection and removal of existing power distribution and control circuit raceways and conductors.
- C. Disconnection and reconnection of equipment requiring electrical power and control circuitry.

1.02. ELECTRICAL DEMOLITION, REMOVALS, AND RELOCATIONS

A. General

- 1. Ensure that all hardware items and replacement equipment are on hand prior to attempting any demolition, modification, or remedial work.
- 2. Contractor shall take necessary precautions to ensure against damage to existing materials or equipment to remain in place, to be reused or to remain the property of the owner. Repair or replace damaged materials and equipment at no additional cost to owner.
- 3. Not all equipment, conduits, conductors, cables, and materials to be demolished, removed, or relocated have been shown.

B. Equipment Demolition and Removals

1. Equipment and Materials

- a. Refer to the Drawings for details and limits of equipment and materials demolition and removals.
- b. Contractor shall furnish labor to disconnect and/or remove items shown on the Drawings and as specified. Carefully dismantle and salvage electrical equipment, switches, fixtures, instruments, conduits, cables, wiring, control panels, etc. as necessary to perform the proposed changes.
- c. Owner reserves the first right of refusal to retain all demolished electrical equipment. Equipment not selected by the owner shall be removed from the Site at no additional cost to the owner.

2. Conduits, Conductors and Cables

- a. Where electrical equipment is removed or relocated, also remove all wiring back to source panelboard, MCC, switch or to last remaining device on the same circuit. Associated conduits, hangers, supports,

- etc. shall be removed unless otherwise noted or required to maintain the support and operation of remaining equipment.
- b. Remove all extraneous wires and exposed conduits for all mechanical, and electrical devices to be removed or abandoned.
 - c. Contractor shall disconnect and remove related equipment and conduit mounting hardware, equipment mounting racks, and equipment associated with materials to be removed unless otherwise required to maintain the support and operation of remaining equipment.
 - d. Any conduit abandoned in concrete slabs, walls, or other inaccessible locations shall be left empty except for a nylon pull wire. Ends shall be capped and labeled as spare for future use.
 - e. If cables cannot be removed due to a collapsed or deformed duct, etc. cut cable at duct entrance at each end and tag cable as "Abandoned Cable", and tag duct as "collapsed duct" or similar text. Notify owner of these conditions.
 - f. Conduits, conductors and cables, and miscellaneous electrical materials of construction, and equipment and conduit system supports demolished as part of the electrical demolition work shall become the property of the Contractor and shall be removed from the Site.
 - g. Existing conduits shall be re-used where specifically indicated on the drawings for re-use.
 - h. Where existing equipment fed from panelboard, MCC, starter, or switch is shown or noted to be re-fed from new panelboard, MCC, starter, or switch, existing conduits or portions of the existing conduit system connected to the existing equipment may be re-used, subject to the approval of the owner. Existing circuits shall be completely removed from such conduits, and the existing conduits proposed for re-use shall be demonstrated to be clear of obstructions to allow safe pulling of conductors.

C. Temporary Equipment, Conduit and Wiring

- 1. Equipment indicated on Drawings as temporary shall be installed as required to accomplish work and as indicated in the Contract Documents, and then removed when work is complete and equipment is no longer required. All temporary equipment shall be turned over to the County upon removal.
- 2. Temporary wiring and conduit shall be installed as required to accomplish work, and as indicated in the Contract Documents. All such wiring and conduit shall be removed when no longer required and shall be removed from site when work is complete.
- 3. Supports and hardware installed for temporary equipment, conduit and wiring shall be removed when work is complete. Restore permanent structures, surfaces and grade to original condition subsequent to removal of equipment and materials.
- 4. Provide temporary labels and nameplates for all temporary equipment installed. Labels and nameplates shall be suitable for lasting for the duration of the construction period or shall be replaced when no longer usable.

D. Equipment Relocations

1. Re-route conduits where shown on the Drawings and as necessitated by architectural, mechanical, and HVAC modifications, and for new electrical work.
2. Provide materials, and hardware for patching, plugging, and refurbishing equipment intended for reuse. Provide new nameplates for reused electrical equipment such as MCC compartments and control panels.
3. Where the work specified herein or under other divisions necessitates relocation of existing equipment, foundations, conduits, wiring, etc. perform all work and make necessary modifications to existing work as required to leave the completed system in a finished and workmanlike condition.
4. Contractor shall include all necessary equipment and components as required to relocate equipment from the existing locations to the new proposed locations. Equipment shall be tested prior to being disconnected and relocated. Any deficiencies in the equipment operation shall be brought to the attention of Engineer. Once the equipment has been fully tested, Contractor shall schedule the relocation of the unit(s). After the unit(s) has been relocated and reconnected. The Contractor shall perform testing as required to demonstrate the operation of the unit(s).

E. Structure Repairs and Refinishing

1. Rehabilitate and relocate items of equipment as required and as indicated on the Drawings or specified.
2. Fill and patch penetrations, holes, damaged surfaces, etc. to restore a smooth finish to floors, ceilings, and walls in accordance with Section 02 41 00 (Demolition).

PART 2 PRODUCTS

2.01. GENERAL

- A. Refer to Division 26 for electrical material requirements.

PART 3 EXECUTION

3.01. GENERAL

- A. Contractor shall remove interior and exterior concrete equipment pads for equipment to be removed and/or demolished. Remove exposed conduits, rebar, and concrete. Refinish existing floors in interior areas of buildings to a level condition.

3.02. EQUIPMENT RELOCATIONS

- A. Contractor shall develop a detailed wiring list prior to disconnecting any existing power and control circuits. The wiring list shall designate wiring termination locations at each end of the wire segment. The list shall include wire marker tags identification, wire color coding, terminal block identification to allow the Contractor to reconnect the existing wiring to the original terminations.
- B. Where existing wire segments are not provided with wire tag references, Contractor shall provide new identification tags at each end of the wire segment.
- C. Contractor shall perform a functionality test of each unit to be relocated. Contractor shall notify Engineer of any equipment deficiencies prior to relocation of the equipment. Contractor shall fully test the equipment to demonstrate the operation of the system after it has been relocated.
- D. Provide updated panel directories for all existing equipment which has been modified. New directories / panelboard cards shall be provided to replace old directories. Directories shall be “typed” and identify both new and existing equipment. (Handwritten directories or updating existing directories is not acceptable).

3.03. CLEANING OF EXISTING ELECTRICAL EQUIPMENT TO BE MODIFIED AND/OR RE-FED

- A. Subsequent to completing modifications work and/or connections to or re-connection work on, at or inside existing electrical power distribution equipment, and prior to such equipment in service, clean the exterior and interior of such equipment. Equipment shall include, but not be limited to switchboard, MCCs, panelboards, transformers, disconnect switches, generator circuit breaker and control panel, and enclosed circuit breakers. Debris and dust that has accumulated on and inside the equipment shall be thoroughly cleaned prior to placing equipment back in service. Cleaning shall include blowing out of equipment interiors using clean, dry compressed air, as well as vacuuming as necessary.
- B. Contractor shall coordinate with owner prior to de-energizing equipment and prior to re-energizing equipment.

END OF SECTION

SECTION 26 05 13 CONDUCTORS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Building wire and cable.
- B. Underground feeder and branch circuit cable.
- C. Wiring connectors and connections.
- D. Special wire and cable.

1.02. RELATED SECTIONS

- A. Section 01 33 00 (Submittal Procedures)
- B. Section 26 00 00 (Electrical – General)

1.03. REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code.
- B. ASTM - American Society of Testing and Materials.
- C. U.L. - Underwriters Laboratories.
- D. Material construction of copper conductors strands shall be coated or uncoated soft drawn or annealed copper as specified in Part 2 and meet or exceed the following:
 - 1. ASTM B-3 for uncoated strands.
 - 2. ASTM B-33 for tin coated strands.
- E. Copper conductor strands shall be combined to form conductors according to the following:
 - 1. ASTM B-8 for concentric-lay-stranded copper conductors.
 - 2. ASTM B-173 for rope-lay-stranded copper conductors.
 - 3. ASTM B-174 for bunch-stranded copper conductors.
- F. Insulation:
 - 1. General:
 - a. All insulation thicknesses shall be in accordance with Section 310 of the National Electric Code.
 - b. Maximum operating temperature as noted in Article 3.05.

- c. Insulation for specific use shall be as specified herein.
- 2. Construction - Material construction of insulation shall meet or exceed the following:
 - a. Ethylene Propylene (EP) - IPECCA S-68-516/NEMA WC 8 and UL 44 standards.
 - b. Ethylene Propylene Diene (EPD) - IPECA S-68-516/NEMA SC-8 and UL 44 Standards.
 - c. Cross Linked Polyethylene (XLP) - IPECA S-66-524/NEMA WC-7 and UL 44 Standards.
 - d. Polyvinyl Chloride (PVC) - UL 83 Standard.
 - e. High Molecular Weight Polyethylene (HMW-PE) - IPECA S-61-402/NEMA WC-5 and UL 83 Standards.
- G. Jacketing and Covering - Material construction of jacketing shall meet or exceed the following:
 - 1. Chlorosulfonated Polyethylene (CP) - (Hypalon) - IPECA S-19-81/NEMA WC-3 and UL 44 Standards.
 - 2. PVC - IPECA S-19-81/NEMA WC-3, IPECA S-61-402/NEMA WC-5 and UL 83 Standards.
 - 3. Nylon - UL Standard 62 and 758.

1.04. SUBMITTALS

- A. Submit under provisions of Sections 01 33 00 (Submittal Procedures) and 26 00 00 (Electrical – General).
- B. Product Data - Provide for each cable assembly type.
- C. Test Reports - Indicate procedures and values obtained.
- D. Manufacturer's Installation Instructions - Indicate application conditions and limitations of use stipulated by product testing agency specified under Article 1.06.
- E. Submittals shall contain a material list with manufacturer data describing the material and showing its compliance with specification, associated standards and test requirements.

1.05. QUALIFICATIONS

- A. Manufacturer - Company specializing in manufacturing products specified in this section with minimum three years' documented experience.

1.06. REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.

- B. Furnish products listed and classified by Underwriters Laboratories, Inc. or other third-party testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

1.07. PROJECT CONDITIONS

- A. Verify that field measurements are as shown on Drawings.
- B. Wire and cable routing, if shown on Drawings, is approximate unless dimensioned. Route wire and cable as required to meet project conditions.
- C. Where wire and cable routing is not shown, and destination only is indicated, Contractor shall determine exact routing and lengths required.

1.08. COORDINATION

- A. Coordinate work all other contracts
- B. Determine required separation between cable and other work.
- C. Determine cable routing to avoid interference with other work.

PART 2 PRODUCTS

2.01. MAJOR POWER DISTRIBUTION

- A. Description - ANSI/NFPA 70, Type XHHW.
- B. Conductor - Copper.
- C. Insulation Voltage Reading - 600 volts.
- D. Insulation - Type XLP (cross-linked polyethylene) or EP.
- E. Manufacturers:
 - 1. Anixter - Model 3B.
 - 2. Manhattan - Model M8628.
 - 3. Okonite Company - Model 112-32-3.
 - 4. Or equal.

2.02. BUILDING WIRE AND CABLE

- A. Description - Single conductor insulated wire.
- B. Conductor - Stranded or solid copper as specified in Part 3 of this section.
- C. Insulation Voltage Rating - 600 volts.

- D. Insulation - ANSI/NFPA 70; Type XHHW insulation for feeders and branch circuits larger than 4 AWG; Type THHN/THWN insulation for feeders and branch circuits 6 AWG and smaller.
- E. Manufacturers:
 - 1. Southwire – THHN or XHHW.
 - 2. Anixter - Model 6G.
 - 3. Okonite - Model 116-67.
 - 4. Or equal.

2.03. BONDING CONDUCTORS

- A. Description - Bare copper wire.
- B. Conductor - Solid ASTM B-1 for sizes No. 8 and smaller; stranded ASTM B-8 for sizes No. 6 and larger.
- C. Manufacturers:
 - 1. Anixter - Model 1A or 1B.
 - 2. Cablec - Model “Bare and coated copper conductors” listed under Section 7 “Special Purpose Cables.”
 - 3. Southwire – Bare copper ground.
 - 4. Or equal.

2.04. WIRING CONNECTORS

- A. Terminal Block Manufacturer:
 - 1. Control Wiring:
 - a. Buchanan - Model 0241.
 - b. Connection - Model NSS3.
 - c. Ideal.
 - d. Or equal.
 - 2. Equipment Power Wiring:
 - a. Buchanan - Model 416.
 - b. Connection - Model NC3.
 - c. Ideal.
 - d. Or equal.
- B. Wire Nuts:
 - 1. For Unclassified Areas - Hexagonal shaped for use with a nut driver, compact swept-wings, ribbed cap, UL-listed for 600V with temperature rating of 105 degrees C (221 degrees F).
 - a. Ideal - Models 341 and 342.
 - b. 3M - Models 212, 312, and 512.

- c. Buchanan - Models B-1, B-2, and B-4.
 - d. Or equal.
- 2. For Wet and Corrosive Areas - Compact swept-wings, ribbed cap, filled with non-hardening sealant, UL-listed for 600V with temperature rating of 105 degrees C (221 degrees F).
 - a. Ideal - Model DB Plus.
 - b. Buchanan - Models BTS2 and BTS4.
 - c. 3M.
 - d. Or equal.
- C. Bolted Wire Connectors - Mechanical connectors for all combination of copper and aluminum conductors. It shall be of a compact high-strength design, tin-plated copper alloy, two-piece connector, and shall utilize two hexhead bolts.
 - 1. Burndy - Model KVSU.
 - 2. Ideal.
 - 3. Ilsco.
 - 4. Or equal.
- D. Terminal Blocks - 600 VAC continuous ratings, heavy duty nylon and suitable for channel mounting with end caps, jumpers and mounting channels as required.
- E. Two-way splices, tubular compression type for conductors 1/0 and larger. Rated 600 VAC and uninsulated.
 - 1. Burndy - Model YS-L "Hylink."
 - 2. Thomas & Betts Catalog - Model 545.
 - 3. 3M - Model 10000.
 - 4. Or equal.
- F. Two-way splices, tubular, compression type for conductors, 1 AWG and smaller, uninsulated and rated 600 VAC.
 - 1. Burndy - Type YSV "Hylink."
 - 2. Thomas & Betts.
 - 3. 3M.
 - 4. Or equal.
- G. Branch Circuit Connector and Fixture Connections - Crimp type, 600 VAC connectors with rubber rap insulator.
 - 1. Ideal Catalog - Series 30; Model 410, 411, and 412 with Model 415 and 417 insulator.
 - 2. Thomas & Betts - Catalog PT66M with PT6 insulator.
 - 3. 3M.
 - 4. Or equal.

2.05. MISCELLANEOUS ACCESSORIES

A. Electrical Tape:

1. Plastic Tape - All weather vinyl electrical tape having a high dielectric strength and resistant to sun, water, oil, acids, and corrosive chemicals. Tape shall be Tomic No. 85; 3M; Thomas & Betts; or equal.
2. High Voltage Electrical Tape - Self bonding polyethylene bond tape. Tape shall be Tomic No. 3; 3M; Thomas & Betts; or equal.
3. High Temperature Tape - A woven glass fabric backing with a thermosetting rubber base adhesive. Tape shall be Tomic No. 77; 3M; Thomas & Betts; or equal.
4. Underground Splice Tape - An inherent positive moisture seal and insulation for 600-volt conductors consisting of a laminate of EPR and Electro-Seal mastic in roll form.
5. Manufacturers - Bishop Electric, 3M, Thomas & Betts, or equal.

B. Wire Pulling Lubricant Manufacturers:

1. Ideal.
2. Tomic Electric.
3. 3M.
4. Or equal.

C. Wire Pulling Lubricant - Wire pulling lubricant shall be non-toxic and contain no solvent to attack wire insulation plastic tape or conduits. Lubricant shall leave no residual in conduit, shall be rust inhibited and be non-combustible.

PART 3 EXECUTION

3.01. EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify ductbanks are completed and terminal equipment is in place.
- C. Verify that mechanical work likely to damage wire and cable has been completed.

3.02. PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.

3.03. CONDUCTOR SIZING

- A. Power and lighting circuits - Minimum number 12 AWG. Quantity as required for proper operation.

- B. Control Circuits - Use stranded conductor not smaller than 14 AWG. Quantity as required for proper operation.
- C. Neutral Wire - To be equal to ungrounded wires unless specifically otherwise shown.
- D. Ground Wire - Minimum size as required by the NEC Table 250 122.

3.04. CONDUCTOR STRANDING

- A. Conductors shall be stranded as called for in the following table.

USE	SIZE	STRANDED REQUIRED
Major power	All	Yes
Panelboard circuits	#8 and Larger	Yes

3.05. WIRING METHODS

- A. General - All conductor shall be Type THWN with insulation suitable for use in wet locations and designed for 75 degrees C maximum operating temperature unless otherwise indicated as noted below:
 - 1. Major Power Distribution (as shown on one-line diagram).
 - a. Use XHHW type-conductor for interior applications.
 - 2. Lighting Circuits - Use THW or THWN-type conductor. Switching control shall be as shown on Drawings. Circuiting approximately as shown; minor variations permitted. Install all required conductors for switching and emergency lighting shown.
 - 3. Receptacle Circuits - Use THW or THWN type conductor. Circuiting approximately as shown; minor variations permitted. Six receptacles per circuit unless indicated otherwise. Special receptacle circuits as shown on Drawings.
 - 4. Wet and Corrosive Areas - Use nylon jacketed type except for major power distribution.
 - 5. 90 Degrees F High Ambient Areas (i.e., Furnace Room) - Use conductor with insulation rated 90 degrees C for dry areas, in locations with continuous ambient temperature in excess of 90 degrees F.

3.06. COLOR CODING

- A. All service, feeder, branch, control, and signaling circuit conductors, shall have color coding throughout the entire run.
- B. Grounding Conductors - Shall be green.
- C. Neutral Conductors - Shall be white or gray, except where neutrals of more than one system are installed in the same raceway or box, the other neutral shall be white with a colored (not green) stripe.

- D. The color of the ungrounded conductors in different voltage systems shall match the existing system. When no existing system exists, color coding shall be as follows:
1. 277/480 volt, 3-phase:
 - a. Phase A – Brown.
 - b. Phase B – Orange.
 - c. Phase C – Yellow.
 2. 120/208 volt, 3 phase:
 - a. Phase A – Black.
 - b. Phase B – Red.
 - c. Phase C – Blue.
 3. dc Power:
 - a. Positive Lead – Red.
 - b. Negative Lead – Black.
 4. dc Control: All – Blue.
 5. 120V Control Wiring - Single conductor ac control wire shall be Red except a wire entering a motor control center compartment or control panel which is an interlock, shall be color coded Yellow.
 6. 24V Control Wiring - Orange.

3.07. INSTALLATION

- A. Install products in accordance with manufacturers' instructions.
- B. Use suitable wire pulling lubricant for building wire 4 AWG and larger.
- C. Do not pull thermoplastic wire at temperatures below 35 degrees F.
- D. Protect exposed cable from damage. For exterior cables, tape ends watertight if terminations are not to be made up immediately after pulling conductors.
- E. Support cables above accessible ceiling, using spring metal clips or metal cable ties to support cables from structure or ceiling suspension system. Do not rest cable on ceiling panels.
- F. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- G. Circuit arrangements shown on Drawings with regard to electrical loading and design concept shall be followed completely. Actual circuit routing shall be at the electrical installer's option as approved by the Engineer. Circuit numbers labeling home runs on Drawings are for count only and not necessarily for directory purposes.
- H. Wiring Diagrams:
 1. Any wiring diagrams shown on plans for hookup of equipment furnished by others are approximate only.
 2. Obtain wiring diagrams, certified correct for the job, from respective supplier for all equipment and systems furnished by them.
 3. Install all work in accordance with certified wiring diagrams.

- I. Conductors installed in wireways shall be grouped and bundled as they exit each conduit run.

In opened areas such as wireways, manholes, etc., wires and cables shall be tied every 12 inches. Provide plastic laminated labels on conductor groupings wrapped to cables.

- J. Electrical trade to provide all power, control and signal wiring and conduits between system components (including installation of any conductors supplied by other trades), including final connections to labeled terminal strips integral in equipment, as shown on Drawings, and in accordance with approved manufacturer's wiring diagrams.
- K. Where instrumentation cables are installed in panels, etc., arrange wiring to provide maximum clearance between instrumentation cables and other conductors. Instrumentation cables shall not be installed in the same bundle with conductors of other circuits.
- L. Intrinsically safe conductors shall be in separate conduits both inside and outside the enclosure and shall be terminated on separate terminal strips with barriers. Label the conduit as "intrinsically safe."
- M. Installation in Manholes and Handholes - Neatly bundle conductors and train them around the outside (long way around) of the manhole. Support conductors from hooks in side of manhole or handhole.
- N. Multi-conductor VFD motor cables shall be installed such that the cable manufacturer's minimum bend radius specifications are followed. As required and prior information, obtain this information from the cable manufacturer for each size cable installed.

3.08. SPARE CONDUCTORS

- A. As noted on the contract drawings.

3.09. TERMINATIONS CONNECTIONS, SPLICES AND JOINTING

- A. General:
 - 1. All accessories that use special tools for proper application as recommended by the manufacturer shall be installed only with those tools and in accordance with the established practices and recommendations of the manufacturers.
 - 2. Solder joints and hinged connectors will not be permitted.
 - a. The exception of multi bolted direct compression connectors in large wire and cable sizes will be permitted, if compression type fittings are not available or the Engineer determines sufficient space is not available.
 - 3. Make splices only in accessible locations and in junction boxes. No splices in pulling fittings, wireways, or MCC wiring spaces.

4. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
 5. Clean conductor surfaces before installing lugs and connectors.
 6. Splices, taps or terminations shall not be made when conductor ends have missing strands or when ends are mutilated in any way.
- B. Splices:
1. No splices will be allowed in any major power distribution runs or in any underground wiring.
 2. Insulate the completed splice with insulating putty to approximately match the insulation thickness or approximately 1/8 inch and tape with self-fusing neoprene splicing tape to twice original cable or wire diameter, two half lapped layers minimum. Extend taping at least 1/2 inch over original insulation or two cable diameters, whichever is larger.
 3. Exceptions:
 - a. Lighting and Receptacle Circuits - Splice connections shall be wrapped with plastic electrical tape, or use insulated compression connectors.
 - b. Fractional horsepower motors wrap splice with plastic electrical tape or insulated compression fillings.
 - c. For splices in circuits located in high ambient temperature areas, wrap the connection with high temperature tape and cover with plastic tape.
- C. All outdoor splices of 600 volt conductors shall be wrapped with underground splice tape and an outer wrapping of plastic electrical tape.
- D. Taps - Make taps similar to splices described above.
- E. Lug Connections - Use one- or two-bolt indent compression lugs. Insulate the lug barrel and original insulation as for splices.
- F. Motor Connections:
1. Motors Less than 1 HP - Use wire nut appropriate for the environment where the motor is located.
 2. Motors from 1 HP to 20 HP - Use branch circuit crimp-type connectors.
- G. Terminal Board Terminations - All interconnecting wiring to terminal boards and strips shall be made with insulated crimp type connectors (locking spade type). Stranded wire shall not be directly connected to terminals without the use of connectors unless the terminations are of the locking collar type. No loose strands shall be permitted outside of the connector, whichever is utilized.
- H. Connections:
1. Connections of conductors to terminal posts or other conductors shall be made with UL approved compression type connectors. Wire nuts shall not be

permitted, except for fractional horsepower, single phase motors or elsewhere where specifically approved by the Engineer.

2. Connections shall insure a thorough connection without damaging the conductor.
3. Connections shall be for proper cable size.
4. Copper to aluminum connection shall be made with UL approved aluminum to copper connectors and compound.

3.10. INTERFACE WITH OTHER PRODUCTS

- A. Identify wire and cable.
- B. Identify each conductor with its circuit number or other designation indicated on Drawings.

3.11. FIELD QUALITY CONTROL

- A. Perform field inspection and testing under provisions of Section 26 00 00 (Electrical – General).
- B. Inspect wire and cable for physical damage and proper connection.
- C. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values. Torque values can also be found in the NEC Handbook.
- D. Verify continuity of each branch circuit conductor.

END OF SECTION

**THIS PAGE
LEFT BLANK**

SECTION 26 05 23

GROUNDING

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Grounding
 - 1. Items to be grounded include all new work of this Contract, but not be limited to metallic water services, equipment housings, motor frames, metal raceways, grounding terminals of outlets, outdoor lighting fixtures, footing rebar, ductbanks, manholes, pullboxes, and transformer secondary neutrals. In addition to the NEC requirements and the above, the following, where a part of this Project, shall be permanently and effectively grounded:
 - a. All structural metals.
 - b. All metallic panels and conduit.
 - c. All metallic equipment bases.
 - d. Metallic hand railing and walkways.
 - e. Metallic portions of heating, ventilating, and air conditioning equipment.
 - 2. Take special precautions to ground all equipment in strict accordance with the NEC and as otherwise noted in these specifications.

1.02. RELATED SECTIONS

- A. Section 26 00 00 (Electrical – General)

1.03. REFERENCES

- A. All materials and installations shall be in accordance with the latest revisions of the following:
 - 1. National Electric Code.
 - 2. Underwriters Laboratories, Inc.
 - 3. Institute of Electrical and Electronics Engineers (IEEE) Standard 81
 - 4. ANSI/NETA ATS

1.04. SUBMITTALS

- A. Provide submittals and samples in accordance with Section 26 00 00 (Electrical – General).
- B. Shop drawing shall be submitted for only the electrode system and conductors used in connection with the grounding system.
- C. Submit an 18-inch sample of the ground system tin-plated conductor and other samples as may be requested by the Engineer.

PART 2 MATERIALS

2.01. ELECTRODES

- A. Driven Ground Rods - 3/4-inch diameter x 10 feet long (minimum) steel core copper jacketed. Rods shall be manufactured by Copperweld Steel Company, Thompson Lightning Protection, Inc., or equal.
- B. Ground Plates - 1/4-inch x 24-inch x 24-inch square copper plates.
- C. Drilled Ground Rods:
 - 1. Drilled ground rods shall be a system consisting of 20 foot straight drilled holes containing salt filled copper tubes. The tubes shall be filled with a combination of NaCL and CaCL salts. All electrical connections at the ground rods shall be made via exothermic welding. All cables shall be tin-plated copper. Backfill material shall be composed of hydrous aluminum silicate. Drilling is typically done by a water well driller as a sub to the Contractor.
 - 2. Drilled system shall be UL listed.
 - 3. System access from grade shall incorporate the use of a concrete or polyplastic box for protection with a steel cover. Box shall be installed flush with finish grade. Use concrete when rods are installed in drives or walkways.
 - 4. Manufacturers:
 - a. Superior Grounding Systems, 1-800-747-7925.
 - b. XIT Grounding System, (213) 320-8000.
 - c. Or equal.
 - 5. Guarantee - Contractor and grounding system installer shall jointly guarantee the grounding system for two years.

2.02. CONDUCTOR

- A. Ground Conductor (Above Grade) - Type XHHW insulated wire in conduit or other raceway. Color code insulation per NEC.
- B. Ground System Conductor (Buried) - Soft drawn or soft annealed stranded copper, tinned bare stranded conductor. Note: This type conductor is not always readily available, and long lead times should be anticipated. For conductors run from inside of building to ground system conductor, also, use tinned bare stranded copper.
- C. Equipment Bonding Conductor - For sizes 8 AWG and smaller, solid ASTM B-1. For sizes 6 AWG and larger, stranded ASTM B-8, bare copper.

2.03. CONNECTORS

- A. Compression-Type Fittings:
 - 1. Construction - Two bolts and a minimum of 1-1/2 inches in length.
 - 2. Manufacturers:
 - a. Thomas & Betts.

- b. Burndy Corporation.
- c. ILSCO.
- d. Or equal.

B. Welded Connection:

- 1. Construction - Molded fusion-welding process.
- 2. Manufacturers:
 - a. Cadweld.
 - b. Thermoweld.
 - c. ILSCO.
 - d. Or equal.

C. Mechanical Connection:

- 1. Construction - Mechanical lugs securely fastened using silicon bronze hardware.
- 2. Manufacturers:
 - a. Thomas & Betts.
 - b. Burndy Corporation.
 - c. Or equal.

PART 3 EXECUTION

3.01. GROUND SYSTEM DESCRIPTION

- A. Install ground system or grid as shown on the Contract Drawings. Install such that tops of ground rods are 12 inches below grade. Depth of the conductor system is to be 30 inches minimum with a length as shown on the Drawings. Thermoweld rods to copper grounding conductor.
- B. When driven rods are specified and cannot be driven due to boulders or rock formations, this specification will allow the NEC 250.53G guidelines for the angled ground rods, but not the horizontal rod, and where shown, to install grounding plates below groundwater level or a minimum of 6 feet below finished grade.
- C. Final resistance to ground of completed ground system shall be a maximum of 5 ohms. If tests indicate higher than 5 ohms resistance, then the Contractor shall install additional rods or plates at no additional cost to Owner to lower the resistance to below 5 ohms.

3.02. CONNECTIONS

- A. Buried Connections - Made with thermal welded fittings specially made for grounding system or compression fitting for buried pipe/plate bonding.
- B. Exposed Connections - Made with grounding system compression-type fittings.

- C. Connections to Metal - Make all connections to water pipes, steel surfaces, etc., using mechanical connectors.
- D. Thoroughly clean all surfaces to bright bare metal to accept ground connections.

3.03. GROUNDING ELECTRODE CONDUCTOR

- A. Services - As shown on the Drawings and as required by the NEC.

3.04. MAIN SERVICE GROUNDS

- A. Bond ground system securely to:
 - 1. Building water service. (If available and if metallic water pipe is used and is of sufficient conductive length to insure continuity, provide jumpers around meters or other removable devices as required.) See Contract Drawings for conductor size and pipe location.
 - 2. Building structural steel (if available), including canopy, roof and hoist supports. One No. 6 minimum two places, opposite corners of building. Buildings over 60 feet in length No. 6 ground at each corner.
 - 3. One No. 6 to foundation (footing) steel reinforcing (20-foot minimum length 1/2-inch rebar).
 - 4. Connect two grounding electrode conductors in conduit to facility grounding grid or system.

3.05. BUILDING GROUND CONNECTION

- A. Connection from main ground to building systems shall be as specified herein as shown and as required. Positively connect equipment housings and conduit system to main service ground, only at main service ground bar.

3.06. INDIVIDUAL GROUNDS

- A. If individual equipment or individual building grounds are made, separate grounding conductors (in earth where possible) shall connect these grounds to main service ground. (This requirement applies only within each system of subsystem fed from a distribution transformer.) Intent is that main ground shall be at the main or incoming power source and not at utilization point unless positively connected to same.

3.07. INTERIOR CONDUIT AND RACEWAY SYSTEM

- A. Electrical integrity of conduit system shall be maintained throughout. Provide bonding jumpers at fittings as required; jumpers shall be no longer than required. Provide a separate ground wire in all conduit systems.

3.08. EXTERIOR CONDUIT AND RACEWAY SYSTEM

- A. Provide separate ground wire for all conduit systems leaving the building interior. Size per NEC 250-122 in NEC or as shown.

- B. Exterior grounding system to be installed in Schedule 80 PVC conduit.

3.09. FEEDERS

- A. Include an insulated grounding conductor, sized per NEC 250-66, in each conduit, sized for total feeder cross-sectional area. Bond all served equipment frames, enclosures, ground bars, etc., to this conductor. Make all conductor terminations and connections using compression lugs or fittings designed and UL labeled for the purposes.

3.10. SEPARATE GROUND

- A. Basic intent of grounding specification is that grounding conductor be completely separate from system neutral and connect neutral to ground at the main service grounding point only. Run separate insulated (green) grounding conductors from all grounding points independently back to main service ground. Where ground passes through panels and disconnects, ground lugs shall be brazed or bolted to panel or disconnect housings with neutral bus or lug isolated from same. Ground all metallic conduits at each panel. Clean paint from metal to accept ground lugs.

3.11. METALLIC, NON-CURRENT CARRYING ENCLOSURE

- A. Connect to ground bar at load center supplying same through conduit system using proper fittings at junction boxes, expansion joints, and between ground bushings on each conduit within all sheet metal enclosures.

3.12. SHIELDED CABLE

- A. Shielding to be continuous and grounded at one point only unless otherwise required by equipment manufacturer's recommendations.

3.13. CONDUIT SEALS

- A. Where non-metallic conduits protecting grounding conductors enter the building from the exterior, provide watertight wall seals on each conduit and a sealing bushing on the enclosed conductor. Sealing bushings on all conduits penetrating the floor. Make bonding jumper connection to metallic conduit, where equipped with sealing bushings, with water pipe ground connections of proper size. Seal watertight the inside of all conduits entering the building below grade.

3.14. GROUND CONDUIT LABELS

- A. Label all service, equipment frame or motor grounding conduits containing only grounding conductors - "(Fill in Name) ground." Label to identify item being grounded.

3.15. INDEPENDENT GROUND SYSTEMS

- A. The grounding system described here shall be independent from the lightning protection ground system. However, both systems, when available, shall be bonded together.

3.16. MAJOR EQUIPMENT FRAMES AND TANKS

- A. Make connection from major equipment frames, i.e., but not limited to, dewatering equipment, mechanical screens or grit equipment, and tanks directly to the exterior/buried ground system via a #6 ground. Conductor shall be installed in conduit the full length from the grounded item to outside below grade.

3.17. METAL STAIRS AND GUARDRAILS (HAND RAILING)

- A. Provide a No. 6 ground conductor to each stair.
- B. Provide a No. 6 bonding jumper between sections of guardrails including stair guardrails.

END OF SECTION

SECTION 26 05 29
ELECTRICAL SUPPORTS, ANCHORS AND FASTENERS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Conduit and equipment supports.
- B. Anchors and fasteners.

1.02. REFERENCES

- A. NECA - National Electrical Contractors Association
- B. ANSI/NFPA 70 - National Electrical Code
- C. Underwriters Laboratories, Inc.

1.03. RELATED SECTIONS

- A. Section 01 33 00 (Submittal Procedures)
- B. Section 26 00 00 (Electrical – General)

1.04. SUBMITTALS

- A. Submit under provisions of Sections 01 33 00 (Submittal Procedures) and 26 00 00 (Electrical – General).
- B. Product Data - Provide manufacturer's catalog data for fastening systems.
- C. Manufacturer's Instructions - Indicate application conditions and limitations of use stipulated by Product testing agency specified under Article 1.05. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

1.05. REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. or other third-party testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

PART 2 PRODUCTS

2.01. PRODUCT REQUIREMENTS

- A. Materials and Finishes - Provide products which incorporate corrosion resistance adequate for the conditions in which they are to be installed.
- B. Provide materials, sizes, and types of anchors, fasteners and supports to carry the loads of equipment and conduit. Consider weight of wire in conduit when selecting products and designing system supports.

2.02. STEEL CHANNEL

A. Non-PVC Coated:

- 1. Ductile Iron (Indoor, dry locations):
 - a. Description - Hot dipped galvanized steel channel designed for use with steel fittings, spring backed washers and nuts.
 - b. Manufacturers:
 - 1) Kindorf.
 - 2) Uni-Strut.
 - 3) B-Line.
 - 4) Globe.
 - 5) Or equal.
- 2. Stainless Steel (Outdoor and wet locations):
 - a. Description - For the purpose of this Section, all stainless steel shall be Type 316.
 - b. All fasteners, fittings, clamps, saddles and accessories shall be stainless steel.
 - c. Manufacturer:
 - 1) Uni-Strut.
 - 2) B-Line.
 - 3) Or equal.

B. Polyvinyl Chloride (PVC) Coated Materials (Wet and Corrosive locations):

- 1. Hanger or support shall be hot dipped galvanized including the threads.
- 2. The zinc surface shall be treated with chromic acid prior to coating to enhance the bond between metal and plastic.
- 3. All surfaces shall be coated with an epoxy acrylic primer of approximately 0.0005-inch thickness.
- 4. The PVC coating shall be applied by the liquid fluidized bed method.
- 5. The coating material shall be compounded of pure materials and shall be free of any fillers or secondary plasticizers or gross, non-uniform characteristics.
- 6. A PVC coating shall be bonded to the galvanized outer surface of the product. The bond between the PVC coating and the product surface shall be greater than the tensile strength of the plastic. The thickness of the PVC coating shall be a minimum of 0.040 inch (40 mils) and a maximum thickness of 0.045 inch (45 mils).
- 7. Finished Color - Manufacturer's standard.
- 8. Manufacturers:
 - a. B-Line Systems, Inc.

- b. Perma-Cote Industries.
- c. Robroy Industries (Plasti-Bond Red).
- d. Kor Kap.
- e. OCAL.
- f. Or equal.

2.03. FIBERGLASS CHANNEL

- A. Description - Pultruded materials of glass strands and polyester resins to form rigid, high strength, non-corrosive, non-flammable structural channels, connectors and fasteners.
- B. Manufacturers:
 - 1. Robroy Industries.
 - 2. Enduro.
 - 3. Aickinstrut.
 - 4. Strut Tech.
 - 5. Or equal.
- C. All strut and hanger rods in corrosive areas shall be fiberglass manufactured in a continuous process whereby linear glass strands, continuous mat laminates, and corrosion resistant polyester resins form a uniform rigid thermoset finished shape. The fiberglass parts shall be self-extinguishing with a V-O classification in the UL 94 test for flammability. Hanger rod washers shall be stamped from protruded flat stock. Hex nuts and strut nuts shall be injection molded. Other hardware shall be PVC coated to a nominal 15 mils. The bond between metal and plastic shall be equal to or greater than the tensile strength of the plastic. Manufacturers: Robroy Industries, Kor Kap, or equal.
- D. Fiberglass spray sealant shall be applied to all field cuts made to the fiberglass channel

2.04. TWO-PIECE MALLEABLE IRON CLAMPS

- A. Cast malleable iron strap clamp sized to match conduit with mating malleable iron clamp backs (spacers). Clamp back shall be thick enough to provide 1/4-inch standoff from conduit to wall. Cadmium plated anchor and washer. Manufacturer - O-Z/Gedney, Thomas & Betts, Appleton, Raco, or equal.
- B. PVC-coated cast malleable iron strap clamp sized to match conduit with mating malleable iron clamp back (spacer). Clamp back shall be thick enough to provide 1/4-inch standoff from conduit to wall. Stainless steel anchor and washer. Manufacturer - Robroy, Thomas & Betts, Ocal, Perma-Cote Industries, Kor Kap, or equal.

PART 3 EXECUTION

3.01. INSTALLATION

A. General:

1. Install products in accordance with manufacturer's instructions.
2. Do not fasten supports to pipes, ducts, mechanical equipment, and conduit. Anchor conduits to or support from structural members only.
3. Fasteners used to wall mount any material or equipment weighing 75 lbs. or more to concrete or masonry shall be adhesive or masonry anchors, Type 316 stainless steel. All floor-mounted equipment and other wall-mounted materials or equipment weighing less than 75 lbs. may be supported via drilled anchors.
4. Do not use spring steel clips and clamps.
5. Do not use powder actuated anchors.
6. Do not drill or cut structural members.
7. Install supports in a manner that does not interfere with or weaken the bolts when attaching to structural steel. Obtain the Engineer's written approval of any drilling or cutting on the structure.
8. Through spaces where surface mounting is not available, install multiple conduits on electrical channel rack, either hung or wall mounted. Provide space on each rack for 25 percent additional conduits.
9. Support conduit passing through above-grade floors so that sealing sleeves or mechanical link seals do not carry the weight of the conduit.
10. Install individual surface mounted conduit with two-piece cast malleable iron clamp assembly.
11. Install surface mounted cabinets and panelboards with minimum of four or six anchors, depending upon the number of normal anchor points. See table at the end of this section.
12. In all locations, use stainless steel channel supports to stand cabinets, panelboards and mounting panels 1/2-inch (12 mm) off wall.
13. Finish of all supports shall be compatible with the conduit system applicable for the area classification where installed.
14. After thorough investigation of architectural, structural and shop drawings related to work to determine how equipment, fixtures, conduit, panelboards, etc. are to be supported, mounted or suspended, provide:
 - a. Extra steel bolts, inserts, pipe stands, brackets, or any other items required for proper support.
 - b. Supporting accessories where required, whether or not shown on Drawings.
15. Refer to details on the Contract Drawings for free-standing and railing-mounted construction and for any other details of special conditions. For other situations, the Contractor shall, prior to installation, submit mounting details to the Engineer for approval.

B. Support Applications:

1. Unclassified Areas - Galvanized steel channel system or malleable iron clamps.
2. Interior Hazardous Areas - PVC-coated channel.

3. Interior Corrosive (Polymer) Areas - Fiberglass reinforced plastic channel system.
 4. Interior Wet Areas - Stainless steel channel system.
 5. Exterior Areas - Stainless steel channel system.
- C. Anchor and Fastener Application Schedule - See schedule at end of this section.
- D. Support Spacing:
1. Metallic Conduit - Not more than 8 feet on center. Types A, A-1, and E within 3 feet of each outlet box, junction box, cabinet or fitting.
 2. Non-Metallic Conduit:
 - a. Sizes up through 1-1/4-inches diameter - not more than 3 feet on center.
 - b. Sizes 1-1/2-inches diameter and larger - Not more than 4 feet on center.
 - c. Within 18 inches of each outlet box, junction box, cabinet or fitting.
 3. Maximum Deflection:
 - a. Metallic Conduit - 1/100th of span between supports.
 - b. Non-Metallic Conduit - 1/360th of span between supports.

ANCHOR AND FASTENER APPLICATION SCHEDULE

ITEM CATEGORY	MOUNTING SURFACES					
	WOOD, PLYWOOD	WALLBOARD, GYPSUM, FRP, COMPOSITION	HOLLOW MASONRY	SOLID MASONRY	CAST CONCRETE	SHEET METAL
Individual conduit	F	G	D	A	A	E
Steel/FRP channel	F, I	D	D	A	A	E
Structures; i.e., conduit rack, cable tray	F, I	D	D	A	A	--
Devices and equipment less than 75 lbs. (Note 5)	I	Note 1	D	A	A	Note 2
Devices and equipment 75 lbs. or more (Note 4)	I	Note 2	H	B, H, J	B, C, H	Note 2
Mounting panels (Note 3)	I	Note 1	D	B, H, J	B, C, H	Note 2

Key to Anchor Types:

- A - Drilled (lead insert in masonry, expansion bolt in concrete)
- B - Adhesive anchor
- C - Cast-in-place insert
- D - Toggle bolt, hollow wall fastener
- E - Sheet metal screw
- F - Wood screw
- G - Sheet rock screw
- H - Through bolt
- I - Lag screw
- J - Masonry anchor

In wet, exterior, corrosive, or hazardous areas, all fasteners and anchors shall be Type 316 stainless steel. In all unclassified areas, cadmium-plated fasteners shall be used, except grouted anchors shall be Type 316 stainless steel.

Notes:

- (1) Support via plywood mounting panel lagged to studs or via electrical channel lagged to studs.
- (2) Do not mount to these surfaces.
- (3) Panels mounted to masonry or concrete surfaces shall have 1/2-inch air space between surface and panel via stainless steel spacers.
- (4) Provide two additional support connections; minimum of four or six, depending on number of normal connection points. This requirement may necessitate fabricating the additional connections. Maintain NEMA rating of enclosure.
- (5) Use adhesive or masonry anchors for all exterior conduit supports.

END OF SECTION

SECTION 26 05 33
RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01. SECTION INCLUDES

- A. Metal conduit.
- B. Flexible metal conduit.
- C. Liquidtight flexible metal conduit.
- D. Electrical metallic tubing.
- E. Nonmetal conduit.
- F. Electrical nonmetallic tubing.
- G. Flexible nonmetallic conduit.
- H. Fittings and conduit bodies.
- I. Wireway and wire trough.
- J. Outlet and device boxes.
- K. Pull and junction boxes.

1.02. RELATED SECTIONS

- A. Section 01 33 00 (Submittal Procedures)
- B. Section 26 00 00 (Electrical – General)
- C. Section 26 05 23 (Grounding)

1.03. REFERENCES

- A. Federal Specifications (Fed. Spec.)

W-C-582(1)	Conduit, Raceway, Metal and Fittings: Surface
W-C-583B	Conduit Boxes and Outlet Fittings, Floor (for Rigid Metal Conduit)
W-C-586B(1)	Conduit Outlet Boxes, Bodies and Entrance Caps, Electrical: Cast Metal for Shore Use
W-C-1094A	Conduit and Conduit Fittings Plastic, Rigid

W-F-406B	Fittings for Cable, Power, Electrical and Conduit, Metal, Flexible
W-F-408C(1)	Fittings for Conduit, Metal, Rigid (Thick-wall and Thin-wall (EMT) Type)
FF-S-760A(2)	Strap, Retaining (Metal for Conduit, Pipe and Cable)
FF-S-325	Shield, Expansion, Nail, Expansion; and Nail, Drive
WW-C-00540 C	Conduit, Metal, Rigid: Electrical, Thin-wall, Steel Type (Electrical Metallic Tubing); Straight Lengths, Elbows and Bends
WW-C-581E	Conduit, Metal, Rigid; and Couplings, Elbow and Nipple, Electrical Conduit: Zinc-coated

B. National Fire Protection Association (NFPA) Publications

No. 70	National Electrical Code (NEC)
--------	--------------------------------

C. Underwriters Laboratories, Inc. (UL) Publications

No. 1	Flexible Metal Electrical Conduit
No. 5	Surface Metal Electrical Conduit
No. 6	Rigid Metal Conduit
No. 467	Electrical Grounding and Bonding Equipment
No. 514	Electrical Outlet Boxes and Fittings
No. 651	Rigid Nonmetallic Electrical Conduit
No. 797	Electrical Metallic Tubing

D. ANSI American National Standards Institute

ANSI C80.1	Rigid Steel Conduit, Zinc Coated
ANSI C80.3	Electrical Metallic Tubing, Zinc Coated
ANSI C80.5	Rigid Aluminum Conduit
ANSI/NEMA FB 1	Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies
ANSI/NEMA OS 1	Sheet steel Outlet Boxes, Device Boxes, Covers, and Box Supports
ANSI/NEMA OS 2	Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports

E. National Electrical Manufacturer's Association

NEMA RN 1	Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
NEMA TC 2	Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC 80)
NEMA TC 3	PVC Fittings for Use with Rigid PVC Conduit and Tubing
NEMA TC 6	PVC and ABS Plastic Utilities Duct for Underground Installation
NEMA TC 8	Extra-Strength PVC Plastic Utilities Duct for Underground Installation
NEMA TC 9	Fittings for ABS and PVC Plastic Utilities Duct for Underground Installation
NEMA 250	Enclosures for Electrical Equipment (1000 Volts Maximum)

1.04. SUBMITTALS

- A. Submittals and samples shall be made in accordance with Sections 01 33 00 (Submittal Procedures) and 26 00 00 (Electrical – General).
- B. Shop drawings shall be submitted for, but not be limited to, the following:
 - 1. All raceway types, A through J.
 - 2. Conduit fittings.
 - 3. Types K, K-1, and K-2 wireway and trough.
 - 4. Wall sleeves and wall plates.
 - 5. Wall sleeve seals.
 - 6. Boxes larger than 100 cubic inches.
 - 7. Pullboxes.
 - 8. Junction boxes.
- C. Shop drawings shall include dimensions, interior and exterior finish, and location where material is to be installed.
- D. Samples shall be submitted as requested by the Engineer.

1.05. PROJECT RECORD DOCUMENTS

- A. Submit under provisions of 26 00 00 (Electrical – General).
- B. Accurately record actual locations and mounting heights of pull and junction boxes.
- C. Accurately record and indicate the size and location of all conduits into and out from all manholes, handholes, and buried pullboxes. Indicate circuit number, size, quantity, source and destination of all conductors in each circuit. Provide measurements to all boxes, bends in conduit groups, and every 100 feet along straight runs of ductbanks.

- D. Measure and record ties from permanent structures to the center of each cover or box with two ties 90 degrees apart.

1.06. REQUIREMENTS

- A. Trenching, backfilling and concrete shall be provided by the Contractor in accordance with the applicable sections of the Contract Specifications.
- B. Conform to requirements of ANSI/NFPA 70.
- C. All work shall be coordinated with the Owner and Engineer.
- D. Furnish products listed and classified by Underwriters Laboratories, Inc. or other third-party testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

1.07. PROJECT CONDITIONS

- A. Verify field measurements are as shown on Drawings.
- B. Verify locations of boxes and outlets in all areas prior to rough in.

1.08. DEFINITIONS

- A. Distribution Runs - Major one-line feeders and power to transformers and panelboards.
- B. Equipment Power and Control Circuits - Power and control for equipment including such items as pumps, mixers, and large fans powered directly from motor control centers or distribution panelboards.
- C. Branch Circuits - Power for all devices and equipment from lighting and equipment panelboards.

PART 2 MATERIALS

2.01. RACEWAYS

- A. The types of materials correspond with the types of raceway as stated in conduit applications.

Type A	Rigid, hot dipped galvanized steel conduit shall conform to ANSI C80-1 and UL No. 6. Manufacturers: Allied, Wheatland, Republic, or equal.
Type A-1	Rigid, hot dipped galvanized intermediate steel conduit shall conform to UL 1242 and Federal Spec. WWC581. Manufacturers: Allied, Wheatland, Republic, or equal.
Type B	Rigid aluminum conduit shall conform to ANSI C80-5. Manufacturers: Allied, Republic, or equal.
Type C	Electric metallic tubing (E.M.T.) shall conform to ANSI C80.3 galvanized steel with interior lacquer and enamel coating, exterior zinc chromate treated and UL No. 797. Manufacturers: Allied, Wheatland, Republic, or equal.
Type D	Rigid, non-metallic conduit shall be Schedule 40 PVC and conform to Federal Specs W-C-1094A and Underwriters Laboratories, Inc., Standard UL-651. Manufacturers: Robroy, Allied, Carlon, or equal.
Type D-1	Similar to Type D, except Schedule 80. Manufacturers: Robroy, Allied, Carlon, or equal.
Type E	<p>PVC-coated, rigid steel conduit shall conform to Federal Specification WWC-581d and NEMA RN1 and be coated with a heat polymerizing adhesive prior to plastic coating. The plastic coating shall be a thickness between 0.035-inch and 0.045-inch applied by the “plastisal” method. Interior coating shall be a factory-applied, two-part, 2 mil thick, chemically cured, hot dipped urethane coating. The coating shall be sufficiently flexible to provide field bending without cracking, splitting or rolling up.</p> <p>At each coupling or fitting, a plastic sleeve shall extend on to the conduit a minimum of one pipe diameter. Plastic sleeves or plastic gaskets shall not interfere with the continuity of ground, vapor-proof, or explosion-resisting characteristics inherent in the fitting. Manufacturers: Robroy, Perma-Cote, KorKap, OCAL, or equal.</p>
Type F	Flexible steel conduit (Greenfield) shall be galvanized steel and conform to U.L. No. 1. Manufacturers: Triangle; Columbia; Porter; or equal.
Type G	Liquid-tight, flexible conduit shall be flexible galvanized steel case with extruded polyvinyl chloride jacket. Manufacturers: Robroy; Anonconda; Triangle Conduit; Keystone; O-Z/Gedney; or equal.
Type G-1	Similar to Type G with Type “UA” rating, UL listed as sunlight resistant.
Type G-2	Liquidtight, flexible non-metallic conduit shall conform to UL 1660 consisting of hard PVC spirals with extra flexible thin-wall PVC coating. Manufacturer: Carlon Carflex; Thomas & Betts Xtraflex; Hubbell Poly Tuff; or equal.

Type H	Explosion-proof, flexible conduit shall be flexible core with bronze braid covering and steel end fittings. Manufacturers: Crouse-Hinds; Appleton; Killark; or equal.
Type J	Surface metal raceway shall be painted steel, formed channels with Snap-On covers, sized as required per NEC for conductors used. Manufacturers: Wiremold Company; Walker Division of Butler Manufacturing Company; or equal.
Types K and K-1 - Wireway and Wire Trough	<ol style="list-style-type: none"> 1. Formed steel wireway with hinged cover; full lay-in for entire length. Provide with cover latches or captive screws; latches shall have provisions for a sealing wire in the closed position. Finish shall be gray (ASA 49) electro-coated epoxy baked enamel applied over a corrosion-resistant phosphate primer. Provide an approved grounding bar and install whenever a non-metallic extension is made from a wireway. All lengths and fittings shall have smooth, round edges. Furnish without knockouts. 2. Type K - General purpose wireway covers and troughs shall be constructed from a minimum of 16 gauge steel. Manufacturer: Square D, G.E., Westinghouse, Hoffman, or equal. 3. Type K-1 Oiltight troughs shall be 14 gauge steel with oil-resistant, closed cell cover gasket. Provide oil-resistant neoprene joint gasket between bolted end flanges. Manufacturer: Square D Class 5120 or equal.
Type K-2 - Wireway and Trough	PVC wireway with snap cover, NEMA 12 rated, UL listed for electrical wiring up to 600 volts. UL File No. ULE151021. Gray extruded PVC meeting UL 94V-O. Manufacturers: Carlon or equal.

2.02. PULLING FITTINGS (CONDUIT BODIES)

A. For Types A and A-1 Conduit:

1. Cast iron alloy or malleable iron.
2. Threaded hubs.
3. Zinc electroplate.
4. Cast iron alloy cover with stainless steel screws and solid neoprene gasket.
5. Comply with UL Standard 514 and ASTM A47-77.
6. Manufacturers:
 - a. Crouse-Hinds.
 - b. O-Z/Gedney.
 - c. Appleton.
 - d. Or equal.

B. For Type B Conduit:

1. Cast copper-free aluminum.
2. Threaded hubs.

3. Aluminum acrylic paint.
 4. Cast copper-free aluminum cover with stainless steel screws and solid neoprene gasket.
 5. Comply with UL Standard 514.
 6. Manufacturers:
 - a. Crouse-Hinds.
 - b. O-Z/Gedney.
 - c. Appleton.
 - d. Or equal.
- C. For Type C Conduit:
1. Diecast copper-free aluminum.
 2. Hubs with hardened hex head with compression connector. No set screws.
 3. Stamped copper-free aluminum cover with stainless steel screws and solid neoprene gasket.
 4. Manufacturers:
 - a. O-Z/Gedney.
 - b. Appleton.
 - c. Or equal.
- D. For Types D and D-1 Conduit:
1. Cast PVC fitting molded from pure polyvinyl chloride material in conformance with NEMA TC-2 Federal Specifications, WC1094A and UL651 Specifications.
 2. Push-on hubs for use with cement solvent.
 3. Molded PVC cover with stainless steel screws and neoprene gasket.
 4. Manufacturers:
 - a. Carlon.
 - b. Orangeburg.
 - c. Allied.
 - d. Or equal.
- E. For Type E Conduit:
1. Cast iron alloy or malleable iron body with PVC coating.
 2. Tapered threaded hubs.
 3. Each hub shall have an extended PVC collar equal in length to the pipe diameter.
 4. Cast iron alloy cover with PVC coating outside, stainless steel screws and solid neoprene gasket.
 5. Manufacturers:
 - a. Robroy.
 - b. Perma-Cote.
 - c. KorKap.
 - d. OCAL.
 - e. Or equal.

2.03. EXPANSION FITTINGS

- A. All expansion fittings shall:
 - 1. Provide for 4-inch linear movement.
 - 2. Provide a watertight connection.
 - 3. Be UL certified.
- B. For Types A and A-1 Conduit:
 - 1. Zinc-plated malleable iron body.
 - 2. Incorporate bonding jumper.
 - 3. Manufacturers:
 - a. Crouse-Hinds.
 - b. Appleton.
 - c. Thomas and Betts.
 - d. Killark.
 - e. Or equal.
- C. For Type B Conduit - Same as for Type A.
- D. For Type C Conduit:
 - 1. Hot dipped galvanized.
 - 2. Self-contained connectors.
 - 3. Manufacturers:
 - a. O-Z/Gedney Type TX.
 - b. Thomas & Betts.
 - c. Or equal.
- E. For Types D and D-1 Conduit:
 - 1. Two-piece, dual hub.
 - 2. Double O-ring seals.
 - 3. 6-inch movement.
 - 4. Manufacturers:
 - a. Carlon E945 Series.
 - b. Orangeburg.
 - c. Or equal.
- F. For Type E Conduit:
 - 1. PVC-coated iron body.
 - 2. Interior coated.
 - 3. 4-inch expansion.
 - 4. Manufacturers:
 - a. Robroy.
 - b. Perma-Cote.

- c. KorKap.
- d. OCAL.
- e. Or equal.

2.04. EXPANSION-DEFLECTION FITTINGS

A. All expansion-deflection fittings shall:

- 1. Provide for 3/4-inch linear movement, angular misalignment and parallel misalignment.
- 2. Provide a watertight connection.
- 3. Have threaded bronze couplings.
- 4. Have molded neoprene jacket with stainless steel jacket clamps, plastic inner sleeve and flexible, braided tinned copper grounding straps.

B. Manufacturers:

- 1. Crouse-Hinds Corporation; Type XD.
- 2. O-Z/Gedney; Type DX.
- 3. Or equal.

2.05. ELBOWS

A. Types A, A-1, and E Conduit:

- 1. Conduit material similar to conduit system.
- 2. Factory made elbows with tapered thread ends.
- 3. Manufacturers - Same as conduit system.

B. Type B Conduit:

- 1. Factory made elbows with threaded ends.
- 2. Aluminum material.

C. Type C Conduit:

- 1. Conduit material similar to conduit system.
- 2. Either factory made elbows or field bend as required.
- 3. Field bend in accordance with National Electrical Code.

D. Types D and D-1 Conduit:

- 1. Conduit material similar to conduit system.
- 2. Either factory made elbows or field bend as required.
- 3. Field bend only with use of "hot box."

2.06. MISCELLANEOUS FITTINGS AND CONNECTORS

A. For Types A and A-1 Conduit:

1. Malleable iron.
2. Zinc or hot dipped galvanized.
3. Tapered threaded hubs or connections.
4. Manufacturers:
 - a. Crouse-Hinds.
 - b. O-Z/Gedney.
 - c. Appleton.
 - d. Killark.
 - e. Or equal.

B. For Type B Conduit:

1. Aluminum.
2. Malleable iron, zinc.
3. Tapered threaded hubs or connections.
4. Manufacturers:
 - a. Crouse-Hinds.
 - b. O-Z/Gedney.
 - c. Appleton.
 - d. Killark.
 - e. Or equal.

C. For Type C Conduit:

1. Steel or malleable iron.
2. Compression type (no set screws).
3. Zinc-plated.
4. Manufacturers:
 - a. O-Z/Gedney.
 - b. Thomas and Betts.
 - c. Or equal.

D. For Types D and D-1 Conduit:

1. PVC.
2. Threaded or socket weld.
3. Manufacturer:
 - a. Carlon.
 - b. Orangeburg.
 - c. Or equal.

E. For Type E Conduit:

1. Malleable iron.

2. Zinc-coated or galvanized.
3. PVC overcoat.
4. Two-part, 2 mil thick chemically cured, hot dipped urethane intercoating.
5. Manufacturer:
 - a. Rob-Roy.
 - b. Perma-Cote.
 - c. KorKap.
 - d. OCAL.
 - e. Or equal.

2.07. OUTLET AND DEVICE BOXES

A. Nonmetallic Outlet Boxes - ANSI/NEMA OS 2.

1. Polyvinyl chloride, molded; fiberglass reinforced plastic with molded conduit sockets and mounting flange.
2. Minimum 18 cubic inch capacity.
3. Manufacturers:
 - a. Carlon.
 - b. Allied Moulded Products, Inc.
 - c. Racor, Inc.
 - d. Or equal.

B. Cast Boxes - NEMA FB 1.

1. Cast, copper-free aluminum or cast iron alloy to match conduit systems.
 - a. For PVC-Coated conduit systems, provide PVC coated boxes and fittings by the same manufacturer as the conduit system.
2. Type FD and FS box with integral mounting lugs and heavy duty threaded hub(s).
3. Provide gasketed cover by box manufacturer.
4. Manufacturers:
 - a. Crouse-Hinds.
 - b. Appleton.
 - c. Killark.
 - d. O-Z/Gedney.
 - e. Or equal.

2.08. PULL AND JUNCTION BOXES

A. Sheet Metal Boxes - NEMA OS 1.

1. Galvanized steel, without knockouts.
2. NEMA 4X rated.
3. Hinged cover.
4. Gasketed cover in wet areas.
5. Manufacturers:
 - a. Hoffman.

- b. McKinstry.
 - c. Or equal.
- B. Surface-Mounted Cast Metal Box - NEMA Publication No. 250, Type 4; flat flanged, surface mounted junction box.
 - 1. Material - Cast aluminum.
 - 2. Cover - Furnish with ground flange, neoprene gasket, and stainless steel cover screws.
- C. Non Metallic Junction Boxes:
 - 1. Polyester reinforced fiberglass.
 - 2. Closed cell neoprene gasketed door.
 - 3. Screw cover door with stainless steel screws.
 - 4. Nonconductive.
 - 5. Ignition temperature minimum - 520 degrees C.
 - 6. Dimensional stability of 168 hours in accordance with ASTM D1042.
 - 7. Manufacturers - Robroy, Hoffman, Crouse Hinds, Carlon, or equal.

2.09. MISCELLANEOUS

- A. Nipples:
 - 1. Nipples for Types A, A-1, B, and E shall be factory made. Material shall be similar to that in the rest of the system.
 - 2. Nipples for Types C, D, and D-1 shall be cut in the field from material similar to the rest of the system. Trim and debur ends.
- B. Locknuts - Zinc-plated malleable iron.
- C. Insulated Bushings - Threaded, galvanized, cast malleable iron body with thermoplastic insulator for Types A and A-1 conduit.
- D. Unions - Three piece (Erickson) couplings. Zinc plated malleable iron with tapered threads for joining Types A and A-1 conduit sections that cannot be turned as manufactured by O-Z/Gedney, Appleton, Thomas & Betts, or approved equal. Split couplings are not permitted.
- E. Strain Relief Connector - Zinc plated malleable iron body and gland nut with neoprene grommet. Manufacturers: Crouse-Hinds, Series CGB-SG; Hubbell (Kellums Division), or approved equal.
- F. Strain Relief (Wire Mesh) Grip - Woven stainless steel wire mesh sleeve with crimped-on zinc-coated retainer ring at one end for use with neoprene grommet and gland nut. Manufacturers: Crouse-Hinds, Pass & Seymour "Flexcor," Hubbell (Kellums Division), or approved equal.

- G. Support (Wire Mesh) Grip - Heavy duty, single eye closed mesh wire sleeve. Eye shall be reinforced with rolled and crimped galvanized steel bearing strip. Wire mesh shall be stainless steel wire. Select diameter size appropriate for cable being supported. Manufacturers: Hubbell (Kellums Division), O-Z/Gedney, Pass & Seymour "Flexcor," or approved equal.
- H. Wall Sleeves, Masonry Only:
 - 1. Sleeves - Schedule 40 galvanized steel. Size sleeve 1 inch larger than outside diameter of conduit. Cut ends to be filed smooth and galvanized.
- I. Combination Sleeve/Seal - Hot dip galvanized, malleable or cast iron castings and PVC or zinc-coated steel sleeves for use with neoprene sealing grommet and PVC coated steel pressure rings; single-face and double-face seals as required. Manufacturers: O-Z/Gedney, Series FSK (single-face seal, walls or floors up to 12 inches thick); Series WSK (double-face seal, walls or floors 12 inches or more thick).
- J. Sleeve Sealing Systems:
 - 1. Bolted, Conduit Sealing Bushing - Molded slip sealing ring joined by steel compression bolts as manufactured by Thunderline Corporation; Type CSM as manufactured by O-Z Gedney Electrical Manufacturing Company, or approved equal. Compression bolts shall be galvanized in dry, above grade areas; stainless steel in all other areas.
 - 2. Multiple Conduit Wall Seals - Steel frame sized to fit into masonry opening with compressible, elastomeric sections selected to accommodate multiple conduits.
 - 3. Fire-Rated Wall Seal:
 - a. Fire Resistant Putty - 3M fire barrier CP 25WB caulk. Fire barrier moldable putty by Dow Corning or Thomas & Betts or approved equal.
 - b. Fire-resistant, modular neoprene/stainless steel seal system. Manufacturer: Thunderline Corporation, Pyro-Pac Series; BICC Pyrotenac; or approved equal.
- K. Mechanical Link-Type Seals - For conduit and sleeve sealing, provide mechanical link-type seal with elastomeric links joined by stainless steel bolts which also serve to expand the seal.

PART 3 EXECUTION

3.01. INSTALLATION

- A. Install electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
- B. All boxes shall be installed level and plumb.

- C. Install electrical boxes to maintain headroom and to present neat mechanical appearance.
- D. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- E. Inaccessible Ceiling Areas - Install outlet and junction boxes no more than 6 inches (150 mm) from ceiling access panel or from removable recessed luminaire.
- F. Junction boxes over 100 cubic inches shall be provided with terminal strips for joining conductors.
- G. Contractor shall size all junction boxes in accordance with the NEC unless otherwise shown or noted.
- H. In all finished areas, device, outlet, and junction boxes may be galvanized sheet metal. In all other areas, device, outlet, and junction boxes shall be cast metal, except NEMA 12 metal boxes may be used in unfinished and unclassified areas.
- I. Boxes in corrosive, wet or explosion proof areas shall be cast aluminum with coatings to match conduit system.
- J. Boxes, where Type D or D-1 conduit is specified or shown, shall be nonmetallic.
- K. Install boxes to preserve fire resistance rating of partitions and other elements.
- L. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices with each other.
- M. Use flush mounting outlet and device boxes in finished areas.
- N. Do not install flush mounting boxes back to back in walls; provide minimum 6-inch (150 mm) separation. Provide minimum 24 inches (600 mm) separation in acoustic rated walls.
- O. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- P. Use stamped steel bridges to fasten flush mounting outlet and device boxes between studs.
- Q. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- R. Use adjustable steel channel fasteners for hung ceiling outlet box.
- S. Do not fasten boxes to ceiling support wires.

- T. Support boxes independently of conduit, except cast box that is connected to two rigid metal conduits both supported within 12 inches (300 mm) of box. Unless box supports a luminaire, then support the box as well.
- U. Use cast gang boxes where more than one device is mounted together. Do not use sectional box.
- V. Use gang box with plaster ring for single device outlets.
- W. Use cast outlet box in exterior locations exposed to the weather and wet locations.
- X. Large Pullboxes - Boxes larger than 12 inches (300 mm) in any dimension, use hinged cover enclosures.

3.02. RACEWAY APPLICATIONS

A. Conduit Types:

A	Rigid galvanized steel (RGS)
A-1	Rigid galvanized intermediate metal conduit
B	Rigid aluminum conduit
C	Electrical metal tubing (EMT)
D	Rigid, non-metallic conduit (PVC), Schedule 40
D-1	Rigid, non-metallic conduit (PVC), Schedule 80
E	PVC-coated rigid steel conduit with interior lacquer coating
F	Flexible steel conduit (Greenfield)
G	Liquid tight, flexible conduit
G-1	Liquid tight, flexible conduit with ultraviolet resistance rating
G-2	Liquid tight, flexible, non-metallic
H	Explosion proof flexible conduit
J	Surface metal raceway
K	Fabricated wireway or wire trough
K-1	Fabricated wireway or wire trough, heavier than Type K and with oil tight cover gasket
K-2	Lay-in PVC wireway or trough with "clip-on" covers

B. Install raceway types according to the schedule below.

- 1. Interior:
 - a. Unfinished Areas:
 - 1) Unclassified (above-grade; not wet, corrosive, or hazardous areas):
 - a) Use conduit Type E.

- b) Final Connections - Use conduit Type G.
 - c) Wireways - Use Type K.
 - 2) Wet and corrosive areas (above- and below-grade areas):
 - a) Use conduit Type E for above grade
 - b) Use conduit Type E for below grade.
 - c) Final Connections - Use conduit Type G.
 - d) Wireways - Use Type K-2.
 - 3) Rooms Below Grade
 - a) Distribution Runs - Use conduit Type E.
 - b) Final Connections - Use conduit Type G.
 - c) Wireways - Use Type K.
 - 4) Hazardous Areas:
 - a) Use conduit Type E
 - b) Final Connections - Use Type H.
 - c) No wireways shall be used; use cast junction or pullboxes.
 - d) Install seal off fittings on non-hazardous side and extend Type E conduit a minimum of 18 inches into non-hazardous area.
- 2. Exterior - Exposed: Use conduit Type E (exposed or on building walls above 18 inches above grade). Type E (conduit stub-ups from ductbanks from 36 inches below grade to a minimum of 18 inches above grade or to first box or enclosure) and Type K-1.
- 3. Underground Ductbanks - Use conduit Type D for 120V and higher voltage power and control. Use conduit Type A for signal and non-fiber optic communications. All stub-ups from 36 inches below grade shall be Type E.
- 4. Conduits to Contain Instrumentation Conductors (24 VDC or 4-20 mA):
 - a. For Wet Areas - Type E.
 - b. For Corrosive Areas - Type E.
 - c. For Hazardous Areas - Type E.
 - d. For Non-classified Areas - Type E.
- 5. Exceptions and Restrictions:
 - a. No conduit shall be installed within or beneath below-grade slabs or within below-grade walls.
 - b. Type B and C materials are not permitted encased in concrete or below grade or in wet, corrosive, or hazardous environments.
 - c. Do not use gutters or wireways for power or control circuits to major equipment unless shown otherwise.
 - d. Do not use Type K or K-1 gutters or wireways outside or in wet, corrosive, or hazardous areas inside.
 - e. Specific applications noted on the Contract Drawings shall take precedence over this schedule.

3.03. SYSTEM FABRICATION

A. General:

1. All conduits shall be free of indentations, elliptical sections, blisters and other defects.
2. Install metallic conduit in accordance with NECA "Standard of Installation."
3. Install all conduit in accordance with manufacturer's instructions.
4. Arrange supports to prevent misalignment during wiring installation.
5. Cut conduit square using saw or pipe cutter; de-burr cut ends.
6. Bring conduit to shoulder of fittings; fasten securely.
7. Use conduit hubs for exterior locations or sealing locknuts for interior locations to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes without hubs.
8. Install no more than equivalent of three 90-degree bends between boxes or pull fittings. Use conduit bodies to make sharp changes in direction, as around beams.
9. Avoid moisture traps. In exterior conduit systems and in wet and corrosive areas, provide a junction box with drain fitting at low points in the conduit system or at the bottom of vertical runs more than 8 feet long.
10. Provide deflection joint fittings to accommodate expansion and deflection where conduit crosses seismic, control, and expansion joints.
11. Provide conduit expansion joints at structural expansion joints, between separate structures, on straight runs of 75 feet or more and where shown on plans. Support conduit on each side of expansion joint.
12. Provide 1/8-inch polypropylene pull cord in each interior above-grade spare conduit. Provide 1/4-inch polypropylene pull cord in each underground or concrete-encased conduit.
13. Use suitable caps to protect installed conduit, fittings, and boxes against entrance of dirt, moisture, and foreign material.
14. Ground and bond conduit under provisions of Section 26 05 23 (Grounding).
15. Identify conduit under provisions shown on the Drawings.
16. After conduit run is in place, thoroughly clean the inside of the conduit run and cap each end. Do not remove caps until ready to pull conductors. Install insulated bushings at end of conduit prior to pulling conductor.
17. Attach conduit to electrical equipment such as steel junction boxes, pullboxes, and switches with double steel locknuts. Use threaded insulated bushings on the end of each conduit that terminates in these boxes. Use grounding type insulated bushing for grounding continuity or where required by the N.E.C. Maintain electrical continuity through all connections.
18. Flexible conduit sections shall not exceed 36 inches long. Fit flexible conduit with conductive connectors to enable ground conductivity. Use jumpers as necessary.
19. Install all-thread (close) nipples between fittings and electrical equipment so that no threads are exposed.
20. Do not install conduit runs on the exterior of any building or tank surfaces unless shown on Drawings or approved by the Engineer. Conduit runs up to 10 feet are permitted on concrete process tank walls and structures. Obtain

Engineer's approval for installation of conduit runs greater than 10 feet on concrete process tank walls.

21. In areas where spray insulation is to be applied, provide standoffs and install conduits before the insulation has been applied and provide extensions to all boxes. Boxes and enclosures over 100 cubic inches shall be mounted on electrical channel after the insulation is installed and all connecting conduit shall be offset to connect to boxes or enclosures.
22. Minimum - Conduit sizes shall be as follows unless specifically shown otherwise:
 - a. 3/4 inch for exposed locations (includes those areas above drop ceiling of lay-in tiles).
23. Changes of Conduit Size - Made at pull or junction boxes except where specifically shown via a pull fitting.

B. Conduit Routing:

1. Arrange conduit to maintain headroom of at least 7 feet 6 inches above floors or other walking surfaces and present neat appearance. Provide Engineer-approved supports. Where conduit has to be run on walking surfaces, first contact the Engineer to review and approve installation and, if approved, provide stainless steel pipe guards per Engineer's requirements.
2. Route exposed conduit parallel and perpendicular to walls.
3. Route conduit installed above accessible ceilings parallel and perpendicular to walls.
4. Maintain adequate clearance between conduit and piping.
5. Where cutting walls or floors is necessary to install conduit, take care not to weaken the structure involved. Do not cut beams or other structural supports under any condition.
6. Not more than three 90 degree elbows or equivalent bends up to 270 degrees shall be installed in any run between pulling or access fittings. In interior telephone, instrumentation, and signal conduit only two 90 degree bends or equivalent bends up to 180 degrees are allowed between access fitting or boxes.
7. Maximum spacing between pulling or access fittings shall be 100 feet in any run of conduit.
8. Group conduit runs wherever possible.
9. Do not chase block walls which will be left without plaster or tile finish; do not run horizontally in block walls.
10. All interior conduit shall be installed exposed except in finished areas (only above drop ceilings) or where specifically shown otherwise.
11. When installing conduit(s) in concrete walls or slabs or beneath slabs on grade, encase conduit with at least 3 inches of concrete on all sides. Allow adequate space for concrete to flow between conduits. No conduits will be permitted within walls below grade, i.e., as in basements or galleries or within or below slabs that are below grade.
 - a. Earth or gravel fill around conduits beneath slab on grade is not acceptable.

12. In or beneath concrete floor slabs, run conduit from point to point.
13. Secure conduit installed in poured-in-place concrete to reinforcing with tie wires. Install suitable brackets secured to forms in the absence of reinforcing.
14. For conduit penetrations through the roof, use openings for piping and ductwork or roof jack with pitch pocket. Coordinate all roof penetrations with roofing installer and follow their required method of installing conduits through roofs. For single conduits, roofing installer may require the use of preformed "boots."
15. Interior raceway containing instrumentation cable shall be installed to provide the following clearances:
 - a. Raceway parallel to power conductor raceways for distance greater than 20 feet and energized at 120 volts or greater - 36 inches unless otherwise shown.
 - b. Raceway installed at right angles to conductors energized at 120 volts or greater - 8 inches.
 - c. Where practicable, raceway containing instrumentation cable shall cross raceway containing conductors of other system only at right angles.
 - d. Intrinsically safe conductors shall be in separate conduits inside and outside enclosures and to separate terminal strips with barriers.
16. Conduit shall be installed away from equipment and other devices so as not to encumber maintenance, repair, or replacement of the equipment or device.

C. Clearances from Heat:

1. Crossing Heated Pipes:
 - a. Insulated Pipes - Maintain 2-inch clearance.
 - b. Uninsulated Pipes:
 - 1) Surfaces Less than 104 degrees F - Maintain 4-inch clearance.
 - 2) Surfaces 104 degrees F or Greater - Maintain 8-inch clearance.
2. Parallel to Heated Pipes:
 - a. Insulated Pipes - Maintain 4-inch clearance.
 - b. Uninsulated Pipes:
 - 1) Surfaces Less than 104 degrees F - Maintain 6-inch clearance.
 - 2) Surfaces 104 degrees F or Greater - Maintain 12-inch clearance.
3. Avoid installing conduit parallel to heated, uninsulated pipe, if possible.
4. Do not install conduit above or in front (in path of heated air) of heating or heat producing equipment.

D. Rigid Conduit Systems (Types A, A-1, B, C, and E):

1. Heating metal conduit to facilitate bending is strictly prohibited.
2. Field bending metal conduit is permitted as follows:
 - a. Types A, A-1, and B - Up to and including 3/4-inch size.
 - b. Type C - Up to and including 1-1/4-inch size.

3. For all rigid metal conduit larger than that above, use manufactured elbows or hydraulic one-shot bender to fabricate bends.
4. Use manufactured elbows for all bends in Type E conduit systems. No field bending is allowed.
5. Make all bends with radius no less than N.E.C. requirement.
6. Do not join conduits of dissimilar metals. Provide an isolation fitting between them.
7. Conduit threads made in the field shall conform to standard NPT sizes and length.
8. Threaded conduit connections shall be screwed tight with only incomplete threads exposed.
9. Do not weld conduit and/or conduit fittings together or to any steel structure.
10. Sealing and Lubricating Compounds:
 - a. Make all screwed ferrous conduit joints with standard couplings and join using copper-type conductive sealing compound.
 - b. Lubricate aluminum conduit thread with graphite.
11. Couplings:
 - a. Butt ends of conduit tightly into the coupling.
 - b. In exposed work, where standard couplings cannot be used, three-piece (Erickson) couplings are permitted.

E. Non-metallic Systems (Types D and D-1):

1. Join non-metallic conduit using cement as recommended by manufacturer. Wipe non-metallic conduit with appropriate cleaner, then dry before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
2. Field bending of Types D and D-1 conduit is permitted only if a "hot box" is used.
3. Make all bends with radius no less than N.E.C. requirement.
4. Kinked or crimped conduit bends are not acceptable. Remove and replace all such bends.

F. Underground Conduits:

1. General - Trenching, rock excavation, dewatering, backfilling, compaction, concrete, reinforcing and rough grading shall be provided in accordance with the applicable sections of the Contract Specifications. Finish grading shall be by the General Contractor.
2. Underground conduit shall consist of parallel runs of conduit as shown.
3. All underground, vertical conduit bends shall be 36 inch radius; all underground horizontal bends shall be long radius, 48 inches minimum.
4. Stagger all joints.
5. Make underground joints as watertight as possible.
6. Slope ductbank continuously away from buildings at 3 inches per 100 feet to the nearest manhole. Do not install ductbanks with a low point at or between structures.

7. After all cables have been installed, fill around cables and all unused duct openings with approximately 1-1/2-inch thick oakum or asbestos wick to a depth of 6 inches. Then seal with a non-hardening, plastic compound equivalent to Johns-Manville "Duxseal," O-Z/Gedney "Duct Sealing Compound," or approved equal.
8. Clean all spare conduits and cap and seal watertight.
9. At concrete encased ductbank, make pour continuous wherever feasible. Where separate pours must be made, install 48-inch by #6 rebars, three at the top and three at the bottom, inserted 24 inches into the end of the first pour.
10. Exercise care not to over excavate ductbank trenches. Any low spots must be brought to line with compacted crusher run granular material. When crossing other buried utilities where the backfill is not compact or is "soft," either compact the backfill and fill with crusher run or bridge the trench by concrete encasing and reinforcing ductbank to 5 feet beyond soft area on each side.
11. Terminate all spares in MCCs, distribution panels, panelboards, or pullboxes unless otherwise indicated.
12. Provide a No. 6 ground wire (stranded bare, tinned copper cable) below conduits before backfilling.
13. Conduit Type D shall be terminated in concrete manholes with bell end fittings installed flush with inside manhole walls. For conduit Type E (extends from 24 inches outside manholes to 3 inches inside for Type A systems), use insulated grounding bushings. Seal around conduits with non-shrink grout flush with inside manhole walls.

3.04. CONDUIT SEALING

A. Conduit Sealing Interiors:

1. Perform conduit sealing after all conductors are installed, tested and accepted by the Engineer and the authority having jurisdiction.
2. Seal conduit passing through vapor sealed walls; in all incoming underground conduits terminating in areas below grade; and between warm, humid rooms, and cooler areas.
No water shall enter any building, structure, or electrical equipment through any conduit. This may require adding drains out of manholes or pullboxes.
3. Exterior Waterproof Conduit Sealing - Provide watertight hubs at conduits entering the top or sides of all NEMA 4 and 4X enclosures. Gasketed locknuts are not acceptable as a waterproof conduit seal.
Seal conduits entering the top or sides of interior NEMA 4 and 4X enclosures using gasketed locknuts.

3.05. WALL/FLOOR PENETRATIONS AND SEALING

A. Below Exterior Grade Walls:

1. New Concrete:
 - a. Single, Two, or Three Penetrations - Cast-in-place sleeve seals or core drill and seal using link seals.

- b. Multiple - Thru-wall pullbox where shown on the Contract Drawings.
 - 2. Existing Concrete or New Precast Walls - Core drill openings and use modular neoprene/stainless steel "link-type" seal.
- B. Above-Grade Exterior Walls:
 - 1. New or Existing Concrete or Masonry:
 - a. Core drill all holes for up to six conduits.
 - b. Use stainless steel thru-wall pullbox where shown on the Contract Drawings.
 - 2. In concrete walls, seal space around conduit in cored holes with modular neoprene/stainless steel "link-type" seal.
 - a. On walls less than 15 inches thick, provide seal on outside face. On walls 15 inches thick or thicker, provide seal on both inside and outside faces.
 - 3. In masonry walls, seal space around conduit in cored holes with non-shrink grout to within 1/2 inch of wall face. Seal remaining space watertight with silicone or acrylic latex masonry sealant.
 - 4. Seal all unused spaces in thru-wall barrier with appropriate sized sealing blocks.
- C. Interior Walls:
 - 1. Non-Fire Rated Walls:
 - a. Between Unclassified Areas:
 - 1) No Drop Ceiling or Below Drop Ceiling - Use wall sleeves or core drilled holes.
 - 2) Above Drop Ceiling.
 - a) Air handling space - Core drill holes and seal around conduit.
 - b) Not air handling space - Box out wall for conduits.
 - b. Between Classified or Classified/Unclassified Areas - Use core drilled hole. In masonry wall, seal with non-shrink grout to within 3/4 inch of wall face. Seal gastight and watertight with silicone masonry sealant. Fill hollow masonry voids with grout. In concrete wall, seal around conduit with modular neoprene links and stainless steel compression bolts. Use thru-wall barrier as shown on Contract Drawings. Fill unused holes with matching plug.
 - 2. Fire-Rated Wall Seals:
 - a. Refer to Contract Drawings for location of fire rated walls.
 - b. Masonry Walls:
 - 1) Individual Conduit - Core drill wall and provide galvanized metal sleeve. Fill voids in block prior to installing sleeve. Seal between wall and sleeve with non-shrink grout. Seal around conduit with fire barrier caulk or fire barrier moldable putty.
 - 2) Multiple Conduits - Provide through wall barrier.
 - c. Concrete Walls:

- 1) Individual Conduit - Core drill wall and provide fire-rated "link seal." Seal around conduit with fire barrier caulk or with fire barrier moldable putty.

3.06. EMPTY RACEWAYS

- A. Provide permanent, removable cap over each end.
- B. Provide PVC plug with pull tab for underground raceways with end bells.
- C. Provide nylon pull cord.
- D. Identify, as specified in Article Identification Devices, with waterproof tags attached to pull cord at each

3.07. PROTECTION OF INSTALLED WORK

- A. Protect products from effects of moisture, corrosion, and physical damage during construction.
- B. Provide and maintain manufactured watertight and dust-tight seals over all conduit openings during construction.

3.08. ACCESSORIES

- A. Identification Devices:
 1. Raceway Tags:
 - a. Identify origin and destination.
 - b. For exposed raceways, install tags at each terminus, near midpoint, and at minimum intervals of every 50 feet, whether in ceiling space or surface mounted.

END OF SECTION

**THIS PAGE
LEFT BLANK**

APPENDIX 1

ASBESTOS SURVEY

THIS PAGE INTENTIONALLY BLANK



Asbestos Containing Materials Survey

Alexandria Renew
1800 Limerick St.
Alexandria, VA 22314

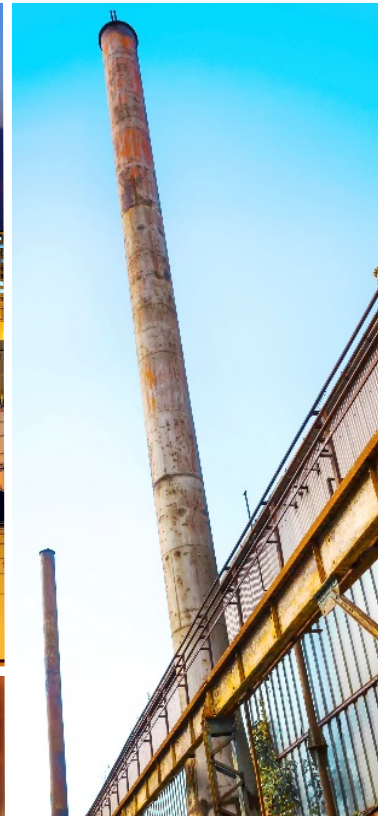




Table of Contents

1.	Introduction.....	1
2.	Asbestos Survey	1
2.1	No ACM Detected Locations	2
2.2	ACM Identified Locations	2
2.2.1	Sample 001 – G1 middle roof cement tiles	2
2.2.2	Sample 005 – G1 midle roof horizontal metal/brick joint beige caulking.....	2
2.2.3	008 – G1 middle roof metal/brick interface sealant.....	3
2.2.4	012 – G1 upper roof silver/black sealant.....	3
2.2.5	013 – G1 upper roof black fibrous flashing.....	3
2.2.6	016 – G1 lower roof beige caulking on lower flashing.....	3
3.	Conclusions.....	3

Figure Index

Figure 1	G1 Roof Layout and Sampling Location Map
----------	--

Table Index

Table 1	Asbestos Sampling Results
Table 2	Asbestos-Containing Materials Quantity Estimation

Appendix Index

Appendix A	Inspector's License
Appendix B	Asbestos Laboratory Analytical Reports
Appendix C	Photographic Documentation



1. Introduction

On October 22, 2020, GHD Services, Inc. (GHD) conducted an asbestos survey at Building G1 of the Alexandria Renew facility located at 1800 Limerick St. in Alexandria, VA (Site). The completed services and this corresponding report cover areas surveyed as directed by Alexandria Renew staff. This report documents the results of the GHD asbestos sampling activities conducted.

2. Asbestos Survey

GHD conducted a limited asbestos survey to identify potential asbestos-containing materials (ACM) on October 22, 2020. The asbestos inspection and assessment procedures were based on those outlined in the Title 40 Code of Federal Regulation (CFR) Part 763, United States Environmental Protection Agency (USEPA) Asbestos Hazard Emergency Response Act (AHERA), and the Asbestos Model Accreditation Plan (effective April 4, 1994). Mr. Dustin Zedaker, Virginia Asbestos Inspector License 17027581, identified and collected 19 bulk samples for asbestos analysis, as shown on the attached Asbestos Sampling Results presented in **Table 1**. Sample locations are presented on **Figure 1**. Mr. Zedaker's asbestos licenses is provided in **Appendix A**.

The following potential ACM were visually inspected and were identified as locations of suspected asbestos containing building materials (ACBM) and a total of 19 samples were collected accordingly during the survey:

1. Cementitious roof tiles
2. Sealants and caulking
3. Grout and mortar
4. Roof structure cores
5. Flashing
6. Flashing backing materials

Following collection, the samples were properly packaged, labeled and transported under chain-of-custody (COC) to EMSL Analytical, Inc. (EMSL), in Beltsville, Maryland. EMSL is a licensed asbestos laboratory, and accredited by the American Industrial Hygiene Association (AIHA), Lab Code 102891, and the National Voluntary Laboratory Accreditation Program (NVLAP), Lab Code 200293-0, to perform asbestos analysis via Polarized Light Microscopy (PLM) via USEPA Method 600/R-91/116.

The AHERA and USEPA regulations define ACM as any material that contains more than 1.0% asbestos by area as determined using PLM.

Analysis of the samples collected identified six (6) samples of materials containing greater than 1.0% asbestos, as described in Section 2.2.1 through Section 2.2.4.



The asbestos sampling laboratory analytical report and chain of custody documentation are included as **Appendix B**. Photographic documentation is included as **Appendix C**. The results, locations, and descriptions from the asbestos sampling are presented on **Table 1**, and are further discussed and segregated per location below. ACM quantity estimations are provided in **Table 2**.

2.1 No ACM Detected Locations

ACM was not identified in the following 10 locations:

- Sample 002 – G1 middle roof black sealant on metal
- Sample 003 – G1 middle roof gray caulking on vertical metal on stone
- Sample 004 – G1 middle roof white caulking in stone joints
- Sample 006 – G1 middle roof black sealant on protrusion
- Sample 007A – G1 middle roofing gray/black aggregate base
- Sample 007B – G1 middle roofing black sub-base
- Sample 007C – G1 middle roofing tan sub-base
- Sample 009 – G1 middle roof black fibrous backing behind metal
- Sample 010 – G1 middle roof beige brick mortar
- Sample 011A – G1 upper roof core – black sub-base
- Sample 011B – G1 upper roof core – gray sub-base
- Sample 014 – G1 lower roof lower flashing – silver/black flashing
- Sample 015 – G1 lower roof lower silver sealant

A total of 13 samples were collected from the locations listed above and were recorded to have no ACM detected. Sample locations are presented on **Figure 1**, sample descriptions and results are presented on **Table 1**, and ACM quantity estimations are provided in **Table 2**.

2.2 ACM Identified Locations

ACM was identified in the six (6) samples collected from the following locations:

2.2.1 Sample 001 – G1 middle roof cement tiles

The cement tiles on the G1 roof were found to contain 10% chrysotile asbestos.

2.2.2 Sample 005 – G1 middle roof horizontal metal/brick joint cream caulking

The cream colored caulking used on the G1 roof along the metal flashing was found to contain 5% chrysotile asbestos.



2.2.3 008 – G1 middle roof metal/brick interface sealant

The silver/black sealant used on the G1 upper roof metal flashing was found to contain 3% chrysotile asbestos.

2.2.4 012 – G1 upper roof silver/black sealant

The silver/black sealant used on the fibrous upper roof flashing was found to contain 6% chrysotile asbestos.

2.2.5 013 – G1 upper roof black fibrous flashing

The black fibrous flashing on the upper roof was found to contain 8% chrysotile asbestos.

2.2.6 016 – G1 lower roof cream caulking on lower flashing

The cream colored caulking along the lower roof metal flashing was found to contain 5% chrysotile asbestos.

Sample locations are presented on **Figure 1**, sample descriptions and results are presented on **Table 1**, and ACM quantity estimations are provided in **Table 2**. Photographs of the materials which tested positive for asbestos are included in **Appendix C**.

3. Conclusions

GHD conducted an ACM survey at the Alexandria Renew site. This report is not intended to serve as a comprehensive environmental building survey and only covers areas planned for roof replacement activities and as requested by Alexandria Renew staff. This report documents the results of the GHD sampling and inspection activities. ACM quantities provided by GHD are estimated and as such should be confirmed prior to disturbance by an abatement professional.



about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

Dustin Zedaker
Dustin.Zedaker@ghd.com
804.237.0300

www.ghd.com

Figures

Figure 1 - Building G1 Layout and Sample Location Map

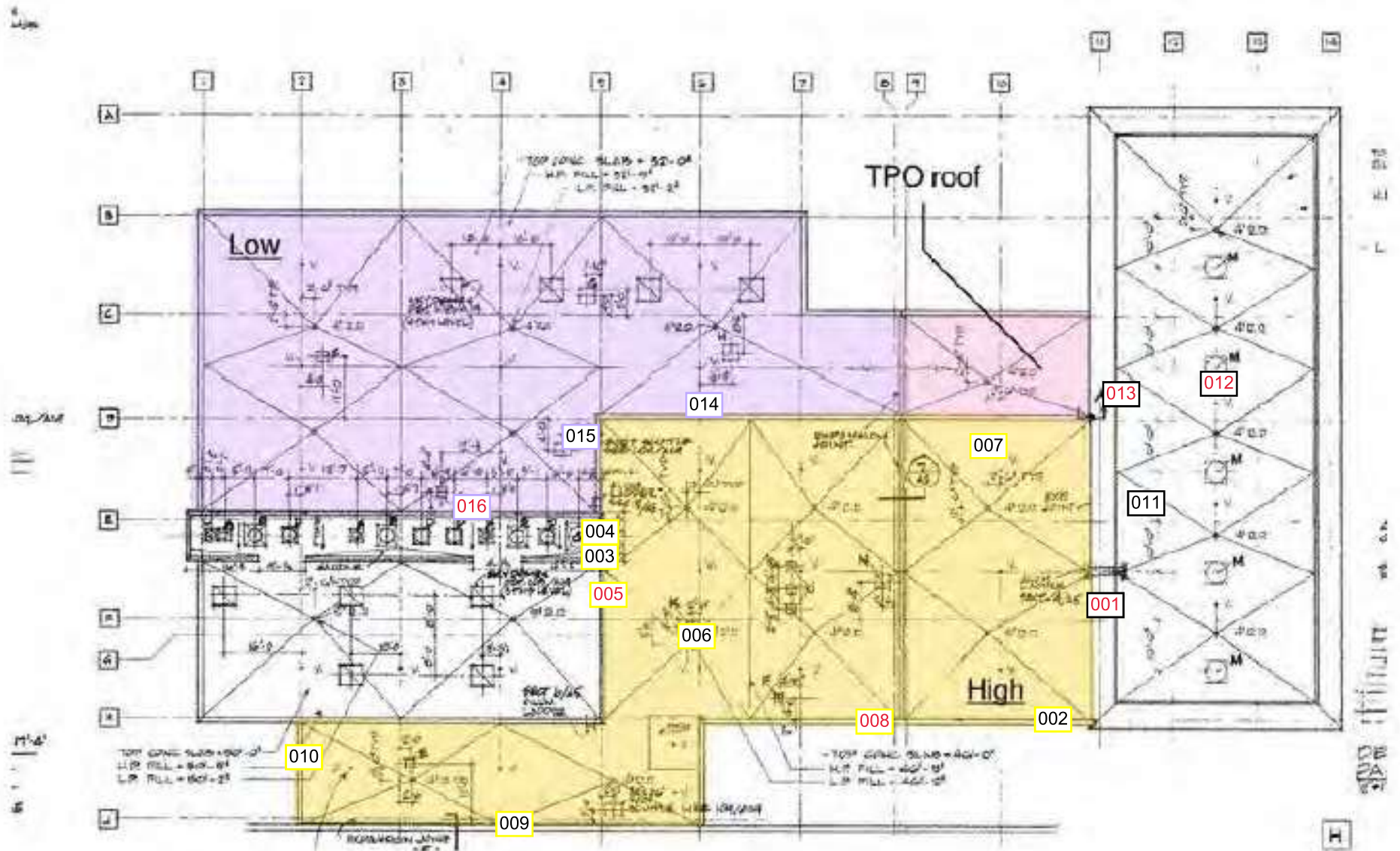


Figure Key:
 002 - Sample Location non-detect for ACM
 001 - Sample Location positive for ACM

Tables

Table 1
Alexandria Renewal - Asbestos Sampling Results

Location	Sample	Description	Date	Time	ACM Concentration (% ACM)	ACM Type	Sample Type
G1 Upper Roof	001	Cement Tile, Gray, Fibrous, Homogeneous	10/22/2020	08:30:00	10	Chrysotile	misc
G1 Middle Roof	002	Sealant, Black, Non-Fibrous, Homogeneous	10/22/2020	08:34:00	NAD	NAD	misc
	003	Caulking, Gray, Non-Fibrous, Homogeneous	10/22/2020	08:38:00	NAD	NAD	misc
	004	Caulking, White, Non-Fibrous, Homogeneous	10/22/2020	08:40:00	NAD	NAD	misc
	005	Caulking, Cream, Non-Fibrous, Homogeneous	10/22/2020	08:42:00	5	Chrysotile	misc
	006	Sealant, Black, Fibrous, Homogeneous	10/22/2020	08:43:00	NAD	NAD	misc
	007A	Aggregate, Gray/Black, Non-Fibrous, Homogeneous	10/22/2020	08:52:00	NAD	NAD	misc
	007B	Sub-Base, Black, Fibrous, Homogeneous	10/22/2020	08:54:00	NAD	NAD	misc
	007C	Sub-Base, Tan, Fibrous, Homogeneous	10/22/2020	08:59:00	NAD	NAD	misc
	008	Sealant, Black/Silver, Non-Fibrous, Homogeneous	10/22/2020	09:09:00	3	Chrysotile	misc
	009	Backing, Black, Fibrous, Homogeneous	10/22/2020	09:12:00	NAD	NAD	misc
	010	Mortor, Tan, Non-Fibrous, Homogeneous	10/22/2020	09:13:00	NAD	NAD	misc
G1 Upper Roof	011A	Sub-Base, Black, Fibrous, Homogeneous	10/22/2020	09:29:00	NAD	NAD	misc
	011B	Sub-Base, White, Non-Fibrous, Homogeneous	10/22/2020	09:33:00	NAD	NAD	misc
	012	Sealant, Black/Silver, Non-Fibrous, Homogeneous	10/22/2020	09:41:00	6	Chrysotile	misc
	013	Flashing, Black, Fibrous, Homogeneous	10/22/2020	09:43:00	8	Chrysotile	misc
G1 Lower Roof	014	Flashing, Silver/Black, Fibrous, Homogeneous	10/22/2020	09:56:00	NAD	NAD	misc
	015	Sealant, Silver, Non-Fibrous, Homogeneous	10/22/2020	09:58:00	NAD	NAD	misc
	016	Caulking, Cream, Non-Fibrous, Homogeneous	10/22/2020	10:01:00	5	Chrysotile	misc

Notes:

ACM - asbestos-containing material

misc - miscellaneous

NAD - no asbestos detected

TSI - thermal system insulation

RED - values provided in bolded red font exceed 1% asbestos screening criteria and are considered ACM

Table 2
Alexandria Renew - ACM Quantity Estimates

Asbestos Containing Material				
Material		Location	Quantity	Estimated LF
Misc	Cement Tiles	001	>1,000	N/A
	Metal/Brick Joint Caulking	005	N/A	250
	Silver/Black Sealant	008	N/A	75
	Silver/Black Sealant	012	4	300
	Black Flashing	013	4	60
	Cream Caulking	016	4	80

Notes:
N/A - Not Applicable
LF - Linear Feet

Attachment A Inspector's License

EXPIRES ON
02-28-2021

COMMONWEALTH of VIRGINIA

Department of Professional and Occupational Regulation
9960 Mayland Drive, Suite 400, Richmond, VA 23233
Telephone: (804) 367-8500

NUMBER
3303004130

BOARD FOR ASBESTOS, LEAD, AND HOME INSPECTORS
ASBESTOS INSPECTOR LICENSE

DUSTIN ZEDAKER
13001 FAIRVIEW CT
ASHLAND, VA 23005



Status can be verified at <http://www.dpor.virginia.gov>



Mary Broz-Vaughan
Mary Broz-Vaughan, Director

(SEE REVERSE SIDE FOR PRIVILEGES AND INSTRUCTIONS)

DPOR-LIC (02/2017)

Attachment B

Asbestos Laboratory Analytical Report



EMSL Analytical, Inc.

200 Route 130 North Cinnaminson, NJ 08077

Tel/Fax: (800) 220-3675 / (856) 786-5974

<http://www.EMSL.com/cinnaslab@EMSL.com>

EMSL Order: 042025882

Customer ID: CONE53Z

Customer PO:

Project ID:

Attention: Dustin Zedaker

GHD

121 North 20th Street

Richmond, VA 23223

Phone: (804) 514-6365

Fax:

Received Date: 10/23/2020 9:20 AM

Analysis Date: 10/26/2020 - 10/27/2020

Collected Date: 10/22/2020

Project: Alex Renew

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
001 042025882-0001	G1 Roof Angle - Intact - Cement Tile - Grey	Gray Fibrous Homogeneous	HA: 1	90% Non-fibrous (Other)	10% Chrysotile
002 042025882-0002	G1 Roof - Black Sealant on Metal	Black Non-Fibrous Homogeneous	HA: 2	100% Non-fibrous (Other)	None Detected
003 042025882-0003	G1 Roof Vertical Metal on Stone - grey Caulking	Gray Non-Fibrous Homogeneous	HA: 3	100% Non-fibrous (Other)	None Detected
004 042025882-0004	G1 Stone Joints - White Caulking	White Non-Fibrous Homogeneous	HA: 4	100% Non-fibrous (Other)	None Detected
005 042025882-0005	G1 Horizontal Metal/Brick Joint - Cream Caulking	Beige Non-Fibrous Homogeneous	HA: 5	95% Non-fibrous (Other)	5% Chrysotile
006 042025882-0006	G1 Protrusion - Black Sealant	Black Fibrous Homogeneous	HA: 6	85% Non-fibrous (Other)	None Detected
007A 042025882-0007	G1 Roofing - Aggregate Base - Grey/Black	Gray/Black Non-Fibrous Homogeneous	HA: 7	100% Non-fibrous (Other)	None Detected
007B 042025882-0008	G1 Roofing - Black Sub Base - Fibrous	Black Fibrous Homogeneous	HA: 7	90% Non-fibrous (Other)	None Detected
007C 042025882-0009	G1 Roofing - Tan Sub Base - Fibrous	Tan Fibrous Homogeneous	HA: 7	90% Cellulose 10% Non-fibrous (Other)	None Detected
008 042025882-0010	G1 Metal/Brick Interface - Silver/Black Sealant	Black/Silver Non-Fibrous Homogeneous	HA: 8	97% Non-fibrous (Other)	3% Chrysotile
009 042025882-0011	G1 Roof Backing behind Metal - Black Backing - Fibrous	Black Fibrous Homogeneous	HA: 9	100% Non-fibrous (Other)	None Detected
010 042025882-0012	G1 Brick - Cream Brick Mortar	Tan Non-Fibrous Homogeneous	HA: 10	100% Non-fibrous (Other)	None Detected

Initial report from: 10/27/2020 08:09:28



EMSL Analytical, Inc.

200 Route 130 North Cinnaminson, NJ 08077

Tel/Fax: (800) 220-3675 / (856) 786-5974

<http://www.EMSL.com / cinnasblab@EMSL.com>

EMSL Order: 042025882

Customer ID: CONE53Z

Customer PO:

Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
011A 042025882-0013	G1 Upper Roof Core - Black Sub-base	Black Fibrous Homogeneous	15% Cellulose HA: 11	85% Non-fibrous (Other)	None Detected
011B 042025882-0014	G1 Upper Roof Core - Grey Sub-base	White Non-Fibrous Homogeneous	 HA: 11	100% Non-fibrous (Other)	None Detected
012 042025882-0015	G1 Upper Roof - Silver/Black Sealant	Black/Silver Non-Fibrous Homogeneous	 HA: 12	94% Non-fibrous (Other)	6% Chrysotile
013 042025882-0016	G1 Upper Roof - Black Flashing - Fibrous	Black Fibrous Homogeneous	 HA: 13	92% Non-fibrous (Other)	8% Chrysotile
014 042025882-0017	Lower Roof Flash - Silver/Black Flashing	White/Black Fibrous Homogeneous	15% Synthetic HA: 14	85% Non-fibrous (Other)	None Detected
015 042025882-0018	Lower Roof - Silver Sealant	White Non-Fibrous Homogeneous	 HA: 15	100% Non-fibrous (Other)	None Detected
016 042025882-0019	Lower Roof - Cream Caulking	Beige Non-Fibrous Homogeneous	 HA: 16	95% Non-fibrous (Other)	5% Chrysotile

Analyst(s)

John Witcraft (18)

Nancy Stalter (1)

Samantha Rundstrom, Laboratory Manager
or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. The above analyses were performed in general compliance with Appendix E to Subpart E of 40 CFR (previously EPA 600/M4-82-020 "Interim Method") but augmented with procedures outlined in the 1993 ("final") version of the method. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Estimation of uncertainty is available on request.

Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ NVLAP Lab Code 101048-0, AIHA-LAP, LLC-IHLAP Lab 100194, NYS ELAP 10872, NJ DEP 03036, PA ID# 68-00367, LA #04127

Initial report from: 10/27/2020 08:09:28

EMSL ANALYTICAL, INC.
LABORATORY PRODUCTS TRAININGAsbestos Bulk Building Material
Chain of Custody

EMSL Order Number (lab use only):

Beltsville, MD 20705
Phone (301) 937-5700
Fax (301) 937-5701

042025882

Company Name: GHD Services, Inc.		EMSL Customer ID:	
Street: 121 N 20th Street		City: Richmond	State or Province: VA
Zip/Postal Code: 23223	Country: US	Telephone #: 8043174461	Fax #:
Report To (Name): Dustin Zedaker		Please Provide Results via: <input type="checkbox"/> Fax <input type="checkbox"/> Email	
email Address: dustin.zedaker@ghd.com		Purchase Order Number:	
Client Project ID: Alex Renew		EMSL Project ID (internal use only):	
State or Province Collected: VA		CT only <input type="checkbox"/> Commercial/Taxable <input type="checkbox"/> Residential/Tax Exempt	
EMSL-Bill to: <input type="checkbox"/> Same <input checked="" type="checkbox"/> Different - If bill to is different note instructions in comment. Third party billing requires written authorization from third party			
Turnaround Time (TAT) Options Please Check			
<input type="checkbox"/> 3 Hour	<input type="checkbox"/> 6 Hour	<input type="checkbox"/> 24 Hour	<input type="checkbox"/> 32 Hour* <input checked="" type="checkbox"/> 48 Hour <input type="checkbox"/> 72 Hour <input type="checkbox"/> 96 Hour <input type="checkbox"/> 1 Week <input type="checkbox"/> 2 Week
*32 Hour TAT available for select tests only; samples must be submitted by 11:30am. Please call ahead for large projects and/or turnaround times 6 hours or less.			
PLM - Bulk (reporting limit)		TEM - Bulk	
<input checked="" type="checkbox"/> PLM EPA 600/R-93/116 (<1%)		<input type="checkbox"/> TEM EPA NOB - EPA 600/R-93/116 Section 255.1	
<input type="checkbox"/> PLM EPA NOB (<1%)		<input type="checkbox"/> NY ELAP Method 198.4 non-friable - NY	
Point Count <input type="checkbox"/> 400 (<0.25%) <input type="checkbox"/> 1000 (<0.1%)		<input type="checkbox"/> Chatfield Protocol (semi-quantitative)	
Point Count w/Gravimetric <input type="checkbox"/> 400 (<0.25%) <input type="checkbox"/> 1000 (<0.1%)		<input type="checkbox"/> TEM % by Mass - EPA 600/R-93/116 Section 255.2	
<input type="checkbox"/> NIOSH 9002 (<1%)		<input type="checkbox"/> TEM Qualitative via Filtration Prep Technique	
<input type="checkbox"/> NY ELAP Method 198.1- friable - NY		<input type="checkbox"/> TEM Qualitative via Drop Mount Prep Technique	
<input type="checkbox"/> NY ELAP Method 198.6 NOB- non-friable - NY		Other tests (please specify)	
<input type="checkbox"/> NY ELAP Method 198.8- Vermiculite Surfacing Material			
<input type="checkbox"/> OSHA ID-191 Modified			
<input type="checkbox"/> EMSL Standard Addition Method			
<input checked="" type="checkbox"/> Positive Stop - Clearly Identify Homogenous Areas (HA)		Date Sampled: 10/22/2020	
Sampler's Name: Dustin Zedaker		Sampler's Signature: [Signature]	
Sample #	HA #	Sample Location	Material Description
001	1	G1 ROOF ANGLE - INTACT	CEMENT TILE - GREY
002	2	G1 ROOF	BLACK SEALANT ON METAL
003	3	G1 ROOF VERTICAL METAL ON STONE	GREY CAULKING
004	4	G1 STONE JOINTS	WHITE CAULKING
005	5	G1 HORIZONTAL METAL/BRICK JOINT	CREAM CAULKING
006	6	G1 PROTRUSION	BLACK SEALANT
Client Sample # (s): 19		Total # of Samples: 19	
Relinquished by (Client): [Signature]		Date: 10-22-2020	Time: 13:30
Received by (Lab): [Signature]		Date: 10/23/2020	Time: 9:20 AM
Comments/Special Instructions: Bill To: GHD, Inc., 2235 Mercury Way, Suite 150, Santa Rosa, CA, 49080, US Attention: Accounts Payable Phone: 804-317-4461 Email: Purchase Order:			

Page 1 of 2

Attachment C

Photographic Documentation



Photo 1 - Sample 001 fibrous cement tile
10% Chrysotile ACM



Photo 2 - Sample 001 setting



Site Photographs



Photo 3 - Sample 002 black/silver sealant on metal flashing



Photo 4 - Sample 002 setting



Site Photographs



Photo 5 - Sample 003 gray caulking on flashing



Photo 6 - Sample 003 setting



Site Photographs



Photo 7 - Sample 004 white caulking in stonework joints



Photo 8 - Sample 005 beige caulking between brick and flashing
5% Chrysotile ACM



Site Photographs



Photo 9 - Sample 005 setting



Photo 10 - Sample 006



Site Photographs

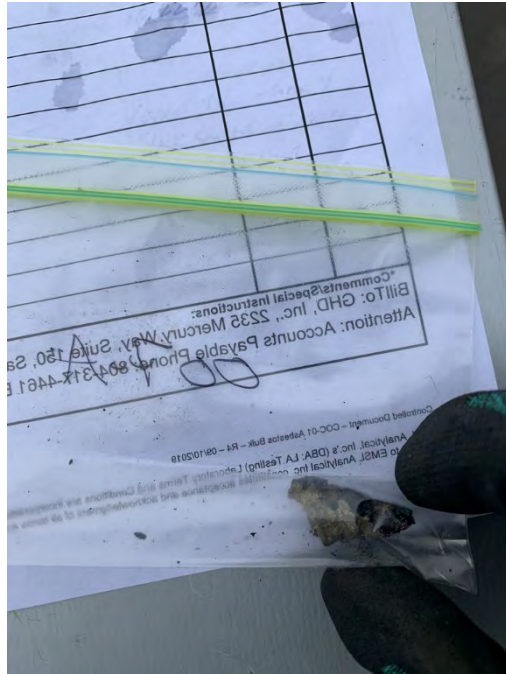


Photo 11 – Sample 007A

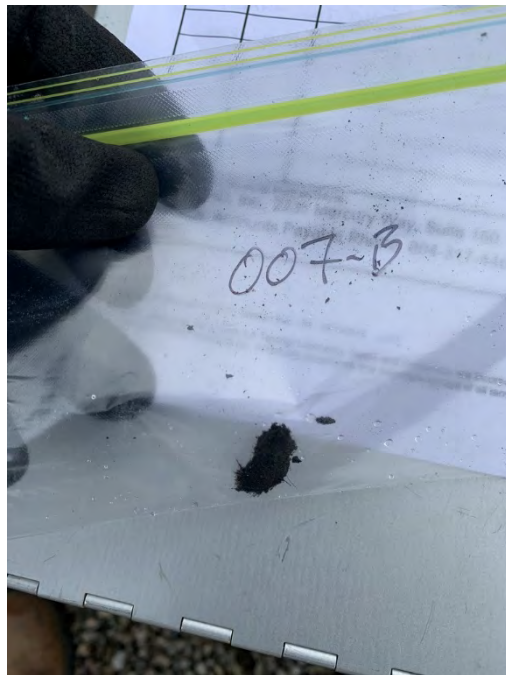


Photo 12 – Sample 007B



Site Photographs

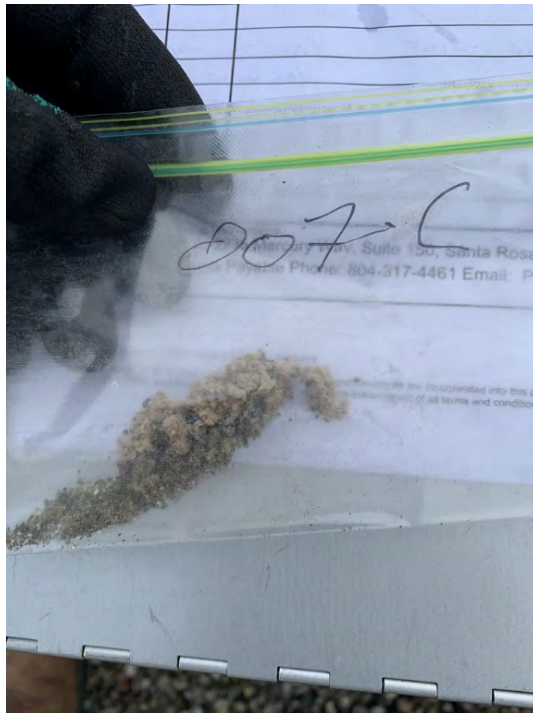


Photo 13 – Sample 007C



Photo 14 – Sample 007 setting



Site Photographs



Photo 15 – Sample 007 setting



Photo 16 – Sample 008
3% Chrysotile ACM



Site Photographs



Photo 17 – Sample 008 Setting



Photo 18 – Sample 008 Setting



Site Photographs



Photo 19 – Sample 009

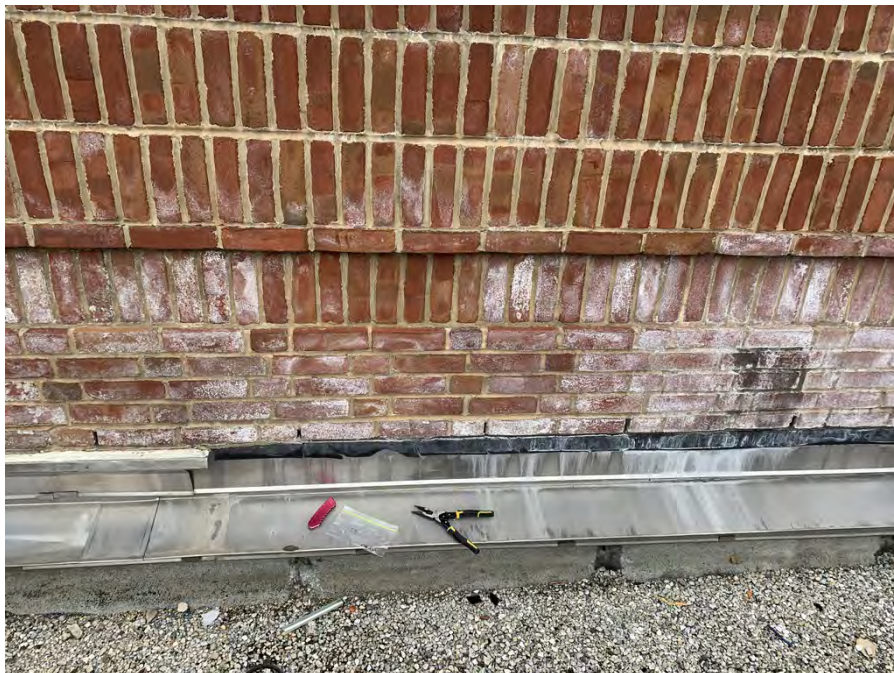


Photo 20 – Sample 009



Site Photographs



Photo 21 – Sample 010



Photo 22 – Sample 010 Setting



Site Photographs



Photo 23 – Sample 011A



Photo 24 – Sample 011B



Site Photographs



Photo 25 – Sample 11 Setting



Photo 26 – Sample 012
6% Chrysotile ACM



Site Photographs

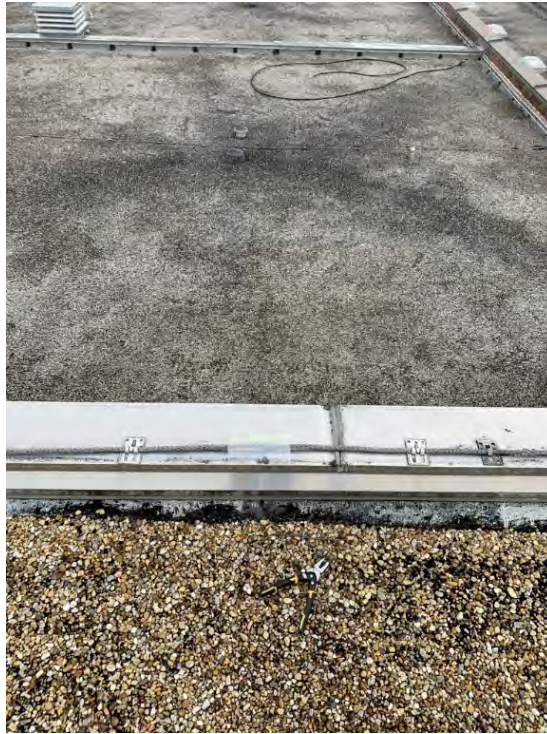


Photo 27 – Sample 012 Setting



Photo 28 – Sample 013
8% Chrysotile ACM



Site Photographs



Photo 29 – Sample 013 Setting



Photo 30 – Sample 014



Site Photographs



Photo 31 – Sample 015



Photo 32 – Sample 015 Setting



Site Photographs



Photo 33 – Sample 016
5% Chrysotile ACM



about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

Dustin Zedaker
Dustin.Zedaker@ghd.com
804.237.0300

www.ghd.com

THIS PAGE INTENTIONALLY BLANK