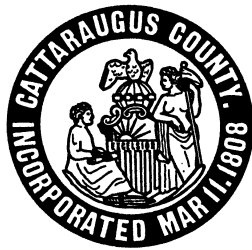


**HVAC IMPROVEMENTS
EMERGENCY SERVICES
303 COURT STREET
LITTLE VALLEY, NY 14755**

BID NO. 56

Prepared by:
Cattaraugus County
Department of Public Works

8810 Route 242
Little Valley, NY 14755



General Provisions and Bid Proposal Booklet

SEPTEMBER 2018

CATTARAUGUS COUNTY DEPARMENT OF PUBLIC WORKS

Instructions to Bidders,

Specifications and Related Documents

For

**HVAC IMPROVEMENTS
EMERGENCY SERVICES
303 COURT STREET
LITTLE VALLEY, NY 14755**

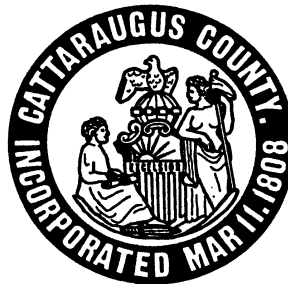
Cattaraugus County Department of Public Works

8810 Route 242

Little Valley, New York 14755

Tel. (716) 938-9121

Fax (716) 938-2754



CATTARAUGUS COUNTY

DEPARTMENT OF PUBLIC WORKS

Development – Progress – Workmanship

*Kathleen M. Ellis
Commissioner*

*Vacant
Deputy Commissioner*

*Mark C. Burr, P.E.
Director of Engineering*



*Jack Ellis Drive
8810 Route 242
Little Valley, New York 14755
Phone (716) 938-9121
FAX (716) 938-2753*

ADVERTISEMENT FOR BIDS

Sealed bids for the **HVAC Improvements, Emergency Services, 303 Court Street, Little Valley, New York**, according to specifications, will be received by the undersigned, at the Department of Public Works Facility, 8810 Route 242, Little Valley, New York, until **Friday, October 12, 2018 at 1:45 P.M.** after which they will be publicly opened at **2:00 P.M.** (at the *same location*), by the undersigned, under the direction of the Public Works Committee of the Cattaraugus County Legislature. Each bid, at the time it is received, will be stamped showing date and time of receipt. All bids must be sealed and clearly marked as follows: (Any bid not clearly marked will not be considered.)

DPW BID #56 – HVAC Improvements, Emergency Services, 303 Court Street, Little Valley, New York

Contractors are encouraged to visit the site before **October 3, 2018**. Please coordinate by contacting Brian Bingerman at 716-938-2202 or bdbingerman@cattco.org to schedule a site meeting.

Final Request for Information shall be 4:00 P.M. **Friday, October 5, 2018**. Final addendum shall be issued, **Tuesday, October 9, 2018** at 2:00 P.M. if needed.

Copies of the proposed Contract Documents, Plans, Specifications and Instructions to Bidders will be available **Wednesday, September 19, 2018**, and may be secured at Cattaraugus County Department of Public Works, 8810 Route 242, Little Valley, New York 14755. Phone Dawn Smith at 938-9121, ext. 2465. There will be a **\$50.00** charge for each set of specifications, plus **\$8.00** postage if mailed. Checks are to be made payable to the Cattaraugus County Treasurer. All questions and RFI's to be directed to Wendel; 375 Essjay Road, Williamsville, NY 14221 @ 716-688-0766 Attn: Gerry May, gmay@wendelcompanies.com. The specifications for this project will be available for examination at the office of Southern Tier Builders Association, 65 West Main St., Falconer, NY 14733, & on their web site, (STBA website at: www.stba.com) Login Page: <http://login.onlineplanservice.com/SP/code.aspx> Password: **NYBX18-03494-056**

Cattaraugus County Local Law 12-2012 as amended by Local Law 5-2015 requires that the County provide a copy of the Cattaraugus County Vendor Responsibility Form to the low bidder. The low bidder will have 5 business days to return the completed form unless the form was mailed by the county to the vendor, in which case they will have 10 business days from the date of the mailing to return the form. Failure by the low bidder to submit the form within the above time frame will lead to the automatic rejection of their bid. The contractor must also ensure that all subcontractors to be

used on the project complete this form and submit it to the County for approval within 5 days of the preconstruction meeting. Failure to do so may lead to the rejection of the subcontractor at the County's discretion.

Currently the Commissioner of Public Works has approved the CCA-2 (New York State Vendor Responsibility Questionnaire For-Profit Construction) with attachments A, B, and C to serve as the Cattaraugus County Vendor Responsibility Form.

The full deposit, according to General Municipal Law, Less any postage costs, will be refunded for complete sets with no missing pages, returned in good condition (NOT MARKED IN OR WRITTEN IN) within 30 days of the award of contract. No refunds will be made for sets returned later than 30 days of the award of contract.

All bids must be sent or delivered to Cattaraugus County Department of Public Works, 8810 Route 242, Little Valley, NY 14755. Attention: Dawn Smith.

All bids must be accompanied by a NON-COLLUSIVE BIDDING CERTIFICATE and Bid Bond in the amount of 5% of bid total. All substitutions are to be submitted at time of bid as per the contract documents. No substitutions will be considered after the bid date. Any bid submitted without such certification and bid bond will not be accepted. Any bid not meeting ALL specifications will not be considered. Cattaraugus County reserves the right to reject any or all bids, to waive any informalities, and to accept the lowest responsible bid.

John Searles
County Administrator
County Center - 303 Court Street
Little Valley, New York 14755

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*** To be completed by All Bidders and returned with bid.**

**** To be completed by the Apparent Low Bidder.**

SECTION A

LUMP SUM PRICE BID SCHEDULE

The Contractor shall furnish all materials, equipment, tools and labor of every kind required to complete the HVAC Improvements – Emergency Services, 303 Court Street, Little Valley, NY 14755 and perform all other work and incidental work in the most substantial and workmanlike manner, and do everything required by the Contract Documents as defined herein.

The total bid price shall be the sum of all materials, installation and labor costs as defined herein. Lump sum bid price shall be entered both in words and numerically in the spaces provided. In the event of a discrepancy the words will be used for tabulation purposes.

**BID FORMS OMITTED FROM
SPECIFICATION BOOKS**

TO OBTAIN BID FORMS PLEASE CONTACT

DAWN SMITH AT 716-938-9121 EXT. 2465

OR SEND EMAIL REQUEST TO:

dasmith@cattco.org

BID BOND

Sec. 38 – Highway law

KNOW ALL MEN BY THESE PRESENTS, That

(Name of Contractor)

.....
(Address)

(hereinafter called the "Principal") and the
a corporation created and existing under the laws of the State of....., having its principal
office in the City of (hereinafter called the "Surety"), are held and firmly bound unto
Cattaraugus County (hereinafter called the "County") in the full just sum of Five Percent (5%) of Attached Bid,
good and lawful money of the United States of America, for the payment of which said sum of money, well and
truly to be made and done, the said Principal binds themselves (himself/herself, itself), their (his/hers, its) heirs,
executors and administrators, successors and assigns, and the said Surety binds itself, its successors and assigns
jointly and severally, firmly by these presents:

Signed, sealed and dated this 20.....A.D.

WHEREAS, the said Principal has submitted to the Cattaraugus County Commissioner of Public Works, a
bid for

(Description of Project)

.....
AND

WHEREAS, under the terms of the Laws of the State of New York as above indicated, the said Principal has filed
or intends to file this bond to guarantee that the Principal will execute all required contract proposal documents and
furnish such faithful performance or other bonds as may be required by law in accordance with the terms of the
Principal's said proposal.

NOW, THEREFORE, the condition of the foregoing obligation is such, that if the said Principal shall promptly
execute and submit, and the Commissioner of Public Works shall accept, all required contract proposal documents
including such faithful performance bond or other bonds as may be required by law in accordance with the terms of the
Principal's said proposal, then this obligation shall be null and void, otherwise to remain in full force and virtue.

IN TESTIMONY WHEREOF, the said Principal has hereunto set his/her (their, its) hand and seal and the said Surety
has caused this instrument to be signed by its.....President and its
.....Secretary, and its corporate seal to be hereunto affixed, the day and year first above
written.

Signed, sealed and delivered in the presence of:

(Corporate seal of (L.S.)

Principal if a (L.S.)
corporation)

..... (L.S.)

Principal

(Corporate seal of Company
Surety Co.)

of

By

(Title of Officer)

Attest.....

(Title of Officer)

(Acknowledgment by principal, unless it is a corporation)

STATE OF NEW YORK

SS:

COUNTY OF

On this day of 20....., before me personally came
....., to me known and known to me to be the person described in and who executed the
foregoing instrument, and acknowledged that he/she executed the same.

.....
Notary Public County

(Acknowledgment by principal, if a corporation)

STATE OF NEW YORK

SS:

COUNTY OF

On this Day of 20....., before me personally came
....., to me known who being by me duly sworn, did depose and say that he/she
resides in; that he/she is the of the
.....; the corporation described in and which executed the foregoing instrument; that
he/she knew the seal of said corporation; that the seal affixed to said instrument was such corporate seal; that
it was so affixed by order of the Board of Directors of said corporation, and that he/she signed his/her name
thereto by like order.

.....
Notary Public County

(Acknowledgment by Surety Company)

STATE OF NEW YORK

SS:

COUNTY OF

On this day of 20....., before me personally came
....., to me known, who being by me duly sworn, did depose and say that he/she resides
in; that he/she is the of the; the
corporation described in and which executed the within instrument; that he/she knows the seal of said
corporation; that the seal affixed to said instrument is such corporate seal; that it was so affixed by the order
of the Board of Directors of said corporation, and that he/she signed his/her name there to by like order.

.....
Notary Public County

2008 WICKS REFORM – SUBCONTRACTOR INFORMATION

Pursuant to the 2008 Wicks Law Reform, _____
(Company Name of Bidder)
submits with our bid the following sub-contractor(s) and the agreed upon amounts for

Project No. _____
Titled _____

Trade: Plumbing and Gas Fitting

<i>Name and Address of Subcontractor</i>	<u>Amount</u>
1. _____ <i>Description of work:</i> _____	_____

Trade: Electric Wiring and Standard Illuminating Fixtures

<i>Name and Address of Subcontractor</i>	<u>Amount</u>
1. _____ <i>Description of work:</i> _____	_____

Dated ____/____/____

Legal name of person, partnership, joint venture or corporation:

(if corporation, affix corporate seal)

By _____

(Signature)

Title _____

SEAL IN SEPARATE ENVELOPE AND SUBMIT ALONG WITH PROPOSAL

2008 WICKS REFORM – SUBCONTRACTOR INFORMATION
ACKNOWLEDGMENT FOR SUBCONTRACTOR INFORMATION

THE LEGAL ADDRESS OF THE BIDDER

Telephone No. _____ Facsimile No. _____

If a Corporation

Name	Address
_____ President _____	
_____ Secretary _____	
_____ Treasurer _____	

If a Partnership

Name of Partners	Address
_____	_____
_____	_____
_____	_____

If a Joint Venture

Name of Members	Address
_____	_____
_____	_____
_____	_____

If an Individual

Name of Individual	Address
_____	_____
_____	_____
_____	_____

BIDDER INFORMATION SHEET

NAME OF BIDDER: * _____

ADDRESS: _____

PHONE NUMBER: _____

TYPE OF ENTITY: CORPORATION _____ PARTNERSHIP _____ INDIVIDUAL _____

IF A NON-PUBLICLY OWNED CORPORATION:

NAME OF CORPORATION: _____

LIST OF PRINCIPAL STOCKHOLDERS (HOLDING OVER 5% OF OUTSTANDING
SHARES):

LIST OF OFFICERS: _____

LIST OF DIRECTORS: _____

DATE OF ORGANIZATION: _____

IF A PARTNERSHIP:

PARTNERS: _____

NAME OF PARTNERSHIP: _____

DATE OF ORGANIZATION: _____

- IF THE BUSINESS IS CONDUCTED UNDER AN ASSUMED NAME, A COPY OF THE CERTIFICATE REQUIRED TO BE FILED UNDER THE NEW YORK GENERAL BUSINESS LAW MUST BE ATTACHED.

NON-COLLUSIVE BIDDING CERTIFICATION

REQUIRED BY SECTION 103-D OF GEN. MUNICIPAL LAW

Section 103-d, GML, "Statement of non-collusion in bids and proposals to political subdivision of the state."

Every bid or proposal hereafter made to a political subdivision of the state or any public department, agency or official thereof where competitive bidding is required by statute, rule, regulation or local law, for work or services performed or to be performed or goods sold or to be sold, shall contain the following statement subscribed by the bidder and affirmed by such bidder as true under the penalties of perjury: Non-collusive bidding certification.

"(a) By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of knowledge and belief:

- (1) The prices in this bid have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor;
 - (2) Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly to any other bidder or to any competitor; and
 - (3) No attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition."
- (b) A bid shall not be considered for award nor shall any award be made where (a)(1)(2) and (3) above have not been complied with; provided however, that if in any case the bidder cannot make the foregoing certification, the bidder shall so state and shall furnish with the bid a signed statement which sets forth in detail the reasons therefore. Where (a)(1)(2) and (3) above have not been complied with, the bid shall not be considered for award nor shall any award be made unless the head of the purchasing unit of the political subdivision, public department, agency or official thereof to which the bid is made, or his/her designee, determines that such disclosure was not made for the purpose of restricting competition.

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

2.* Any bid hereafter made to any political subdivision of the state or any public department, agency or official thereof by a corporate bidder for work or services performed or to be performed or goods sold or to be sold, where competitive bidding is required by statute, rule, regulation, or local law, and where such bid contains the certification referred to in subdivision one of this section, shall be deemed to have been authorized by the board of directors of the bidder, and such authorization shall be deemed to include the signing and submission of the bid and the inclusion therein of the certificate as to non-collusion as the act and deed of the corporation.

* So in original, No subd. 1 has been designated.

NON-COLLUSIVE BIDDING CERTIFICATION

BY EXECUTING THIS DOCUMENT, THE CONTRACTOR AGREES TO:

1. Perform all work listed in accordance with the Contract Documents at the lump sum price.
2. All the terms and conditions of the non-collusive bidding certifications required by Section 103-d of the General Municipal Law;
3. Certification of Specialty Items category selected, if contained in this proposal;
4. Certification of any other clauses required by this proposal and contained herein.

(Legal Name of Person, Corporation, or Firm Which
is Submitting Bid or Proposal)

Date: _____

BY: _____
(Signature of Person Representing Above)

AS: _____
(Official Title of Signator in Above Firm)

(Acknowledgment by Individual Contractor, If a Corporation)

STATE OF NEW YORK)
) SS:
COUNTY OF)

On this _____ day of _____, 20____, before me personally came _____, to me known and known to me to be the person who executed the above instrument, who being duly sworn by me, did depose and say that he/she resides at _____, and that he/she is the _____ of the corporation described in and which executed the above instrument, and that he/she signed his/her name thereto on behalf of said Corporation by order of the Board of Directors of said Corporation.

Notary Public

(Acknowledgment by Co-Partnership Contractor)

STATE OF NEW YORK)

) SS:

COUNTY OF)

On this _____ day of _____, 20____, before me personally came _____, to me known and known to me to be the person described in and who executed the above instrument, who, being duly sworn by me, did for himself/herself depose and say that he/she is a member of the firm of _____, consisting of himself/herself and _____, and that he/she executed the foregoing instrument in the firm name of _____ and that he/she had authority to sign same, and did duly acknowledge to me that he/she executed same as the act and deed of said firm of _____ for the uses and purposes mentioned herein.

Notary Public

(Acknowledgment by Individual Contractor)

STATE OF NEW YORK)

) SS:

COUNTY OF)

On this _____ day of _____, 20____, before me personally came _____, to me known and known to me to be described in and who executed the foregoing instrument, and that he/she acknowledged that he/she executed the same.

Notary Public

NON-COLLUSIVE BIDDING CERTIFICATION BIDDER INFORMATION

Bidder to provide information listed below:

Bidder Address:

Street or P.O. Box No.

City

State

Zip

Federal Identification No.:

Name of Contact Person:

Phone # of Contact Person:

If Bidder is a Corporation:

President's Name & Address:

Secretary's Name & Address:

Treasurer's Name & Address:

If Bidder is a Partnership:

Partner's Name & Address:

Partner's Name & Address:

If Bidder is a Sole Proprietorship:

Owner's Name & Address:

**REPORTING VIOLATIONS OF NON-COLLUSIVE BIDDING PROCEDURES, MISCONDUCT, OR
OTHER PROHIBITED CONTRACT ACTIVITIES**

NEW YORK STATE INSPECTOR GENERAL HOTLINE. Reports of New York State Governmental Misconduct may be made in strict confidence to the New York State Inspector General on the Toll Free Statewide HOTLINE or by writing to the Office of the Inspector General. The Toll Free Statewide HOTLINE telephone number is 1-800-367-4448 and calls will be answered between 9:00 A.M. and 5:00 P.M., Monday thru Friday. The address of the Office of the State Inspector General is the State Capitol, Executive Chamber, Albany, New York 12224.

REFERENCE SHEET

All bidders are required to complete this form providing three references of past performance. References should involve projects and/or service situations of similar size, scope, and character of work to this Bid. References must have had dealings with the Bidder within the last thirty-six (36) months. The County reserves the right to contact any or all of the references supplied for an evaluation of past performance in order to establish the responsibility of the Bidder before the actual award of the Bid and/or Contract. Completion of the Reference Form is required.

BIDDER'S NAME: _____

DATE FILED: _____

REFERENCE'S NAME: _____

ADDRESS: _____

TELEPHONE: _____ CONTACT PERSON: _____

REFERENCE'S NAME: _____

ADDRESS: _____

TELEPHONE: _____ CONTACT PERSON: _____

REFERENCE'S NAME: _____

ADDRESS: _____

TELEPHONE: _____ CONTACT PERSON: _____

LOCAL LAW NUMBER 12- 2012 AMENDED BY LOCAL LAW NUMBER 5- 2015
COUNTY OF CATTARAUGUS, NEW YORK

Pursuant to Section 10 of the Municipal Home Rule Law and Section 103
of the General Municipal Law.

A LOCAL LAW ESTABLISHING UNIFORM GUIDELINES FOR
DETERMINING THE RESPONSIBILITY OF BIDDERS

BE IT ENACTED by the Legislature of the County of Cattaraugus ("the County"), as follows:

Section 1. Legislative Intent. It is the intent of this Local Law to enhance the County's ability to identify the lowest "responsible bidder" on public works construction projects by instituting more comprehensive submission requirements and an evaluation system which is in compliance with New York State General Municipal Law. The County, based upon its experience, has determined that quality workmanship, efficient operation, safety, and timely completion of projects are not necessarily assured by awarding a public works contract solely on the basis of the low price. This Local Law establishing uniformity of guidelines for determining the responsibility of apparent low bidders will assure efficient use of taxpayer dollars, will promote public safety, and is in the public interest.

Section 2. Applicability. This Local Law shall apply to construction projects subject to the competitive bidding requirements of General Municipal Law §103 and advertised for bids on or after the effective date.

Section 3. Public Works. For purposes of this Local Law, the term "public works" shall mean the following: any constructing, altering, reconstructing, repairing, rehabilitating, refinishing, refurbishing, remodeling, remediating, renovating, custom fabricating, maintenance, landscaping, improving, moving, wrecking, painting, decorating, demolishing, and adding to or subtracting from any public building, structure, highway, roadway, street, alley, bridge, sewer, drain, ditch, sewage disposal plant, water work, parking facility, railroad, excavation, or other project, development, real property, or improvement, or to any part thereof, whether or not the performance of the work herein described involves the addition to, or fabrication into, any structure, project or development, real property or improvement herein described of any material or article of merchandise, which is paid for out of public funds in an amount exceeding the threshold for bidding established by the General Municipal Law. The term also includes any public works leased by the County under a lease containing an option to purchase exceeding the threshold for bidding public works projects established by the General Municipal Law.

Section 4. Cattaraugus County Vendor Responsibility Form and Procedure.

- A. A questionnaire (which shall be titled the "Cattaraugus County Vendor Responsibility Form"), hereinafter "the Form", shall be prepared and, as he/she may deem appropriate, revised by the Cattaraugus County Commissioner of Public Works ("Commissioner").
- B. The Commissioner shall provide the Form to the apparent low bidder on all County public works projects.
- C. The County shall promptly notify the apparent low bidder of its status as such and provide such entity with a copy of the Form either in electronic or paper format. The most current version of the Form shall also be posted on the Cattaraugus County website.
- D. The apparent low bidder shall file the Form in in the Office of the Commissioner not more than five (5) business days after receiving it or, if the form is mailed to the apparent

- E. Low bidder, within ten (10) business days after the date of mailing.
- F. In the event that the apparent low bidder fails to file the fully completed Form in the Commissioner's Office within the required time, its bid will be rejected and any bid bond submitted may, at the County's sole discretion, be forfeited.
- G. If the apparent low bidder is deemed not responsible, or fails to submit the Form within the required time, then the next lowest bidder will be deemed the apparent low bidder and so on until the lowest bidder is deemed responsible and selected as the lowest responsible bidder.
- H. Not later than five (5) calendar days prior to a final determination that the apparent low bidder is not responsible, the County will notify the bidder of same, in writing, and by certified mail, return receipt, stating the reasons. Except in the case of the rejection of an apparent low bid solely because the vendor failed to timely submit a completed Form, such notice shall set forth a time, date and place for the apparent low bidder to appear and be heard, not less than five (5) business days after such notice is served.
- I. Subcontractors proposed to be used on a project must also complete and submit the Form within five (5) days after the preconstruction meeting before the subcontractor is approved by the County. Failure by a subcontractor to submit the Form or unsatisfactory responses to questions may lead to rejection of the bid of the subcontractor at the County's discretion.
- J. If the bid of the apparent low bidder appears disproportionately low when compared with estimates obtained by or on behalf of the County and/or compared to other bids submitted (10% or greater disparity), the County reserves the right to inquire further of the apparent low bidder to determine whether the bid contains mathematical errors, omissions and/or erroneous assumptions, and whether the apparent low bidder has the capability to perform and complete the contract for the bid amount.
- K. If a bidder is found to have willfully violated New York Labor Law §220 within the previous five (5) years, that bidder shall automatically be deemed "not responsible" and its bid shall be rejected unless the Commissioner, subject to review by the Public Works Committee of the Cattaraugus County Legislature, determines otherwise. In all other cases, based on all of the information collected pursuant to this local law and any other factor deemed relevant, the Commissioner, or other department heads soliciting public works bids, shall determine if the apparent lowest bidder is in fact "responsible."

Section 5. Additional Requirements.

- A. Contractors and all subcontractors shall classify their workers as employees rather than as independent contractors, unless those workers meet the definition of "independent contractor" as defined by the Internal Revenue Service, and shall treat said employees accordingly for purposes of workers' compensation insurance coverage, unemployment insurance, employment taxes, and social security taxes.
- B. The contractors and all subcontractors shall submit certified payrolls to the Commissioner.

Section 6. Procedure. Cattaraugus County will make its own determinations of responsibility for low bidders. A bidder recognized by the state as a responsible vendor must still satisfy the requirements of this local law by submitting the required Cattaraugus County Vendor Responsibility Form within the required time frame.

Section 7. Incomplete Submissions by Bidders and Subcontractors. It is the sole responsibility of the contractor to comply with all submission requirements to the County. The submission requirements also apply to all subcontractors, except that the contractor shall submit all subcontractor questionnaires to the County of Cattaraugus for approval. Failure to submit the Form may lead to the rejection of the bid of the subcontractor at the County's discretion.

Contractor submissions deemed non-responsive will result in automatic rejection of the bid.

Section 8. Materiality. The requirements of this Local Law are a material part of the bid documents and the contract and the successful bidder shall insert this Local Law in all subcontracts.

Section 9. Severability. If any clause, sentence, paragraph, subdivision, section or part of this Local law or the application thereof, to any person, individual, corporation, firm, partnership, entity or circumstance, shall be adjudged by any court of competent jurisdiction to be invalid or unconstitutional such order of Judgment shall not affect, impair, or invalidate the remainder thereof, but shall be confined in its operation to the clause, sentence, paragraph, subdivision, section or part of this Local law or in its application to the person, individual, corporation, firm, partnership, entity, or circumstance directly involved In the controversy in which such judgment or order shall be rendered.

Section 10. Other Local Laws. Any prior Local Law or portion thereof in conflict with this Local Law is hereby repealed.

Section 11. Effective Date. This Local Law shall take effect upon filing in the Office of the Secretary of State, in accordance with Section 27 of the New York State Municipal Home Rule Law.

BID FOR PERFORMANCE OF CONTRACT WITH CATTARAUGUS COUNTY LEGISLATURE
LITTLE VALLEY, NEW YORK

TO: Cattaraugus County Legislature, Little Valley, New York, herein after called the County.

The undersigned, desiring to interpose a bid to provide services for ***Bid 56 – HVAC Improvements, Emergency Services, 303 Court Street, Little Valley, NY 14755*** for Cattaraugus County Department of Public Works, does hereby accept all terms, conditions, and agreements contained and set forth in the Notice to Bidders, Instructions to Bidders, Minimum Specifications, Non-Collusive Bidding Certification, Legal Status Information and Bid for Performance of Contract with Cattaraugus County Legislature and does hereby certify, agree and propose as follows:

The undersigned declares that he/she has examined all of the attached documents, and hereby proposes and agrees that, if this bid is accepted, he/she will contract with the County, such contract incorporating the provisions of the documents attached hereto, to furnish all the materials and services and do all the work specified in the attached documents in the manner and time herein specified and according to the requirements as herein set forth, and to take in full payment therefore the bid prices set forth on the preceding specification sheets.

If this proposal is accepted by the County and the undersigned fails to contract as aforesaid, within ten days (not including Sunday) from the date of notice from the County to him/her, then the County may at its option, determine that the bidder has abandoned his/her right to enter into the contract and thereupon the bid and acceptance shall be null and void.

The full name and residences of all persons and parties interested in the foregoing bid as principals are as follows: (Individuals or partnership bids only)

INDIVIDUAL, PARTNERSHIP OR CORPORATE USE

The undersigned certifies, under penalty of perjury, that he/she is fully authorized to sign this bid.

Name and Address of Bidder:

Authorized Signature and Title:

Signature

Title

Date

“Iran Divestment Act of 2012”

“Iranian Energy Sector Divestment”

Pursuant to State Finance Law § 165-a, the Commissioner of General Services is required to develop a list of persons it determines engage in investment activities in Iran, which is defined as provision of goods, services or credit of \$20,000,000 or more, relating to the energy sector.

General Municipal Law § 103-g(4) states as follows:

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

The below signed bidder affirms the following as true under penalties of perjury:

- a. “By submission of this bid, the bidder identified herein and each person signing on behalf of the bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief that this bidder is not on the list created pursuant to paragraph (b) of subdivision 3 of Section 165-a of the state finance law.”

Corporate or Company Name

By: _____
Signature

Title

Sworn to before me this

____ Day of _____, 20____

Notary Public

This AGREEMENT made as of the ____ day of _____ in the year 20__ by and between the County of Cattaraugus, a municipal corporation hereinafter called the "County" and _____ hereinafter called the "Contractor".

WITNESSETH that the County and Contractor in consideration of the mutual covenants hereinafter set forth, agree as follows:

Article 1. WORK. The Contractor will perform all Work as shown in the Contract Documents for the completion of the Project generally described as HVAC Improvements, Emergency Services, 303 Court Street, Little Valley, NY 14755.

(a) The Contractor shall furnish all of the materials and do all the Work required for the replacement of the structure and all other incidental work detailed in the contract documents.

Article 2. ENGINEER. The Project has been designed by Cattaraugus County. Cattaraugus County will hire an Engineer to represent the County in connection with implementation of the Project and is hereinafter called the ENGINEER. The County and the ENGINEER will provide all on-site observation services, and County observation personnel will also be referred to as the ENGINEER.

Article 3. CONTRACT TIME. Time of beginning, rate of progress and time of completion are essential conditions of the Contract. The Contractor shall commence work within ten (10) days of the effective date of the Contract, unless written consent is given by the County to begin at a later date. All work shall be completed on or before **January 31, 2019 or (90 days from Notice to Proceed), whichever is shorter.**

Article 4. CONTRACT PRICE. The County shall pay the Contractor for the performance of the Work in accordance with the Lump Sum Bid indicated in the bid documents.

Article 5. PAYMENTS. The County shall make payments on the account of the Contract as follows:

- (a) Upon request from the Contractor, the Engineer and the County will review and approve statements prepared by the Contractor for the total quantity of work properly completed by the Contractor as of a specified date noted on the statement. No such statement, however, will be reviewed by the Engineer and County within one month after the start of Work under contract, or at intervals of less than one month. The County will pay the Contractor 95% of the amount of each statement, less prior payments, forty-five (45) days after approval of the statement. Neither statement nor payment shall mean that any Work is accepted. The statements should be based on the percent complete of each subtask noted in the Unit Price schedule.

- (b) The 5% of the value of completed Work withheld from the Contractor will be paid to the Contractor by the County upon: (1) the completion of all Work to the satisfaction of the Engineer and the County; and (2) the Contractor has filed with the County a certification of payment of all labor and materials and certificate of release of liens in connection with this agreement.
- (c) The acceptance by the Contractor of the final payment of amounts withheld from the Engineer's statements shall be and shall operate as a release to the County and the Engineer of all claims and of all liability to the Contractor for all things done or furnished in connection with this Work and for every act and neglect of the County and Engineer and others relating to or arising out of this Work.
- (d) The County reserves the right, at any time, to modify or change the Plans or Specifications as deemed necessary and the Agreement shall not be invalidated thereby however;
- (e) If the Contractor considers that he/she is being required to perform extra work for which no Change Order has been issued, then he/she shall serve Written Notice upon the County prior to such extra work is performed. On failure to serve this Notice, all rights of the Contractor to be paid therefore shall be forfeited.

Article 6. CONTRACT DOCUMENTS. The Contract Documents which comprise the Contract between the Owner and the Contractor are attached hereto and made a part hereof and consist of the following:

- (a) The General Provisions and Proposal Booklet titled "**HVAC Improvements, Emergency Services, 303 Court Street, Little Valley, NY.**"
- (b) Drawings and Plans
- (c) Any Modifications, including Addenda, duly delivered before the execution of this Agreement, and Change Orders incorporated after the Agreement is signed.
- (d) Bonds and Insurance instruments.

Article 7. MISCELLANEOUS.

- (a) Terms used in this Agreement shall have the same meanings which are defined in this bid package.
- (b) The Contractor shall furnish a faithful performance surety bond on a form approved by the County in an amount equal to 100 percent of the Contract Price, and shall have as a surety thereon a surety company or companies authorized to do business in New York State. He/She likewise will furnish a Labor and Material Bond to guarantee the payment of all labor and materials supplied in connection with this Agreement.
- (c) Neither the County nor the Contractor shall, without the prior written consent of the other, assign or sublet in whole or in part his/her interest under any of the Contract Documents and,

- (d) Specifically, the Contractor shall not assign any monies due or to become due without the prior written consent of the County.
- (e) The County and the Contractor each binds himself/herself, his/her partners, successors, assigns and legal representatives to the other party hereto in respect of all covenants, agreements and obligations contained in the Contract Documents.
- (f) The Contract Documents constitute the entire agreement between the County and the Contractor and may only be altered, amended or repealed by a duly executed written instrument.

Article 8. CONTRACTOR REPRESENTATIONS. The Contractor is experienced in the use and interpretation of plans and specifications such as those included in these Contract Documents. He/She has carefully reviewed these and all of the Contract Documents and has found them free of ambiguity and sufficient for bid purposes. He/She has based his/her bid solely on these documents not relying on any explanation or interpretation, oral or written, from any other source.

Article 9. CONTRACT PROVISIONS. The parties to the attached contract, license, lease, amendment or other agreement of any kind (hereinafter, "the contract" or "this contract") agree to be bound by the following clauses which are hereby made a part of the contract (the word "Contractor" herein refers to any party other than the County of Cattaraugus, whether a contractor, licensor, licensee, lessor, lessee or any other party). In the event of a conflict between the terms of the contract (including any and all attachments thereto and amendments thereof) and the terms of this Article, the terms of this Article shall control.

(a) Non-Assignment Clause

In accordance with Section 109 of the General Municipal Law, this contract may not be assigned by the Contractor, or its right, title or interest therein assigned, transferred, conveyed, sublet or otherwise disposed of without the previous consent, in writing, of the County and any attempts to assign the contract without the County's written consent are null and void.

(b) Workers' Compensation Benefits

In accordance with Section 108 of the General Municipal Law, this contract shall be void and of no force and effect unless the Contractor shall provide and maintain coverage during the life of this contract for the benefit of such employees as are required to be covered by the provisions of the Workers' Compensation Law.

(c) Non-Discrimination Requirements

In accordance with Article 15 of the Executive Law (also known as the Human Rights Law) and all other State and Federal statutory and constitutional non-discrimination provisions, the Contractor will not discriminate against any employee or applicant for employment because of race, creed, color, sex, national origin, age, disability or marital status. Furthermore, in accordance with Section 220-e of the Labor Law, if this is a contract for the construction, alteration or repair of any public building or

public work or for the manufacture, sale or distribution of materials, equipment or supplies, and to the extent that this contract shall be performed within the State of New York, Contractor agrees that neither it nor its subcontractors shall, by reason of race, creed, color, disability, sex or national origin: (a) discriminate in hiring against any New York State citizen who is qualified and available to perform the work; or (b) discriminate against or intimidate any employee hired for the performance of work under this contract. If this is a building service contract as defined in Section 230 of the Labor Law, then, in accordance with Section 239 thereof, Contractor agrees that neither it nor its subcontractors shall, by reason of race, creed, color, national origin, age, sex or disability (a) discriminate in hiring against any New York State citizen who is qualified and available to perform the work; or (b) discriminate against or intimidate any employee hired for the performance of work under this contract. Contractor is subject to fines of \$50.00 per person per day for any violation of Section 220-e or Section 239 as well as possible termination of this contract and forfeiture of all monies due hereunder for a second or subsequent violation.

(d) Wage and Hours Provisions

If this is a public work contract covered by Article 8 of the Labor Law or a building service contract covered by Article 9 thereof, neither Contractor's employees nor the employees of its subcontractors may be required or permitted to work more than the number of hours or days stated in said statute, except as otherwise provided in the Labor Law and as set forth in prevailing wage and supplement schedules issued by the State Labor Department. Furthermore, Contractor and its subcontractors must pay at least the prevailing wage rate and pay or provide the prevailing supplements, including the premium rates for overtime pay, as determined by the State Labor Department in accordance with the Labor Law.

(e) Non-Collusive Bidding Requirement

In accordance with Section 103-d of the General Municipal Law, if this contract was awarded based upon the submission of bids, Contractor warrants, under penalty of perjury, that its bid was arrived at independently and without collusion aimed at restricting competition. Contractor further warrants that, at the time Contractor submitted its bid, an authorized and responsible person executed and delivered to the County a non-collusive bidding certification on Contractor's behalf.

(f) Set-Off Rights

The County shall have all of its common law and statutory rights of set-off. These rights shall include, but not be limited to, the County's option to withhold for the purposes of set-off any monies due to the Contractor under this contract up to any amounts due and owing to the County with regard to this contract.

(g) Record-Keeping Requirement

The Contractor shall establish and maintain complete and accurate books, records, documents, accounts and other evidence directly pertinent to performance under this contract for a period of six (6) years following final payment or the termination of this contract, whichever is later, and any extensions thereto. The County Treasurer or County Administrator or any other person or entity authorized to conduct an

examination, as well as the agency or agencies involved in this contract, shall have access to such books, records, documents, accounts and other evidential material during the contract term, extensions thereof and said such (6) year period thereafter for the purposes of inspection, auditing and copying. "Termination of this contract", shall mean the later of completion of the work of the contract or the end date of the term stated in the contract.

(h) Governing Law

This contract shall be governed by the laws of the State of New York except where the Federal supremacy clause requires otherwise.

(i) No Arbitration and Service of Process

Disputes involving this contract, including the breach or alleged breach thereof, may not be submitted to binding arbitration (except where statutorily authorized) but must, instead, be heard in a court of competent jurisdiction of the State of New York. Contractor hereby consents to service of process upon it by registered or certified mail, return receipt requested.

(j) Approval by County Legislature

This contract is subject to, and conditioned upon, approval by the Cattaraugus County Legislature.

(k) Postponement, Suspension, Abandonment or Termination of Contract

The County shall have the right to postpone, suspend, abandon or terminate this contract, and such actions shall in no event be deemed a breach of contract. In the event of any termination, postponement, delay, suspension or abandonment, the Contractor shall deliver to the County all data, reports, plans, or other documentation related to the performance of this contract, including but not limited to guarantees, warranties, as-built plans and shop drawings. In any of these events, the County shall make settlement with the Contractor upon an equitable basis as determined by the County which shall fix the value of the work which was performed by the Contractor prior to the postponement, suspension, abandonment or termination of this contract. This clause shall not apply to this contract if the contract contains other provisions applicable to postponement, suspension or termination of the contract.

(l) Indemnification

The Contractor shall defend, indemnify, and save harmless against Cattaraugus County, its officers, employees, and the Engineer from all suits, actions, or claims of any character brought because of any injuries or damage received or sustained by any person, persons, or property on account of the operations of such Contractor; or on account of or in consequence of any neglect in safeguarding the work; or through use of unacceptable materials in constructing the work; or because of any act of omission, neglect, or misconduct of the Contractor; or because of any claims or amounts recovered from any infringements of patent, trademark, or copyright; or from any claims on amounts arising or recovered under the Workers' Compensation Law, or any other law, ordinance, order, or decree; and so much of the money due the

Contractor under and by virtue of his Contract as shall be considered necessary by the County for such purpose, may be retained for the use of the County; or, in case no money is due, his/her surety may be held until such suit or suits, action or actions, claim or claims for injuries or damages as aforesaid shall have been settled and suitable evidence to that effect furnished to the County; except that money due the Contractor will not be withheld when the Contractor produces satisfactory evidence that he/she is adequately protected by public liability and property damage insurance.

The Contractor agrees to make no claim for damages for delay in the performance of this contract occasioned by any act or omission to act of the County or the Engineer or any of its representatives, and the Contractor agrees that any such claim shall be fully compensated for by an extension of time to complete the performance of work as provided herein. This indemnification shall include all costs and disbursements incurred by the County and the Engineer in defending any suit, including attorney's fees.

(m) Conflict of Interest

- (1) The Contractor warrants that to the best of the Contractor's knowledge and belief, there are no relevant facts or circumstances which could give rise to an organizational conflict of interest, as herein defined, or that the Contractor has disclosed all such relevant information to the County.
- (2) An organizational conflict of interest exists when the nature of the work to be performed under this contract may, without some restriction on future activities, either result in an unfair competitive advantage to the Contractor or impair the Contractor's objectivity in performing the work for the County.
- (3) The Contractor agrees that if an actual or potential organizational conflict of interest is discovered after award, the Contractor will make a full disclosure in writing to the County. This disclosure shall include a description of actions which the Contractor has taken or proposes to take, after consultation with the County, to avoid, mitigate, or minimize the actual or potential conflict.
- (4) The County may terminate this contract in whole or in part, if it deems such termination necessary to avoid an organizational conflict of interest. If the Contractor was aware of a potential organizational conflict of interest prior to award, or discovered an actual or potential conflict after award and did not disclose or misrepresented relevant information to the County, then the County may terminate the contract, or pursue such other remedies as may be permitted by law or this contract. The terms of Clause (k) of this Section or other applicable contract provision regarding termination shall apply to termination by the County pursuant to this clause.
- (5) The Contractor further agrees to insert in any subcontract hereunder, provisions which shall conform to the language of this clause.

(n) Requests for Payment

All requests for payment by the Contractor must be submitted on forms supplied and approved by the County. Each payment request must contain such items of information and supporting documentation as required by the County, and shall be all inclusive for the period of time covered by the payment request.

(o) Performance of Work Required

The Contractor agrees that during the performance of the work required pursuant to this Agreement, the Contractor and all officers, employees, agents or representatives working under the Contractor's direction shall strictly comply with all local, state or federal laws, ordinances, rules or regulations controlling or limiting in any way the performance of the work required by this Agreement. Furthermore, each and every provision of law required to be inserted in this Agreement shall be deemed so inserted, and the Agreement shall be read and enforced as if such provisions were so inserted.

The Contractor further agrees to insert in any subcontract hereunder, provisions which shall conform substantially to the language of this clause, including this paragraph.

(p) Independent Contractor Status

It is understood that the Contractor is an independent Contractor and shall not be considered an agent of the County nor shall any of the Contractor's employees or agents be considered sub-agents for the County. The final contract will be between the County and the Contractor and is not intended and shall not be construed to create the relationship of agent, servant, employee, partnership, joint venture, or association between County and Contractor. The employees and agents of one party are not the employees or agents of the other party for any purpose whatsoever. The Contractor understands and agrees that all persons performing work pursuant to the final contract are for purposes of workers' compensation liability, solely employees of the Contractor and not employees of the County. The Contractor shall be solely liable and responsible for furnishing any and all workers' compensation benefits to any person as a result of any injuries arising from or connected with any work performed by or on behalf of the Contractor hereunder. The employees and agents of each party shall while on the premises of the other party, comply with all rules and regulations of the premises including, but not limited to security requirements. The Contractor agrees to comply with the non discrimination employment policies as required by applicable state and federal laws and regulations regarding employment discrimination. The Contractor assures the County that in accordance with applicable law it does not, and agrees that it will not, discriminate in any manner on the basis of age, color, creed, national origin, race, religious belief, sexual preference, or handicap.

(q) No-Waiver

In the event that the terms and conditions of the Agreement are not strictly enforced by the County, such non-enforcement shall not act as or be deemed to act as a waiver or modification of this Agreement, nor shall such non-enforcement prevent the County from enforcing each and every term of this Agreement thereafter.

(r) Severability

If any provision of this Agreement is held invalid by a court of law, the remainder of this Agreement shall not be affected thereby if such remainder would then continue to conform to the laws of the State of New York.

(s) Liquidated Damages

The contractor shall be assessed a penalty of **\$300 per day** and any additional inspection and engineering costs for work not complete within the specified time frame.

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

Attest

By:

County

Attest

By:

Contractor

ACKNOWLEDGMENT OF COUNTY

STATE OF NEW YORK)SS
COUNTY OF CATTARAUGUS)

On this ____ day of _____ 20____, before me, the undersigned, a Notary Public in and for said State, personally appeared _____, personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to the within instrument and acknowledged to me that he/she executed the same in his/her capacity, and that by his/her signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

Notary Public

ACKNOWLEDGMENT OF CONTRACTOR (OUTSIDE NEW YORK STATE)

STATE OF _____)SS:
COUNTY OF _____)

On this _____ day of _____ 20____, before me, the undersigned, a Notary Public in and for said State, personally appeared _____, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name(s) is subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument and that such individual made such appearance before the undersigned in the City/Town of _____ in State of _____.

(SEAL)
Notary Public

ACKNOWLEDGMENT OF CONTRACTOR (WITHIN NEW YORK STATE)

STATE OF NEW YORK)SS:
COUNTY OF _____)

On this ____ day of _____ 20____, before me, the undersigned, a Notary Public in and for said State, personally appeared _____, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name(s) is subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

(SEAL) _____
Notary Public

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PART 1 BIDDING REQUIREMENTS AND CONDITIONS

1.1 NOTICE TO BIDDERS (ADVERTISEMENT)

Sealed bids for the HVAC Improvements, Emergency Services, 303 Court Street, Little Valley, NY 14755, will be received under the direction of the County Administrator at the Cattaraugus County Department of Public Works Facility, 8810 Route 242, Little Valley, New York until **October 12, 2018 at 1:45 p.m.**, after which they will be publicly opened at **2:00 p.m.** (at the same location), under the direction of the Public Works Committee of the Cattaraugus County Legislature. Each bid, at the time received, will be stamped by a clock showing date and time of receipt.

Copies of the Contract Plans and Documents may be examined at no expense at the following location:

Cattaraugus County Department of Public Works
8810 Route 242
Little Valley, New York 14755
(716) 938-9121

Copies of the Contract Plans and Documents may be purchased only at the Cattaraugus County Department of Public Works. The purchase price for each set of Contract Plans and Documents is fifty dollars (\$50.00), which is refundable to bidders only. All checks for purchase of Contract Plans and Documents shall be made payable to "County of Cattaraugus". Full refund for one copy of the plans and specifications will be made to a bidder for this project, if such plans and specifications are returned in good condition within 30 calendar days after the award of the contract or after the rejection of the proposal. The successful bidder is not required to return the copy of the plans and specifications in order to be entitled to such refund. No refund will be made for more than one set of plans and specifications or to persons or firms not submitting a bid.

Questions regarding the contract documents for this project may be directed to Gerald May, PE, Wendel, 375 Essjay Road, Buffalo, New York 14221 at (716) 688-0766.

All bids must be written in ink on the forms provided. The bid must be accompanied by a certified check, cashier's check, or bid bond made payable to "Treasurer, Cattaraugus County", in the amount of 5% of the bid, as a guarantee that if the Contract is awarded to the bidder, he/she will sign the Contract and furnish a satisfactory performance bond. If a bidder should fail to sign the Contract and deliver the performance bond within ten (10) calendar days after he/she has received the Contract, then he/she shall forfeit the proposal guaranty.

In compliance with the provisions of Section 115 (Prevailing Rate of Wage), Public Law 627, the minimum wages paid laborers and mechanics are included in wage schedules that are set out in the bid proposal.

Cattaraugus County Local Law 12-2012 as amended by Local Law 5-2015 requires that the County provide a copy of the Cattaraugus County Vendor Responsibility Form to the low bidder. The low bidder will have 5 business days to return the completed form unless the form was mailed by the county to the vendor, in which case they will have 10 business days from the date of the mailing to return the form. Failure by the low bidder to submit the form within the above time frame will lead to the automatic rejection of their bid. The contractor must also ensure that all subcontractors to be used on the project complete this form and submit it to the County for approval within 5 days of the preconstruction construction meeting. Failure to do so may lead to the rejection of the subcontractor at the County's discretion.

Currently the Commissioner of Public Works has approved the CCA-2 (New York State Vendor Responsibility Questionnaire for-Profit Construction) with attachments A, B and C to serve as the Cattaraugus County Vendor Responsibility Form.

The County of Cattaraugus reserves the right to reject any or all bids, to waive any informality in any bids, and to award the Contract in the County's best interest. The County reserves the right to make the award within forty-five (45) calendar days after the date of the bid opening during which period bids shall not be withdrawn.

1.2 PREQUALIFICATION OF BIDDERS

The County reserves the right to reject any bid if the evidence submitted by, or investigation of, such bidder fails to satisfy the County that such bidder is properly qualified to carry out the obligations of the contract and to complete the work contemplated therein. Conditional bids will not be accepted.

1.3 PROPOSAL GUARANTY

Proposals shall be accompanied by a proposal guaranty in the form of a certified check, cashier's check, or bid bond in the amount of five percent (5%) of the total amount bid. It shall be made payable to "Treasurer, Cattaraugus County".

1.4 DELIVERY OF PROPOSALS

Each proposal must be submitted in a sealed envelope clearly marked to indicate its contents. Sealed proposals must be delivered to the Cattaraugus County Commissioner of Public Works at or before the date, time and location specified herein. No responsibility shall be attached to the Commissioner of Public Works or his representatives for the premature opening of any proposal not properly labeled. Bidders assume all responsibilities and risks associated with mail or courier delivery. When sent by mail, the sealed proposal must be addressed to the County at the address and in care of the official in whose office the bids are to be received. All proposals shall be filed prior to the time and at the place specified in the "Notice to Bidders". Proposals received after the time for opening of bids will be returned to the bidder unopened.

1.5 NOTICE OF SPECIAL CONDITIONS

The contractor's attention is particularly called to those parts of the contract documents and specifications which deal with the following:

- A. Insurance requirements - Item 6.4
- B. Prevailing wage rates required by N.Y.S. Labor Law – Section E

1.6 DISQUALIFICATION OF BIDDERS

Any one or more of the following may be considered as sufficient cause for the disqualification of a bidder and the rejection of his/her proposal.

- (a) More than one proposal for the same work from an individual, firm or corporation under the same or different names.
- (b) Evidence of collusion among bidders. Participants in such collusion will receive no recognition as bidders for any future work with the County until any such participant shall have been reinstated as a qualified bidder.
- (c) Lack of competency and adequate machinery, plant and other equipment, as revealed by the financial statements and experience questionnaire.
- (d) Unsatisfactory performance record as shown by past work for any owner judged from the standpoint of workmanship and progress.
- (e) Uncompleted work which, in the judgment of the County, might hinder or prevent the prompt completion of this work if awarded.
- (f) Failure to pay, or satisfactorily settle, all bills due for labor and materials on former contracts in force at the time of letting.
- (g) Violation of New York Labor Law §220 within the previous five (5) years.
- (h) Failure to comply with any qualification regulations of the County.

PART 2 AWARD AND EXECUTION OF CONTRACT

2.1 CONSIDERATION OF PROPOSALS

In accordance with General Municipal Law, after the proposals are opened and read, they will be compared on the basis the current gross summary in a manner hereafter described for which the work will be performed according to the plans and specifications together with the unit price for each of the separate items as called for. The lowest bid shall be determined by the County on the basis of the gross lump sum for which the entire work will be performed, arrived at by a correct computation of all items specified in the proposal therefore at the unit prices stated in the proposal (if any). If a conflict arises within the bid proposal, then the words will be used for the final tabulation.

The right is reserved to reject any or all proposals, to waive technicalities, to advertise for new proposals, or to proceed to do the work otherwise, if in the judgment of the Commissioner the best interests of the County will be promoted thereby.

2.2 CANCELLATION OF AWARD

The County reserves the right to cancel the award of any Contract at any time before the execution of the Contract by all parties without any liability against the County.

2.3 RETURN OF PROPOSAL GUARANTY

All proposal guaranties, except those of the three lowest bidders, will be returned immediately following the opening and checking of the proposals. That of the successful bidder will be returned after a satisfactory bond has been furnished and the Contract has been executed. The remaining two guaranties will be returned within ten (10) calendar days following the award of the Contract.

2.4 BONDS

The successful bidder shall at the time of the execution of the Contract, furnish a performance bond and a payment bond each in an amount equal to the full amount of the Contract. The purpose of such bonds is to assure the faithful performance of this Contract as well as the payment of all persons performing labor and furnishing materials in connection with this Contract. The form of the bonds and the security shall be acceptable to the County.

Negotiable securities, satisfactory to the County, in an amount equal to that specified for the Contract bond, may be deposited with the County in lieu of such Contract bond and shall be subject to all the conditions of such bond and to such agreements as may be required by the County.

2.5 FAILURE TO EXECUTE CONTRACT

Failure of the Contractor to execute the Agreement and file acceptable performance and payment bonds within ten (10) calendar days from the date of the ***Notice of Award*** (see form on Page D-20) after he/she has received the Contract form shall be just cause for the annulment of the award, and for the forfeiture of the proposal guaranty. The proposal guaranty shall become the property of the County, not as a penalty, but in liquidation of damages sustained. Award may then be made to the next lowest responsible bidder or the work may be re-advertised and constructed under a new Contract or otherwise as the County may decide.

PART 3 SCOPE OF WORK

3.1 RESPONSIBILITY OF THE CONTRACTOR

The Contractor will be held responsible for the execution of a satisfactory and complete piece of work, in accordance with the true intent of the drawings and specifications. He/She shall provide, without extra charge, all incidental items required as a part of his work including layout and survey, even though not particularly specified or indicated. If he/she has good reason for objecting to the use of any material, appliance, or method of construction as shown or specified, then he/she shall report such objections to the Engineer, and if approved by the Engineer, shall obtain proper adjustment before the Contract is made, and then shall proceed with the work with the understanding that a satisfactory job will be required. The Contractor is solely responsible for site safety and adherence to OSHA regulations.

General Scope of Work:

Improvements include modifications to controls, sealing of ductwork, service of supply air fan, replacing the supply air fan motor and adding a supply air fan variable frequency drive (VFD), adding transfer grilles, and the replacement of the duct mounted heating coil and associated coil connections.

PART 4 CONTROL OF WORK

4.1 AUTHORITY OF ENGINEER

The Commissioner of Public Works will be represented by the Engineer who will observe the work done under the Contract on a part time basis throughout construction.

The Engineer shall inspect work performed, review materials to be used, and stop and reject work and materials found to be not in accordance with the plans and specifications. His/Her authority shall cover all phases of the work. In the event that questions should arise concerning the interpretation or changes of plans and specifications or to the acceptability of the work, the Contractor shall submit his/her questions, in writing, to the Engineer. These questions shall be forwarded to the Commissioner of Public Works along with the Engineer's recommendations.

The Engineer may place on the job other personnel who shall observe the work as his/her direct representatives. Their authority shall consist of observing the work under the Contract, rejecting any defective material used and temporarily suspending any work improperly performed. They will not have any authority to make changes or alterations in the plans and specifications, nor be permitted to act as foremen for the Contractor.

Any work done or materials used without scheduling suitable observation by the Engineer or his/her authorized representative as noted may be ordered removed and replaced at the Contractor's expense.

4.2 SUBSTANTIAL COMPLETION AND FINAL ACCEPTANCE OF WORK

When in the opinion of the Engineer the Contractor has substantially completed the project or a specified area of a project so that the County can occupy or utilize the project for the use it was intended, the Engineer shall recommend to the Commissioner of Public Works to issue a Certificate of Substantial Completion (See form on page D-22).

When in the opinion of the Engineer the Contractor has fully performed the work under the Contract, the Engineer shall recommend to the Commissioner of Public Works the acceptance of the work so completed. If the Commissioner of Public Works accepts the recommendation of the Engineer, then he/she shall notify the Contractor by letter of such acceptance, and copies of such acceptance shall be sent to other interested parties.

4.3 GENERAL GUARANTY:

Neither the final certificate of payment nor any provision in the contract documents nor partial or entire occupancy of the premises by the County shall constitute acceptance of work not done in accordance with the contract documents or relieve the Contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship.

The Contractor shall remedy any defects in the work and pay for any damage to other work resulting there from, which shall appear within a period of two (2) years from the date of substantial completion. The County will give notice of observed defects with reasonable promptness.

4.4 CONTRACTOR'S PERSONNEL

The Contractor shall place in charge of the work a competent and reliable English-speaking Superintendent, who shall have the authority to act for the Contractor and who shall be acceptable to the Engineer. This Superintendent must be present at all times during the working day to receive directions and orders given by the Engineer or his/her representatives. All workers must have sufficient skill and experience to properly perform the work assigned to them. Any person employed by the Contractor who the Engineer may deem incompetent or unfit to perform the work shall at once be discharged and shall not again be employed on projects for the County at that specific task.

4.5 COOPERATION WITH UTILITIES

It shall be the Contractor's duty to notify all utility companies or other parties affected within a time frame as not to affect the schedule prior to all necessary adjustment of the public or private utility fixtures and other appurtenances within or adjacent to the limits of construction. The Contractor shall notify the Engineer in writing describing the need for, and extent of, utility adjustments and the anticipated schedule.

It is understood and agreed upon that the Contractor has considered in his/her bid all of the permanent and temporary utility appurtenances in their present or relocated positions as shown on the plans and that no additional compensation will be allowed for any delays, inconveniences, or damage sustained by him due to any interference from the utility appurtenances or the operation of moving them by the utility owners. The Contractor will be responsible for any fees required by the utility owners for temporary locations.

PART 5 CONTROL OF MATERIALS

5.1 CERTIFICATE OF ACCEPTABILITY

All certificates of acceptability of materials required by the specifications shall be supplied by the Contractor at no expense to the County. The Engineer shall have the right to approve of the laboratories or fabricators that will issue the certificates.

The cost of the inspection by the Engineer of any plants not approved by the County shall be borne by the Contractor. This shall include, but not be limited to, plants employed to provide mobile concrete and steel reinforcement.

PART 6 LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

6.1 SUBCONTRACTORS, MATERIALMEN AND LABORERS

The Contractor shall furnish the Engineer, before final payment is authorized; an affidavit that all labor and material associated with the work in any way is paid for in full. The Contractor shall indemnify and hold the County and the Engineer harmless from any lien or claim which may be made or filed after such payment by any subcontractor, material man or laborer in connection with work performed hereunder.

6.2 RESPONSIBILITY FOR DAMAGE CLAIMS

The Contractor shall indemnify and save harmless Cattaraugus County, its officers, employees and the Engineer, from all suits, actions, or claims of any character brought because of any injuries or damage received or sustained by any person, persons, or property on account of the operations of the Contractor; or on account of or in consequence of any neglect in safeguarding the work; or through use of unacceptable materials in constructing the work; or because of any act or omission, neglect, or misconduct of the Contractor; or because of any claims or amounts recovered from any infringements of patent, trademark, or copyright; or from any claims on amounts arising or recovered under the Workers' Compensation Law, or any other law, ordinance, order, or decree; and so much of the money due the Contractor under and by virtue of his/her Contract as shall be considered necessary by the County for such purpose, may be retained for the use of the County; or, in case no money is due, his/her surety may be held until such suit or suits, action or actions, claim or claims for injuries or damages as aforesaid shall have been settled and suitable evidence to that effect furnished to the County; except that money due the Contractor will not be withheld when the Contractor produces satisfactory evidence that he/she is adequately protected by public liability and property damage insurance.

The Contractor agrees to make no claim for damages for delay in the performance of this contract occasioned by any act or omission to act of the County or the Engineer, or any of its representatives, and the Contractor agrees that any such claim shall be fully compensated for by an extension of time to complete the performance of work as provided herein.

6.3 NO WAIVER OF LEGAL RIGHTS

The County shall not be precluded or stopped by a measurement, estimate or certificate made either before or after the completion and acceptance of the work and payment therefore, from showing the true amount and character of the work performed and materials furnished by the Contractor, nor from showing that any such measurement, from recovering from the Contractor or his/her sureties, or both, such damage as it may sustain by reason of his/her failure to comply with the terms of the Contract. Neither the acceptance by the County, or any representative of the County, nor any extension of time, nor any possession taken by the County shall operate as a waiver of any portion of the Contract or of any power herein reserved, or of any right to damages. A waiver of any breach of the Contract shall not be held to be a waiver of any other or subsequent breach.

6.4 INSURANCE

The Contractor shall procure and maintain at its own expense and without expense to the County, until final acceptance by the County, of the work covered by the contract, insurance for liability for damages imposed by law, of the kinds and in the amounts hereinafter provided, with insurance companies authorized to do such business in the County covering all operations under the contract whether performed by it or its subcontractors. Within ten (10) days of the Notice to Award and prior to the commencement of any work the Contractor shall furnish to the Cattaraugus County Human Resources a certificate or certificates of insurance in form satisfactory to the Cattaraugus County Human Resources Personnel Officer showing that it has complied with this Section, which certificate or certificates shall provide that the policies shall not be changed or canceled until thirty (30) days written notice has been given to the Cattaraugus County Human Services Department. Failure to supply a satisfactory certificate with ten (10) days after the Notice of Award may result in the cancellation of award and for the forfeiture of the Contractor's bid security, in the sole discretion of the County. The types of insurance are as follows:

- A. Workers' Compensation Insurance. A policy covering the obligations of the Contractor in accordance with the provisions of the Workers' Compensation Law, covering all operations under the contract, whether performed by it or its subcontractor and also under the Disability Benefits Law. The contract, shall be void and of no effect unless the person or corporation making or executing same shall secure compensation and disability benefits coverage for the benefit of, and keep insured during the life of the contract, such employees in compliance with the provisions of the Workers' Compensation Law.
- B. Liability and Property Damage Insurance. Policies following the 1986 Insurance Services Office formats shall be provided. Unless otherwise specifically required by special provision, each policy shall not be amended or contain deductible clauses or coverage exclusions of any nature and shall have limits not less than shown on the sample Certificate of Liability Insurance (Column A – Construction & Maintenance) on page D-15.

For all damages arising during the policy period, shall be furnished in the types (a1.) through (e.) as described below. An umbrella type policy, dedicated to this contract, may be used to meet these limits.

- a1. Contractor's Liability Insurance issued to and covering the liability for damages imposed by law upon the Contractor with respect to all work performed by him under the agreement;
- a2. Contractor's Liability Insurance issued to and covering the liability for damages imposed by law upon EACH SUBCONTRACTOR with respect to all work performed by said subcontractor under the agreement;
- b. Contractor's Protective Liability Insurance issued to and covering the liability for damages imposed by law upon the Contractor with respect to all work under the agreement performed for the Contractor by subcontractors;
- c. Completed Operations' Liability Insurance issued to and covering the liability for damages imposed by law upon the Contractor and each subcontractor arising between the date of final cessation of the work and the date of final acceptance thereof, out of that part of the work performed by each;

- d. Protective Liability Insurance issued to and covering the liability for damages imposed by law upon Cattaraugus County and the Commissioner of Public Works and all employees of the County both officially and personally, any municipality in which the work is being performed, and/or any public benefit corporation, railroad, or public utility whose property or facilities are affected by the work or any consultant inspecting engineer or inspector working for or on the project, and their agents or employees,, with respect to all operations under the agreement by the Contractor or its subcontractors, including omissions and supervisory acts of the State, municipality, public benefit corporation or consultant. Specifically, this includes, but is not necessarily limited to the parties listed below.

Failure to list a firm, organization or municipality, etc. does not eliminate the requirement to provide such coverage.

If the Contractor elects to use the same policy for more than one project, then it must provide with the insurance certificate the Aggregate Limits of Insurance (per project) Endorsement indicating the specific project site and contract number;

- e. Commercial General Liability (Premises, Existence, Hazard) Liability Insurance (formerly called Owner's, Landlord's and Tenant's Liability Insurance) issued to and covering the liability for damages imposed by law upon Cattaraugus County and the Commissioner of Public Works and all employees of the County both officially and personally, any municipality in which the work is being performed, and/or any public benefit corporation, railroad, or public utility whose property or facilities are affected by the work or any consultant inspecting engineer or inspector working for or on the project, and their agents or employees, with respect to temporarily opening any portion of the County construction project under this agreement, until the construction or reconstruction pursuant to the agreement has been accepted by the County. Specifically, this includes, but is not necessarily limited to the parties listed on page D-15 (Column A – Construction & Maintenance).

Failure to list a firm, organization or municipality, etc. does not eliminate the requirement to provide such coverage. This coverage will not be required for contracts involving only turf establishment, landscaping, or traffic signals, which do not involve work on the roadway.

- C. Automobile Liability and Property Damage Insurance. A policy covering the use in connection with the work covered by the Contract Documents of all owned, non-owned and hired vehicles bearing, or, under the circumstances under which they are being used, required by the Motor Vehicle Laws of the State of New York to bear license plates.”

List of Additional Insured Parties

County of Cattaraugus, 303 Court Street, Little Valley, NY 14755

6.5 LITIGATION

In the event any litigation shall arise from this contract, the laws of the State of New York shall control any litigation, regardless of which party shall institute such action.

COUNTY OF CATTARAUGUS STANDARD INSURANCE REQUIREMENTS

The insurance companies providing these coverages acknowledge that the Named Insured is entering into a contract with the County of Cattaraugus in which the Named Insured agrees to defend, hold harmless, and indemnify the County, its officials, employees, and agents against all claims resulting from work performed, material handled, and services rendered. In some circumstances it will be necessary to require alternate coverage and limits which will be defined in the bid specifications, contract, lease or agreement. The alternate coverage and limits should be evidenced on the certificate in lieu of the standards printed below.

Minimum Coverage Limits are as follows:

	A Construction & Maintenance	Aa Low Risk Construction & Maintenance	C Professional	D Property Leased to Others or Use of Facilities	F Livery	G All Purpose Public Entity, Concessionaire	Ga Low Risk All Purpose Public Entity
** COMMERCIAL GENERAL LIABILITY	\$2,000,000 Agg. \$1,000,000 Occ.	\$1,000,000 Agg. \$ 500,000 Occ.	\$2,000,000 Agg. \$1,000,000 Occ.	\$2,000,000 Agg. \$1,000,000 Occ.	\$2,000,000 Agg. \$1,000,000 Occ.	\$2,000,000 Agg. \$1,000,000 Occ.	\$1,000,000 Agg. \$ 500,000 Occ.
Prem. - Ops.	Include	Include	Include	Include	Include	Include	Include
Indep. Contractor	Include	Include	Include	Include	Include	Include	Include
Contractual	Include	Include	Include	Include	Include	Include	Include
BF Property Damage	Include	Include	Include	Include	Include	Include	Include
X,C,U	Include	Include		Include			
Personal Injury	Include	Include	Include	Include	Include		Include
Liquor Law				Include	Include		
Host Liquor				Include			
** AUTO LIABILITY	\$1,000,000 CSL	\$1,000,000 CSL	\$1,000,000 CSL	\$1,000,000 CSL	\$1,000,000 CSL	\$1,000,000 CSL	\$1,000,000 CSL
Owned	Include	Include	Include	Include	Include	Include	Include
Hired	Include	Include	Include	Include	Include	Include	Include
Non-Owned	Include	Include	Include	Include	Include	Include	Include
** EXCESS LIABILITY	\$3,000,000	\$1,000,000	\$1,000,000	\$1,000,000	\$3,000,000	\$1,000,000	
WORKERS' COMP. DISABILITY	Per attached information sheet	Per attached information sheet	Per attached information sheet	Per attached information sheet	Per attached information sheet	Per attached information sheet	Per attached information sheet
EMPLOYER'S LIABILITY	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited
*** PROFESSIONAL LIAB.			\$3,000,000 Agg. \$1,000,000 Occ.				

* The Comprehensive/Commercial General Liability limits can be met by one or more policies, or in combination with an Excess and/or Umbrella Liability policy. The COI must indicate if the coverage trigger in an 'Occurrence' form or a 'Claims-made' form.

** 'Claims-made' policies shall continue to provide evidence of coverage three (3) years after completion of work or product delivery.

*** Cattaraugus County MUST be named as Additional Insured for all acts of Named Insured pursuant to this contract.

Each policy, as allowed by law, shall be endorsed stating that the contractor's Insurers agree to waive any rights of subrogation against the County of Cattaraugus because of payments for any injury or damages arising out of work performed under this contract.

PART 7 PROSECUTION AND PROGRESS

7.1 NOTICE TO PROCEED

The "Notice to Proceed" (see form on page D-21) will stipulate the date on which it is expected the Contractor will begin the work. Commencement of work by the Contractor shall be deemed and taken as a waiver of this notice on his part. In no case, however, shall the Contractor begin work prior to the date of the signing of the Contract.

7.2 PROSECUTION OF WORK

The Contractor shall start construction operations on the part of the project approved by the Engineer, or set forth in the approved Progress Schedule. The work shall be conducted in such manner and with sufficient materials, equipment, and labor as are considered necessary to insure its completion in accordance with the plans and specifications as interpreted by the Engineer, by the date set forth in the Agreement. Should the prosecution of the work for any reason be discontinued, the Contractor shall notify the Engineer at least 24 hours in advance of resuming operations.

7.3 TEMPORARY SUSPENSION OF WORK

The Engineer shall have the authority to suspend the work wholly or in part by written order for such period as he/she may deem necessary due to unsuitable weather, to conditions considered unfavorable for the suitable prosecution of the work, or to carry out orders given or to perform any provisions of the Contract.

7.4 DATE OF COMPLETION OF CONTRACT WORK

The Contractor shall perform fully, entirely, and in a satisfactory and acceptable manner the work contracted, by the date stipulated in the Agreement.

In adjusting the Agreement date for the completion of the project, all strikes, lock-outs, unusual delays in transportation, or any condition over which the Contractor has no control, and also any suspensions ordered by the Engineer for causes not the fault of the Contractor, shall be excluded from the computation of the contract time for completion of the work. No allowance will be made for delays or suspensions of the prosecution of the work due to the fault of the Contractor.

7.5 TERMINATION OF CONTRACT

If the Contractor is adjudged bankrupt or makes an assignment for the benefit of creditors or a receiver is appointed for the Contractor or any insolvency arrangement proceedings are instituted by or against him, or if the Contractor fails after seven (7) days notice to supply enough properly skilled workers or proper materials or fails to prosecute the work with such diligence as will insure its completion by the Agreement date or shall in any other respect commit a breach of his/her Agreement and fail to remedy the same within seven (7) days after notice thereof, then the County may, by twenty-four (24) hours written notice, terminate the Contractor's right to proceed with the balance of the work or with any portion thereof and may take possession of the work and complete it by Contract or otherwise. The County may utilize such materials, plant and equipment as may be on the site of the work.

7.6 FAILURE TO COMPLETE WORK ON TIME

When the work embraced in the Contract is not completed on or before the date specified therein, engineering and inspection expenses incurred by the County upon the work from the completion date originally fixed in the Agreement to the final date of completion of the work may be charged to the Contractor and be deducted by the County from any payment due the Contractor. Consideration of any extra work or supplemental Contract work added to the original Contract as well as extenuating circumstances beyond the control of the Contractor, will be given due consideration by the County before assessing engineering and inspection charges against the Contractor. The Contractor will be responsible for any delays resulting from causes within the Contractor's control, including inefficient operations, and the Commissioner of Public Works shall be the sole judge of whether such charges shall be assessed against the Contractor.

7.7 ASSIGNMENT

Assignment of the contract shall be in accordance with Section 109 of the General Municipal Law as follows:

§109. Assignment of public contracts

1. A clause shall be inserted in all specifications or contracts hereafter made or awarded by any officer, board or agency of a political subdivision, or of any district therein, prohibiting any contractor, to whom any contract shall be let, granted or awarded, as required by law, from assigning, transferring, conveying, subletting or otherwise disposing of the same, or of his/her right, title, or interest therein, or his/her power to execute such contract, to any other person or corporation without the previous consent in writing of the officer, board or agency awarding the contract.
2. If any contractor, to whom any contract is let, granted or awarded, as required by law, by any officer, board or agency of a political subdivision, or of any district therein, shall without the previous written consent specified in subdivision one of this section, assign, transfer, convey, sublet or otherwise dispose of such contract, or his/her right, title, or interest therein, or his/her power to execute such contract, to any other person or corporation, the officer, board or agency which let, made, granted or awarded such contract shall revoke and annul such contract, and the political subdivision or district therein, as the case may be, and such officer, board or agency shall be relieved and discharged from any and all liability and obligations growing out of such contract to such contractor, and to the person or corporation to which such contract shall have been assigned, transferred, conveyed, sublet or otherwise disposed of, and such contractor, and his/her assignees, transferees or sublessees shall forfeit and lose all moneys theretofore earned under such contract, except so much as may be required to pay his/her employees. The provisions of this section shall not hinder, prevent, or affect an assignment by any such contractor for the benefit of his/her creditors made pursuant to the laws of this state.

PART 8 MEASUREMENT, PAYMENT, AND RECORD KEEPING

8.1 PAYMENTS ON CONTRACT

Payments to the Contractor for work satisfactorily completed will be made monthly in the amount of 95% of the work completed. No monthly payment will be rendered for less than 10% of the Contract amount or \$1,000, whichever is less. The payments will be based on the completed percentage of each unit bid as shown in the Itemized schedule.

The attention of persons intending to make proposals is specifically called to the provisions of Section 70 and 71 of the Lien Law in relation to funds being received by a Contractor for a public improvement. These provisions declare that the funds received by the Contractor shall constitute trust funds in the hands of such Contractor to be applied first to the payment of certain claims.

No certificate approving or authorizing the first partial payment, or in the event taxes shall be found due in accordance with this Section after the first payment to the Contractor, then no certificates approving or authorizing any final payment shall be made to a foreign Contractor unless such Contractor furnishes satisfactory proof that all taxes due by such Contractor under the provisions of Articles 9, 9A, 16, and 16A of the Tax Law have been paid. The certificate of the State Tax Commission to the effect that all such taxes have been paid shall be conclusive proof of the payment of such taxes.

The term "Foreign Contractor" as used in the preceding paragraph means in the case of an individual, a person who is a legal resident of another state or foreign country; and in the case of a firm or co-partnership, one having one or more partners who is a legal resident of another State or foreign country and in the case of a corporation, one having its principal place of business in another State or foreign country.

8.2 DIFFERING SITE CONDITIONS

The Contractor shall promptly, and before the conditions are disturbed, give a written notice to the Engineer of (1) subsurface or latent physical conditions at the site which differ materially from those indicated in this contract, or (2) unknown physical conditions at the site of an unusual nature, which differ materially from those ordinarily encountered and generally recognized as inhering in work of the character provided for in the contract.

The Engineer shall investigate the site conditions promptly after receiving the notice. If the conditions do materially so differ and cause an increase or decrease in the Contractor's cost of, or the time required for, performing any part of the work under this contract, whether or not changed as a result of the conditions, then an equitable adjustment shall be made under this clause and the contract modified in writing accordingly.

No request by the Contractor for an equitable adjustment to the contract under this clause shall be allowed, unless the Contractor has given the written notice required; provided, that the time prescribed above for giving written notice may be extended by the Engineer.

8.3 RECORD KEEPING

In conformance with Cattaraugus County Local Law 12-2012, the contractor and all its subcontractors will submit the following payroll related information to the County on a biweekly basis. Such information shall include, at a minimum, name of employee, title of employee, time reported for work and time left work for each day.

This information is separate from the certified payrolls required for projects governed by Article 8 of the Labor Law.

NOTICE OF AWARD

TO: _____

PROJECT Description:

HVAC Improvements – Emergency Services, 303 Court Street, Little Valley, NY

The County has considered the Bid submitted by you for the above-described work in response to its Advertisement for Bid No. 56 opened October 12, 2018. You are hereby notified that your Bid has been accepted in the amount of \$ _____. You are required by the General Provisions to execute the Agreement and furnish the required Contractor's Performance Bond and Payment Bond within ten (10) calendar days from the date of this Notice of Award.

If you fail to execute such Agreement and to furnish the Bonds within the ten (10) days from the date of this Notice, then the County will be entitled to consider all your rights arising out of Cattaraugus County's acceptance of your Bid as abandoned and as a forfeiture of your Bid Bond. Cattaraugus County will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this Notice of Award to Cattaraugus County.

Dated this ____ day of _____ in the year 2018.

OWNER: Cattaraugus County

BY: _____

TITLE: Director of Engineering, Department of Public Works

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF AWARD is hereby acknowledged by

Dated this _____ day of _____ in the year _____.

By: _____

Title: _____

NOTICE TO PROCEED

DATE: _____

PROJECT: HVAC Improvements – Emergency Services, 303 Court Street, Little Valley, NY

TO: _____

You are hereby notified to commence work in accordance with the Agreement dated _____, on or before _____. All work shall be completed on or before January 31, 2019 or (90 days after Notice to Proceed), whichever is shorter, and final payment shall be submitted within 45 calendar days of completion of work.

You are required to return an acknowledged copy of this Notice of Proceed to Cattaraugus County

CATTARAUGUS COUNTY

Owner

By: _____

Title: Director of Engineering, Department of Public Works

ACCEPTANCE OF THIS NOTICE

Receipt of the above Notice to Proceed is hereby acknowledged by

Dated this _____ day of _____ in the year _____.

By: _____

Title: _____

CERTIFICATE OF SUBSTANTIAL COMPLETION

DATE:

PROJECT: HVAC Improvements – Emergency Services, 303 Court Street, Little Valley, NY

TO: _____

The performed under this contract has been inspected by authorized representatives of the County, Contractor and Engineer and the Project was found to be substantially completed in accordance with the contract documents.

DEFINITION OF SUBSTANTIAL COMPLETION

The date of substantial completion of a project or a specified area of a project is the date when the construction is sufficiently completed, in accordance with the contract documents, as modified by any change orders agreed to by the parties, so that the County can occupy or utilize the project or specified area of the project for the use it was intended.

A tentative list of items to be completed or corrected is attached hereto. This list may not be exhaustive, and the failure to include an item on it does not alter the responsibility of the Contractor to complete all the work in accordance with the contract documents

Engineer

By _____
Authorized Representative

Date _____

The Contractor accepts the above Certificate of Substantial Completion and agrees to complete and correct the items on the tentative list with the time indicated.

Contractor

By _____
Authorized Representative

Date _____

The County Accepts the project or specified area of the project as substantially complete and will assume full possession of the project or specified are of the project at _____(time), on _____(date).

Cattaraugus County

By _____
Authorized Representative

Date _____

SECTION E

DEPARTMENT OF LABOR CONTRACT REQUIREMENTS **AND PREVAILING WAGE RATE SCHEDULES**

Labor classifications not appearing on the following rate sheets can be used only with the consent of the Commissioner of Public Works and then the rate to be paid will be given by the Commissioner of Public Works after advising with the State Department of Labor.

All requests for minimum wage rates for additional occupations shall be directed through the County.

The bidder shall take into account in his/her bid all changes in wage rates and supplements that may be forthcoming during the time the contract is in force.

The Contractor in the execution of the work under the contract in accordance with the provisions of the specifications and the special provisions to the specifications may submit job orders to and may also request the referral of lists of qualified applicants for the work of the NEW YORK STATE EMPLOYMENT SERVICE.



Andrew M. Cuomo, Governor

Roberta Reardon, Commissioner

Cattaraugus County DPW

Dawn Smith, Procurement Specialist
8810 Route 242
Little Valley NY 14755

Schedule Year 2018 through 2019
Date Requested 08/22/2018
PRC# 2018010237

Location Emergency Services
Project ID# HVAC Improv-ES
Project Type Seal existing duct, replace motor, replace hot and cold water coils, balance adjust controls

PREVAILING WAGE SCHEDULE FOR ARTICLE 8 PUBLIC WORK PROJECT

Attached is the current schedule(s) of the prevailing wage rates and prevailing hourly supplements for the project referenced above. A unique Prevailing Wage Case Number (PRC#) has been assigned to the schedule(s) for your project.

The schedule is effective from July 2018 through June 2019. All updates, corrections, posted on the 1st business day of each month, and future copies of the annual determination are available on the Department's website www.labor.state.ny.us. Updated PDF copies of your schedule can be accessed by entering your assigned PRC# at the proper location on the website.

It is the responsibility of the contracting agency or its agent to annex and make part, the attached schedule, to the specifications for this project, when it is advertised for bids and /or to forward said schedules to the successful bidder(s), immediately upon receipt, in order to insure the proper payment of wages.

Please refer to the "General Provisions of Laws Covering Workers on Public Work Contracts" provided with this schedule, for the specific details relating to other responsibilities of the Department of Jurisdiction.

Upon completion or cancellation of this project, enter the required information and mail **OR** fax this form to the office shown at the bottom of this notice, **OR** fill out the electronic version via the NYSDOL website.

NOTICE OF COMPLETION / CANCELLATION OF PROJECT

Date Completed: _____ Date Cancelled: _____

Name & Title of Representative: _____

Phone: (518) 457-5589 Fax: (518) 485-1870
W. Averell Harriman State Office Campus, Bldg. 12, Room 130, Albany, NY 12240

General Provisions of Laws Covering Workers on Article 8 Public Work Contracts

Introduction

The Labor Law requires public work contractors and subcontractors to pay laborers, workers, or mechanics employed in the performance of a public work contract not less than the prevailing rate of wage and supplements (fringe benefits) in the locality where the work is performed.

Responsibilities of the Department of Jurisdiction

A Department of Jurisdiction (Contracting Agency) includes a state department, agency, board or commission; a county, city, town or village; a school district, board of education or board of cooperative educational services; a sewer, water, fire, improvement and other district corporation; a public benefit corporation; and a public authority awarding a public work contract.

The Department of Jurisdiction (Contracting Agency) awarding a public work contract MUST obtain a Prevailing Rate Schedule listing the hourly rates of wages and supplements due the workers to be employed on a public work project. This schedule may be obtained by completing and forwarding a "Request for wage and Supplement Information" form (PW 39) to the Bureau of Public Work. The Prevailing Rate Schedule MUST be included in the specifications for the contract to be awarded and is deemed part of the public work contract.

Upon the awarding of the contract, the law requires that the Department of Jurisdiction (Contracting Agency) furnish the following information to the Bureau: the name and address of the contractor, the date the contract was let and the approximate dollar value of the contract. To facilitate compliance with this provision of the Labor Law, a copy of the Department's "Notice of Contract Award" form (PW 16) is provided with the original Prevailing Rate Schedule.

The Department of Jurisdiction (Contracting Agency) is required to notify the Bureau of the completion or cancellation of any public work project. The Department's PW 200 form is provided for that purpose.

Both the PW 16 and PW 200 forms are available for completion [online](#).

Hours

No laborer, worker, or mechanic in the employ of a contractor or subcontractor engaged in the performance of any public work project shall be permitted to work more than eight hours in any day or more than five days in any week, except in cases of extraordinary emergency. The contractor and the Department of Jurisdiction (Contracting Agency) may apply to the Bureau of Public Work for a dispensation permitting workers to work additional hours or days per week on a particular public work project. There are very few exceptions to this rule. Complete information regarding these exceptions is available on the "[4 Day / 10 Hour Work Schedule](#)" form (PW 30.1).

Wages and Supplements

The wages and supplements to be paid and/or provided to laborers, workers, and mechanics employed on a public work project shall be not less than those listed in the current Prevailing Rate Schedule for the locality where the work is performed. If a prime contractor on a public work project has not been provided with a Prevailing Rate Schedule, the contractor must notify the Department of Jurisdiction (Contracting Agency) who in turn must request an original Prevailing Rate Schedule from the Bureau of Public Work. Requests may be submitted by: mail to NYSDOL, Bureau of Public Work, State Office Bldg. Campus, Bldg. 12, Rm. 130, Albany, NY 12240; Fax to Bureau of Public Work (518) 485-1870; or electronically at the NYSDOL website www.labor.ny.gov.

Upon receiving the original schedule, the Department of Jurisdiction (Contracting Agency) is REQUIRED to provide complete copies to all prime contractors who in turn MUST, by law, provide copies of all applicable county schedules to each subcontractor and obtain from each subcontractor, an affidavit certifying such schedules were received. If the original schedule expired, the contractor may obtain a copy of the new annual determination from the NYSDOL website www.labor.ny.gov.

The Commissioner of Labor makes an annual determination of the prevailing rates. This determination is in effect from July 1st through June 30th of the following year. The annual determination is available on the NYSDOL website www.labor.ny.gov.

Payrolls and Payroll Records

Contractors and subcontractors are required to establish, maintain, and preserve for not less than six (6) years, contemporaneous, true, and accurate payroll records. Payrolls must show the following information for each person employed on a public work project: Name, Address, Last 4 Digits of Social Security Number, Classification(s) in which the worker was employed, Hourly wage rate(s) paid, Supplements paid or provided, and Daily and weekly number of hours worked in each classification.

The filing of payrolls to the Department of Jurisdiction is a condition of payment. Every contractor and subcontractor shall submit to the Department of Jurisdiction (Contracting Agency), within thirty (30) days after issuance of its first payroll and every thirty (30) days thereafter, a transcript of the original payrolls, subscribed and affirmed as true under penalty of perjury. The original payrolls or transcripts must be maintained for a period of at least (5) years, by the Department of Jurisdiction (Contracting Agency), from the project's date of completion. The Department of Jurisdiction (Contracting Agency) shall collect, review for facial validity, and maintain such payrolls.

In addition, the Commissioner of Labor may require contractors to furnish, with ten (10) days of a request, payroll records sworn to as their validity and accuracy for public work and private work. Payroll records include, but are not limited to time cards, work description sheets, proof that supplements were provided, cancelled payroll checks and payrolls. Failure to provide the requested information within the allotted ten (10) days will result in the withholding of up to 25% of the contract, not to exceed \$100,000.00. If the contractor or subcontractor does not maintain a place of business in New York State and the amount of the contract exceeds \$25,000.00, payroll records and certifications must be kept on the project worksite.

The prime contractor is responsible for any underpayments of prevailing wages or supplements by any subcontractor.

All contractors or their subcontractors shall provide to their subcontractors a copy of the Prevailing Rate Schedule specified in the public work contract as well as any subsequently issued schedules. A failure to provide these schedules by a contractor or subcontractor is a violation of Article 8, Section 220-a of the Labor Law.

All subcontractors engaged by a public work project contractor or its subcontractor, upon receipt of the original schedule and any subsequently issued schedules, shall provide to such contractor a verified statement attesting that the subcontractor has received the Prevailing Rate Schedule and will pay or provide the applicable rates of wages and supplements specified therein. (See NYS Labor Laws, Article 8 . Section 220-a).

Determination of Prevailing Wage and Supplement Rate Updates Applicable to All Counties

The wages and supplements contained in the annual determination become effective July 1st whether or not the new determination has been received by a given contractor. Care should be taken to review the rates for obvious errors. Any corrections should be brought to the Department's attention immediately. It is the responsibility of the public work contractor to use the proper rates. If there is a question on the proper classification to be used, please call the district office located nearest the project. Any errors in the annual determination will be corrected and posted to the NYSDOL website on the first business day of each month. Contractors are responsible for paying these updated rates as well, retroactive to July 1st.

When you review the schedule for a particular occupation, your attention should be directed to the dates above the column of rates. These are the dates for which a given set of rates is effective. To the extent possible, the Department posts rates in its possession that cover periods of time beyond the July 1st to June 30th time frame covered by a particular annual determination. Rates that extend beyond that instant time period are informational ONLY and may be updated in future annual determinations that actually cover the then appropriate July 1st to June 30th time period.

Withholding of Payments

When a complaint is filed with the Commissioner of Labor alleging the failure of a contractor or subcontractor to pay or provide the prevailing wages or supplements, or when the Commissioner of Labor believes that unpaid wages or supplements may be due, payments on the public work contract shall be withheld from the prime contractor in a sufficient amount to satisfy the alleged unpaid wages and supplements, including interest and civil penalty, pending a final determination.

When the Bureau of Public Work finds that a contractor or subcontractor on a public work project failed to pay or provide the requisite prevailing wages or supplements, the Bureau is authorized by Sections 220-b and 235.2 of the Labor Law to so notify the financial officer of the Department of Jurisdiction (Contracting Agency) that awarded the public work contract. Such officer MUST then withhold or cause to be withheld from any payment due the prime contractor on account of such contract the amount indicated by the Bureau as sufficient to satisfy the unpaid wages and supplements, including interest and any civil penalty that may be assessed by the Commissioner of Labor. The withholding continues until there is a final determination of the underpayment by the Commissioner of Labor or by the court in the event a legal proceeding is instituted for review of the determination of the Commissioner of Labor.

The Department of Jurisdiction (Contracting Agency) shall comply with this order of the Commissioner of Labor or of the court with respect to the release of the funds so withheld.

Summary of Notice Posting Requirements

The current Prevailing Rate Schedule must be posted in a prominent and accessible place on the site of the public work project. The prevailing wage schedule must be encased in, or constructed of, materials capable of withstanding adverse weather conditions and be titled "PREVAILING RATE OF WAGES" in letters no smaller than two (2) inches by two (2) inches.

The ["Public Work Project"](#) notice must be posted at the beginning of the performance of every public work contract, on each job site.

Every employer providing workers' compensation insurance and disability benefits must post notices of such coverage in the format prescribed by the Workers' Compensation Board in a conspicuous place on the jobsite.

Every employer subject to the NYS Human Rights Law must conspicuously post at its offices, places of employment, or employment training centers, notices furnished by the State Division of Human Rights.

Employers liable for contributions under the Unemployment Insurance Law must conspicuously post on the jobsite notices furnished by the NYS Department of Labor.

Apprentices

Employees cannot be paid apprentice rates unless they are individually registered in a program registered with the NYS Commissioner of Labor. The allowable ratio of apprentices to journeymen in any craft classification can be no greater than the statewide building trade ratios promulgated by the Department of Labor and included with the Prevailing Rate Schedule. An employee listed on a payroll as an apprentice who is not registered as above, must be paid the prevailing journeyworker's wage rate for the classification of work the employee is actually performing.

NYSDOL Labor Law, Article 8, Section 220-3, require that only apprentices individually registered with the NYS Department of Labor may be paid apprenticeship rates on a public work project. No other Federal or State Agency of office registers apprentices in New York State.

Persons wishing to verify the apprentice registration of any person must do so in writing by mail, to the NYSDOL Office of Employability Development / Apprenticeship Training, State Office Bldg. Campus, Bldg. 12, Albany, NY 12240 or by Fax to NYSDOL Apprenticeship Training (518) 457-7154. All requests for verification must include the name and social security number of the person for whom the information is requested.

The only conclusive proof of individual apprentice registration is written verification from the NYSDOL Apprenticeship Training Albany Central office. Neither Federal nor State Apprenticeship Training offices outside of Albany can provide conclusive registration information.

It should be noted that the existence of a registered apprenticeship program is not conclusive proof that any person is registered in that program. Furthermore, the existence or possession of wallet cards, identification cards, or copies of state forms is not conclusive proof of the registration of any person as an apprentice.

Interest and Penalties

In the event that an underpayment of wages and/or supplements is found:

- Interest shall be assessed at the rate then in effect as prescribed by the Superintendent of Banks pursuant to section 14-a of the Banking Law, per annum from the date of underpayment to the date restitution is made.
- A Civil Penalty may also be assessed, not to exceed 25% of the total of wages, supplements, and interest due.

Debarment

Any contractor or subcontractor and/or its successor shall be ineligible to submit a bid on or be awarded any public work contract or subcontract with any state, municipal corporation or public body for a period of five (5) years when:

- Two (2) willful determinations have been rendered against that contractor or subcontractor and/or its successor within any consecutive six (6) year period.
- There is any willful determination that involves the falsification of payroll records or the kickback of wages or supplements.

Criminal Sanctions

Willful violations of the Prevailing Wage Law (Article 8 of the Labor Law) may be a felony punishable by fine or imprisonment of up to 15 years, or both.

Discrimination

No employee or applicant for employment may be discriminated against on account of age, race, creed, color, national origin, sex, disability or marital status.

No contractor, subcontractor nor any person acting on its behalf, shall by reason of race, creed, color, disability, sex or national origin discriminate against any citizen of the State of New York who is qualified and available to perform the work to which the employment relates (NYS Labor Law, Article 8, Section 220-e(a)).

No contractor, subcontractor, nor any person acting on its behalf, shall in any manner, discriminate against or intimidate any employee on account of race, creed, color, disability, sex, or national origin (NYS Labor Law, Article 8, Section 220-e(b)).

The Human Rights Law also prohibits discrimination in employment because of age, marital status, or religion.

There may be deducted from the amount payable to the contractor under the contract a penalty of \$50.00 for each calendar day during which such person was discriminated against or intimidated in violation of the provision of the contract (NYS Labor Law, Article 8, Section 220-e(c)).

The contract may be cancelled or terminated by the State or municipality. All monies due or to become due thereunder may be forfeited for a second or any subsequent violation of the terms or conditions of the anti-discrimination sections of the contract (NYS Labor Law, Article 8, Section 220-e(d)).

Every employer subject to the New York State Human Rights Law must conspicuously post at its offices, places of employment, or employment training centers notices furnished by the State Division of Human Rights.

Workers' Compensation

In accordance with Section 142 of the State Finance Law, the contractor shall maintain coverage during the life of the contract for the benefit of such employees as required by the provisions of the New York State Workers' Compensation Law.

A contractor who is awarded a public work contract must provide proof of workers' compensation coverage prior to being allowed to begin work.

The insurance policy must be issued by a company authorized to provide workers' compensation coverage in New York State. Proof of coverage must be on form C-105.2 (Certificate of Workers' Compensation Insurance) and must name this agency as a certificate holder.

If New York State coverage is added to an existing out-of-state policy, it can only be added to a policy from a company authorized to write workers' compensation coverage in this state. The coverage must be listed under item 3A of the information page.

The contractor must maintain proof that subcontractors doing work covered under this contract secured and maintained a workers' compensation policy for all employees working in New York State.

Every employer providing worker's compensation insurance and disability benefits must post notices of such coverage in the format prescribed by the Workers' Compensation Board in a conspicuous place on the jobsite.

Unemployment Insurance

Employers liable for contributions under the Unemployment Insurance Law must conspicuously post on the jobsite notices furnished by the New York State Department of Labor.



Andrew M. Cuomo, Governor

Roberta Reardon, Commissioner

Cattaraugus County DPW

Dawn Smith, Procurement Specialist
8810 Route 242
Little Valley NY 14755

Schedule Year 2018 through 2019
Date Requested 08/22/2018
PRC# 2018010237

Location Emergency Services
Project ID# HVAC Improv-ES
Project Type Seal existing duct, replace motor, replace hot and cold water coils, balance adjust controls

Notice of Contract Award

New York State Labor Law, Article 8, Section 220.3a requires that certain information regarding the awarding of public work contracts, be furnished to the Commissioner of Labor. One "Notice of Contract Award" (PW 16, which may be photocopied), **MUST** be completed for **EACH** prime contractor on the above referenced project.

Upon notifying the successful bidder(s) of this contract, enter the required information and mail **OR** fax this form to the office shown at the bottom of this notice, **OR** fill out the electronic version via the NYSDOL website.

Contractor Information

All information must be supplied

Federal Employer Identification Number: _____		
Name: _____		
Address: _____ _____		
City: _____	State: _____	Zip: _____
Amount of Contract: \$ _____	Contract Type:	
Approximate Starting Date: ____/____/____	☐ (01) General Construction	
Approximate Completion Date: ____/____/____	☐ (02) Heating/Ventilation	
	☐ (03) Electrical	
	☐ (04) Plumbing	
	☐ (05) Other : _____	

Phone: (518) 457-5589 Fax: (518) 485-1870
W. Averell Harriman State Office Campus, Bldg. 12, Room 130, Albany, NY 12240

IMPORTANT NOTICE

FOR

CONTRACTORS & CONTRACTING AGENCIES

Social Security Numbers on Certified Payrolls

The Department of Labor is cognizant of the concerns of the potential for misuse or inadvertent disclosure of social security numbers. Identity theft is a growing problem and we are sympathetic to contractors' concerns with regard to inclusion of this information on payrolls if another identifier will suffice.

For these reasons, *the substitution of the use of the last four digits of the social security number on certified payrolls submitted to contracting agencies on public work projects is now acceptable to the Department of Labor.*

NOTE: This change does not affect the Department's ability to request and receive the entire social security number from employers during the course of its public work / prevailing wage investigations.

**To all State Departments, Agency Heads and Public Benefit Corporations
IMPORTANT NOTICE REGARDING PUBLIC WORK ENFORCEMENT FUND**

Budget Policy & Reporting Manual

B-610

Public Work Enforcement Fund

effective date December 7, 2005

1. Purpose and Scope:

This Item describes the Public Work Enforcement Fund (the Fund, PWEF) and its relevance to State agencies and public benefit corporations engaged in construction or reconstruction contracts, maintenance and repair, and announces the recently-enacted increase to the percentage of the dollar value of such contracts that must be deposited into the Fund. This item also describes the roles of the following entities with respect to the Fund:

- New York State Department of Labor (DOL),
- The Office of the State of Comptroller (OSC), and
- State agencies and public benefit corporations.

2. Background and Statutory References:

DOL uses the Fund to enforce the State's Labor Law as it relates to contracts for construction or reconstruction, maintenance and repair, as defined in subdivision two of Section 220 of the Labor Law. State agencies and public benefit corporations participating in such contracts are required to make payments to the Fund.

Chapter 511 of the Laws of 1995 (as amended by Chapter 513 of the Laws of 1997, Chapter 655 of the Laws of 1999, Chapter 376 of the Laws of 2003 and Chapter 407 of the Laws of 2005) established the Fund.

3. Procedures and Agency Responsibilities:

The Fund is supported by transfers and deposits based on the value of contracts for construction and reconstruction, maintenance and repair, as defined in subdivision two of Section 220 of the Labor Law, into which all State agencies and public benefit corporations enter.

Chapter 407 of the Laws of 2005 increased the amount required to be provided to this fund to .10 of one-percent of the total cost of each such contract, to be calculated at the time agencies or public benefit corporations enter into a new contract or if a contract is amended. The provisions of this bill became effective August 2, 2005.

To all State Departments, Agency Heads and Public Benefit Corporations
IMPORTANT NOTICE REGARDING PUBLIC WORK ENFORCEMENT FUND

OSC will report to DOL on all construction-related ("D") contracts approved during the month, including contract amendments, and then DOL will bill agencies the appropriate assessment monthly. An agency may then make a determination if any of the billed contracts are exempt and so note on the bill submitted back to DOL. For any instance where an agency is unsure if a contract is or is not exempt, they can call the Bureau of Public Work at the number noted below for a determination. Payment by check or journal voucher is due to DOL within thirty days from the date of the billing. DOL will verify the amounts and forward them to OSC for processing.

For those contracts which are not approved or administered by the Comptroller, monthly reports and payments for deposit into the Public Work Enforcement Fund must be provided to the Administrative Finance Bureau at the DOL within 30 days of the end of each month or on a payment schedule mutually agreed upon with DOL.

Reports should contain the following information:

- Name and billing address of State agency or public benefit corporation;
- State agency or public benefit corporation contact and phone number;
- Name and address of contractor receiving the award;
- Contract number and effective dates;
- Contract amount and PWEF assessment charge (if contract amount has been amended, reflect increase or decrease to original contract and the adjustment in the PWEF charge); and
- Brief description of the work to be performed under each contract.

Checks and Journal Vouchers, payable to the "New York State Department of Labor" should be sent to:

Department of Labor
Administrative Finance Bureau-PWEF Unit
Building 12, Room 464
State Office Campus
Albany, NY 12240

Any questions regarding billing should be directed to NYSDOL's Administrative Finance Bureau-PWEF Unit at (518) 457-3624 and any questions regarding Public Work Contracts should be directed to the Bureau of Public Work at (518) 457-5589.

Construction Industry Fair Play Act

Required Posting For Labor Law Article 25-B § 861-d

Construction industry employers must post the "Construction Industry Fair Play Act" notice in a prominent and accessible place on the job site.

Failure to post the notice can result in penalties of up to \$1,500 for a first offense and up to \$5,000 for a second offense.

The posting is included as part of this wage schedule. Additional copies may be obtained from the NYS DOL website, www.labor.ny.gov.

If you have any questions concerning the Fair Play Act, please call the State Labor Department toll-free at 1-866-435-1499 or email us at: dol.misclassified@labor.state.ny.us .



New York State Department of Labor
Required Notice under Article 25-B of the Labor Law

**ATTENTION ALL EMPLOYEES, CONTRACTORS AND SUBCONTRACTORS:
YOU ARE COVERED BY THE
CONSTRUCTION INDUSTRY FAIR PLAY ACT**

The law says that you are an employee unless:

- You are free from direction and control in performing your job AND
- You perform work that is not part of the usual work done by the business that hired you AND
- You have an independently established business

Your employer cannot consider you to be an independent contractor unless all three of these facts apply to your work.

**IT IS AGAINST THE LAW FOR AN EMPLOYER TO MISCLASSIFY EMPLOYEES AS
INDEPENDENT CONTRACTORS OR PAY EMPLOYEES OFF-THE-BOOKS.**

Employee rights. If you are an employee:

- You are entitled to state and federal worker protections such as
 - o unemployment benefits, if unemployed through no fault of your own, able to work, and otherwise qualified
 - o workers' compensation benefits for on-the-job injuries
 - o payment for wages earned, minimum wage, and overtime (under certain conditions)
 - o prevailing wages on public work projects
 - o the provisions of the National Labor Relations Act and
 - o a safe work environment
- It is a violation of this law for employers to retaliate against anyone who asserts their rights under the law. Retaliation subjects an employer to civil penalties, a private lawsuit or both.

Independent Contractors: If you are an independent contractor:

- You must pay all taxes required by New York State and Federal Law.

Penalties for paying off-the-books or improperly treating employees as independent contractors:

- **Civil Penalty** First Offense: up to \$2,500 per employee.
Subsequent Offense(s): up to \$5,000 per employee.
- **Criminal Penalty** First Offense: Misdemeanor - up to 30 days in jail, up to a \$25,000 fine and debarment from performing Public Work for up to one year.
Subsequent Offense(s): Misdemeanor - up to 60 days in jail, up to a \$50,000 fine and debarment from performing Public Work for up to 5 years.

If you have questions about your employment status or believe that your employer may have violated your rights and you want to file a complaint, call the Department of Labor at 1(866)435-1499 or send an email to dol.misclassified@labor.state.ny.us. All complaints of fraud and violations are taken seriously and you can remain anonymous.

Employer Name:

WORKER NOTIFICATION

(Labor Law §220, paragraph a of subdivision 3-a)

Effective February 24, 2008

This provision is an addition to the existing prevailing wage rate law, Labor Law §220, paragraph a of subdivision 3-a. It requires contractors and subcontractors to provide written notice to all laborers, workers or mechanics of the *prevailing wage rate* for their particular job classification *on each pay stub**. It also requires contractors and subcontractors to *post a notice* at the beginning of the performance of every public work contract *on each job site* that includes the telephone number and address for the Department of Labor and a statement informing laborers, workers or mechanics of their right to contact the Department of Labor if he/she is not receiving the proper prevailing rate of wages and/or supplements for his/her particular job classification. The required notification will be provided with each wage schedule, may be downloaded from our website www.labor.state.ny.us or made available upon request by contacting the Bureau of Public Work at 518-457-5589.

* In the event that the required information will not fit on the pay stub, an accompanying sheet or attachment of the information will suffice.

Attention Employees

THIS IS A: **PUBLIC WORK PROJECT**

If you are employed on this project as a **worker, laborer, or mechanic** you are entitled to receive the **prevailing wage and supplements rate** for the classification at which you are working.

Chapter 629 of the Labor Laws of 2007:

These wages are set by law and must be posted at the work site. They can also be found at:
www.labor.ny.gov

If you feel that you have not received proper wages or benefits, please call our nearest office.*

Albany	(518) 457-2744	Patchogue	(631) 687-4882
Binghamton	(607) 721-8005	Rochester	(585) 258-4505
Buffalo	(716) 847-7159	Syracuse	(315) 428-4056
Garden City	(516) 228-3915	Utica	(315) 793-2314
New York City	(212) 932-2419	White Plains	(914) 997-9507
Newburgh	(845) 568-5156		

* For New York City government agency construction projects, please contact the Office of the NYC Comptroller at (212) 669-4443, or www.comptroller.nyc.gov – click on Bureau of Labor Law.

Contractor Name: _____

Project Location: _____

OSHA 10-hour Construction Safety and Health Course – S1537-A

Effective July 18, 2008

This provision is an addition to the existing prevailing wage rate law, Labor Law §220, section 220-h. It requires that on all public work projects of at least \$250,000.00, all laborers, workers and mechanics working on the site, be certified as having successfully completed the OSHA 10-hour construction safety and health course. It further requires that the advertised bids and contracts for every public work contract of at least \$250,000.00, contain a provision of this requirement.

NOTE: The OSHA 10 Legislation only applies to workers on a public work project that are required, under Article 8, to receive the prevailing wage.

Where to find OSHA 10-hour Construction Course

1. NYS Department of Labor website for scheduled outreach training at:

www.labor.state.ny.us/workerprotection/safetyhealth/DOSH_ONSITE_CONSULTATION.shtm

2. OSHA Training Institute Education Centers:

Rochester Institute of Technology OSHA Education Center

Rochester, NY

Donna Winter

Fax (585) 475-6292

e-mail: dlwtpo@rit.edu

(866) 385-7470 Ext. 2919

www.rit.edu/~outreach/course.php3?CourseID=54

Atlantic OSHA Training Center

UMDNJ – School of Public Health

Piscataway, NJ

Janet Crooks

Fax (732) 235-9460

e-mail: crooksje@umdnj.edu

(732) 235-9455

<https://ophp.umdnj.edu/wconnect/ShowSchedule.awp?~~GROUP~AOTCON~10~>

Atlantic OSHA Training Center

University at Buffalo

Buffalo, New York

Joe Syracuse

Fax (716) 829-2806

e-mail: mailto:japs@buffalo.edu

(716) 829-2125

http://www.smbs.buffalo.edu/CENTERS/trc/schedule_OSHA.php

Keene State College

Manchester, NH

Leslie Singleton

e-mail: lsingletin@keene.edu

(800) 449-6742

www.keene.edu/courses/print/courses_oshacfm

3. List of trainers and training schedules for OSHA outreach training at:

www.OutreachTrainers.org

Requirements for OSHA 10 Compliance

Chapter 282 of the Laws of 2007, codified as Labor Law 220-h took effect on July 18, 2008. The statute provides as follows:

The advertised specifications for every contract for public work of \$250,000.00 or more must contain a provision requiring that every worker employed in the performance of a public work contract shall be certified as having completed an OSHA 10 safety training course. The clear intent of this provision is to require that all employees of public work contractors, required to be paid prevailing rates, receive such training “prior to the performing any work on the project.”

The Bureau will enforce the statute as follows:

All contractors and sub contractors must attach a copy of proof of completion of the OSHA 10 course to the first certified payroll submitted to the contracting agency and on each succeeding payroll where any new or additional employee is first listed.

Proof of completion may include but is not limited to:

- Copies of bona fide course completion card (*Note: Completion cards do not have an expiration date.*)
- Training roster, attendance record of other documentation from the certified trainer pending the issuance of the card.
- Other valid proof

******A certification by the employer attesting that all employees have completed such a course is not sufficient proof that the course has been completed.

Any questions regarding this statute may be directed to the New York State Department of Labor, Bureau of Public Work at 518-485-5696.

WICKS Reform 2008

(For all contracts advertised or solicited for bid on or after 7/1/08)

- Raises the threshold for public work projects subject to the Wicks Law requiring separate specifications and bidding for the plumbing, heating and electrical work. The total project's threshold would increase from \$50,000 to: \$3 million in Bronx, Kings, New York, Queens and Richmond counties; \$1.5 million in Nassau, Suffolk and Westchester counties; and \$500,000 in all other counties.
- For projects below the monetary threshold, bidders must submit a sealed list naming each subcontractor for the plumbing, HVAC and electrical work and the amount to be paid to each. The list may not be changed unless the public owner finds a legitimate construction need, including a change in specifications or costs or use of a Project Labor Agreement (PLA), and must be open to public inspection.
- Allows the state and local agencies and authorities to waive the Wicks Law and use a PLA if it will provide the best work at the lowest possible price. If a PLA is used, all contractors shall participate in apprentice training programs in the trades of work it employs that have been approved by the Department of Labor (DOL) for not less than three years. They shall also have at least one graduate in the last three years and use affirmative efforts to retain minority apprentices. PLA's would be exempt from Wicks, but deemed to be public work subject to prevailing wage enforcement.
- The Commissioner of Labor shall have the power to enforce separate specification requirements on projects, and may issue stop-bid orders against public owners for non-compliance.
- Other new monetary thresholds, and similar sealed bidding for non-Wicks projects, would apply to certain public authorities including municipal housing authorities, NYC Construction Fund, Yonkers Educational Construction Fund, NYC Municipal Water Finance Authority, Buffalo Municipal Water Finance Authority, Westchester County Health Care Association, Nassau County Health Care Corp., Clifton-Fine Health Care Corp., Erie County Medical Center Corp., NYC Solid Waste Management Facilities, and the Dormitory Authority.
- Reduces from 15 to 7 days the period in which contractors must pay subcontractors.

IMPORTANT INFORMATION

**Regarding Use of Form PW30.1
(Previously 30R)**

“Employer Registration for Use of 4 Day / 10 Hour Work Schedule”

To use the ‘4 Day / 10 Hour Work Schedule’:

There **MUST** be a *Dispensation of Hours (PW30)* in place on the project

AND

You **MUST** register your intent to work 4 / 10 hour days, by completing the PW30.1 Form.

REMEMBER...

The ‘4 Day / 10 Hour Work Schedule’ applies **ONLY** to Job Classifications and Counties listed on the PW30.1 Form.

Do not write in any additional Classifications or Counties.

(Please note : For each Job Classification check the individual wage schedule for specific details regarding their 4/10 hour day posting.)

Instructions for Completing Form PW30.1

(Previously 30R)

“Employer Registration for Use of 4 Day / 10 Hour Work Schedule”

Before completing Form PW30.1 check to be sure ...

- There is a *Dispensation of Hours* in place on the project.
- The 4 Day / 10 Hour Work Schedule applies to the Job Classifications you will be using.
- The 4 Day / 10 Hour Work Schedule applies to the County / Counties where the work will take place.

Instructions (Type or Print legibly):

Contractor Information:

- Enter the Legal Name of the business, FEIN, Street Address, City, State, Zip Code; the Company's Phone and Fax numbers; and the Company's email address (if applicable)
- Enter the Name of a Contact Person for the Company along with their Phone and Fax numbers, and the personal email address (if applicable)

Project Information:

- Enter the Prevailing Rate Case number (PRC#) assigned to this project
- Enter the Project Name / Type (i.e. Smithtown CSD – Replacement of HS Roof)
- Enter the Exact Location of Project (i.e. Smithtown HS, 143 County Route #2, Smithtown, NY; Bldgs. 1 & 2)
- If you are a Subcontractor, enter the name of the Prime Contractor for which you work
- On the Checklist of Job Classifications -
 - Go to pages 2 and 3 of the form
 - Place a checkmark in the box to the right of the Job Classification you are choosing
 - Mark all Job Classifications that apply

****Do not write in any additional Classifications or Counties.****

Requestor Information:

- Enter the name of the person submitting the registration, their title with the company, and the date the registration is filled out

Return Completed Form:

- **Mail** the completed PW30.1 form to: NYSDOL Bureau of Public Work, SOBC – Bldg.12 – Rm.130, Albany, NY 12240 **-OR-**
- **Fax** the completed PW30.1 form to: NYSDOL Bureau of Public Work at (518)485-1870



Department of Labor

Bureau of Public Work Harriman
State Office Campus
Building 12, Room 130
Albany, New York 12240
Phone: (518) 457-5589 | Fax: (518) 485-1870
www.labor.ny.gov

Employer Registration for Use of 4 Day / 10 Hour Work Schedule

Before completing this form, make sure that:

- There is a **Dispensation of Hours** in place on the project.
- The 4 Day / 10 Hour Work Schedule applies to the Job Classifications you will be using.
- The 4 Day / 10 Hour Work Schedule applies to the County / Counties where the work will take place.

Please **type or print** the requested information and then **mail or fax** to the address above.

Contractor Information

Company Name: _____ FEIN: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Phone No: _____ Fax No: _____ Email: _____

Contact Person: _____

Phone No: _____ Fax No: _____ Email: _____

Project Information

Project PRC#: _____ Project Name/Type: _____

Exact Location
of Project: _____ County: _____

(If you are Subcontractor)

Prime Contractor Name: _____

Job Classification(s) to Work 4/10 Schedule: *(Choose all that apply on Job Classification Checklist - Pages 3-8)*
*** Do not write in any additional Classifications or Counties***

Requestor Information

Name: _____

Title: _____ Date: _____

Please use the list below with the number assigned to each county as a reference to the corresponding numbers listed in the following pages under **Entire Counties & Partial Counties**.

1.	Albany County	33.	Oneida County
2.	Allegany County	34.	Onondaga County
3.	Bronx County	35.	Ontario County
4.	Broome County	36.	Orange County
5.	Cattaraugus County	37.	Orleans County
6.	Cayuga County	38.	Oswego County
7.	Chautauqua County	39.	Otsego County
8.	Chemung County	40.	Putnam County
9.	Chenango County	41.	Queens County
10.	Clinton County	42.	Rensselaer County
11.	Columbia County	43.	Richmond County (Staten Island)
12.	Cortland County	44.	Rockland County
13.	Delaware County	45.	Saint Lawrence County
14.	Dutchess County	46.	Saratoga County
15.	Erie County	47.	Schenectady County
16.	Essex County	48.	Schoharie County
17.	Franklin County	49.	Schuyler County
18.	Fulton County	50.	Seneca County
19.	Genesee County	51.	Steuben County
20.	Greene County	52.	Suffolk County
21.	Hamilton County	53.	Sullivan County
22.	Herkimer County	54.	Tioga County
23.	Jefferson County	55.	Tompkins County
24.	Kings County (Brooklyn)	56.	Ulster County
25.	Lewis County	57.	Warren County
26.	Livingston County	58.	Washington County
27.	Madison County	59.	Wayne County
28.	Monroe County	60.	Westchester County
29.	Montgomery County	61.	Wyoming County
30.	Nassau County	62.	Yates County
31.	New York County (Manhattan)		
32.	Niagara County		

Job Classification Checklist

(Place a checkmark by all classifications that will be using the 4/10 schedule)

**** Do not write in any additional Classifications or Counties****

Job Classification	Tag #	Entire Counties	Partial Counties	Check Box
Carpenter – Building	276B-All	7	2 ,5	
Carpenter – Building	276B-Cat	15	5	
Carpenter – Building	276-B-LIV	26, 28, 35, 59	61	
Carpenter – Building	276B-Gen	19, 32, 37	61	
Carpenter – Heavy & Highway	276HH-All	2, 5, 7		
Carpenter – Heavy & Highway	276HH-Erie	15		
Carpenter – Heavy & Highway	276HH- Gen	19, 32, 37, 61		
Carpenter – Heavy & Highway	276HH-Liv	26, 28, 35, 59		
Carpenter – Residential	276R-All	7	2, 5	
Carpenter – Building	277B-Bro	4, 54		
Carpenter – Building	277B-CAY	6, 50, 62		
Carpenter – Building	277B-CS	8, 12, 49, 51, 55	2	
Carpenter – Building	277 JLS	23, 25, 45		
Carpenter – Building	277 omh	22, 27, 33		
Carpenter – Building	277 On	34		
Carpenter – Building	277 Os	38		
Carpenter – Building	277CDO Bldg	9, 13, 39		
Carpenter – Heavy & Highway	277CDO HH	9, 13, 39		
Carpenter – Heavy & Highway	277HH-BRO	4, 6, 8, 12, ,22, 23, 25, 27, 33, 34, 38, 45, 49, 50, 51, 54, 55, 62		
Carpenter – Building	291B-Alb	1, 18, 20, 29, 42, 47, 48		
Carpenter – Building	291B-Cli	10, 16, 17		
Carpenter – Building	291B-Ham	21, 57, 58		
Carpenter – Building	291B-Sar	46		
Carpenter – Heavy & Highway	291HH-Alb	1, 10, 16, 17,18, 20, 21, 29, 42, 46, 47, 48, 57, 58		
Electrician	25m	30, 52		
Electrician – Teledata Cable Splicer	43	12, 22, 27, 33, 38	6, 9, 34, 39, 55, 59	

Job Classification Checklist

(Place a checkmark by all classifications that will be using the 4/10 schedule)

*** Do not write in any additional Classifications or Counties***

Job Classification	Tag #	Entire Counties	Partial Counties	Check Box
Electrician	86	26, 28	19, 35, 37, 59, 61	
Electrician	840 Teledata and 840 Z1	62	6, 34, 35, 50, 59	
Electrician	910	10, 16, 17, 23, 25, 45		
Electrical Lineman	1049Line/Gas	30, 41, 52		
Electrical Lineman	1249a	1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 29, 32, 33, 34, 35, 36, 37, 38, 39, 40, 42, 44, 46, 47, 48, 49, 50, 45, 51, 53, 54, 55, 56, 57, 58, 59, 61, 62		
Electrical Lineman	1249a West	60		
Electrical Lineman	1249a-LT	1, 2, 4, 5, 6, 7, 8, 9, 10, 12, 13, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 29, 32, 33, 34, 35, 37, 38, 39, 42, 46, 47, 48, 49, 50, 45, 51, 53, 54, 55, 57, 58, 59, 61, 62		
Electrical Lineman	1249aREG8LT	11, 14, 36, 40, 44, 56		
Electrical Lineman	1249aWestLT	60		
Elevator Constructor	138	11, 14, 20, 36, 40, 53, 56	13, 44, 60	
Elevator Constructor	14	2, 5, 7, 15, 19, 32, 37, 61		
Elevator Constructor	27	8, 26, 28, 35, 49, 50, 51, 59, 62		
Elevator Constructor	35	1, 10, 16, 18, 21, 22, 29, 39, 42, 46, 47, 48, 57, 58		
Elevator Constructor	62.1	4, 6, 9, 12, 23, 25, 27, 33, 34, 38, 45, 54, 55	13	
Glazier	201	1, 10, 11, 16, 17, 18, 20, 21, 29, 42, 46, 47, 48, 57, 58		
Glazier	660r	2, 5, 7, 15, 19, 32, 37, 61		
Glazier	660	2, 5, 7, 15, 19, 32, 37, 61		
Glazier	677.1	23, 25, 26, 28, 35, 45, 50, 59, 62		
Glazier	677Z-2	6, 12, 22, 27, 33, 34, 38		
Glazier	677z3	4, 8, 9, 13, 39, 49, 51, 54, 55		
Glazier	677r.2	6, 12, 22, 27, 33, 34, 38		
Insulator – Heat & Frost	30-Syracuse	4, 6, 8, 9, 12, 22, 23, 25, 27, 33, 34, 38, 39, 49, 50, 45, 54, 55		
Laborer – Building	621b	2, 7	5	
Laborer – Building	633 bON	34		

Job Classification Checklist

(Place a checkmark by all classifications that will be using the 4/10 schedule)

*** Do not write in any additional Classifications or Counties***

Job Classification	Tag #	Entire Counties	Partial Counties	Check Box
Laborer – Building	633b Cay	6		
Laborer – Building	633bOS	38		
Laborer – Building	785(7)	4	9, 13, 54	
Laborer – Building	785B-CS	8, 51	49	
Laborer – Building	7-785b	12, 55	49, 54	
Laborers – Heavy & Highway	157h/h	47	18, 29, 46	
Laborers – Heavy & Highway	190 h/h	1, 42, 58	11, 20, 46	
Laborers – Heavy & Highway	35/2h	21, 22, 27, 33	18, 29	
Laborer – Residential	621r	2, 7	5	
Laborers – Tunnel	157	47	18, 29, 46	
Laborers – Tunnel	35T	21, 22, 27, 33	18, 29	
Laborers – Tunnel	190	1, 42, 58	11, 20, 46	
Mason – Building	2TS.1	1, 10, 11, 16, 17, 18, 20, 21, 29, 42, 46, 47, 48, 57, 58		
Mason – Building	2TS.2	22, 23, 25, 33, 45	27	
Mason – Building	2TS.3	6, 34, 38	27	
Mason – Building	2b-on	34		
Mason – Building	2b.1	1, 11, 18, 20, 21, 29, 42, 46, 47, 48, 58	57	
Mason – Building	2b.2	22, 33	25	
Mason – Building	2b.3	6, 34	27	
Mason – Building	2b.4	38		
Mason – Building	2b.5	23	25	
Mason – Building	2b.6	45		
Mason – Building	2b.8	10, 16, 17	57	
Mason – Building	3b-Co-Z2	8, 49, 51	2	
Mason – Building	3B-Z1	19, 26, 28, 35, 50, 59, 61, 62		
Mason – Building – Residential	3B-Z1R	19, 26, 28, 35, 50, 59, 61, 62		
Mason – Building	3B-Bing-Z2	4, 9, 13, 39, 54		
Mason – Building	3B-lth-Z2	12, 55		

Job Classification Checklist

(Place a checkmark by all classifications that will be using the 4/10 schedule)

*** Do not write in any additional Classifications or Counties***

Job Classification	Tag #	Entire Counties	Partial Counties	Check Box
Mason – Building	3B-Jam-Z2	7	2, 5	
Mason – Building – Residential	3B-Jam-Z2R	2, 4, 8, 7, 9, 12, 39, 13, 49, 51, 54, 55	5	
Mason – Building	3B-Z3	15, 32	5	
Mason – Building	3B-Z3.Orleans	37		
Mason – Residential	3B-Z3R	15, 32	5	
Mason – Residential	3B-z3R.Orleans	37		
Mason - Heavy & Highway	3h	2, 4, 8, 7, 9, 12, 13, 19, 26, 28, 35, 37, 39, 49, 50, 51, 54, 55, 59, 61, 62	5, 15, 32	
Mason – Tile Finisher	3TF-Z1	19, 26, 28, 35, 50, 59, 61, 62		
Mason – Tile Finisher	3TF-Z2	2, 4, 8, 7, 9, 12, 13, 39, 49, 51, 54, 55	5	
Mason – Tile Finisher	3TF-Z3	15, 32, 37	5	
Mason – Tile Finisher	3TF-Z1R	19, 26, 28, 35, 50, 59, 61, 62		
Mason – Tile Finisher	3TF-Z2R	2, 4, 7, 9, 12, 13, 39, 49, 51, 54, 55	5	
Mason – Tile Finisher	3TF-Z3R	15, 32, 37	5	
Mason – Tile Setter	3TS-Z1	19, 26, 28, 35, 50, 59, 61, 62		
Mason – Tile Setter Residential	3TS-Z1R	19, 26, 28, 35, 50, 59, 61, 62		
Mason – Tile Setter	3TS-Z2	2, 4, 7, 8, 9, 12, 13, 39, 49, 51, 54, 55	5	
Mason – Tile Setter Residential	3TS-Z2R	2, 4, 7, 8, 9, 12, 13, 39, 49, 51, 54, 55	5	
Mason – Tile Setter	3TS-Z3	15, 32, 37	5	
Mason – Tile Setter Residential	3TS-Z3R	15, 32, 37	5	
Mason – Building/Heavy & Highway	780	3, 24, 30, 31, 41, 43, 52		
Operating Engineer - Heavy & Highway	137H/H	40, 60	14	
Operating Engineer – Heavy & Highway	158-832H	2, 8, 26, 28, 35, 49, 51, 59, 62	19	
Operating Engineer – Heavy & Highway	158-H/H	1, 4, 9, 10, 11, 14, 16, 17, 18, 20, 21, 22, 29, 39, 42, 46, 47, 48, 54, 57, 58		
Operating Engineer – Heavy & Highway	158-545h	6, 12, 23, 25, 27, 33, 38, 45, 50, 55		
Painter	1456-LS	1, 3, 10, 11, 14, 16, 17, 18, 20, 21, 24, 29, 30, 31, 36, 40, 41, 42, 43, 44, 46, 47, 48, 52, 53, 56, 57, 58, 60		
Painter	150	28, 59, 62	26, 35	

Job Classification Checklist

(Place a checkmark by all classifications that will be using the 4/10 schedule)

*** Do not write in any additional Classifications or Counties***

Job Classification	Tag #	Entire Counties	Partial Counties	Check Box
Painter	178 B	4, 9, 54		
Painter	178 E	8, 49	51	
Painter	178 I	12, 55		
Painter	178 O	13, 39		
Painter	31	6, 22, 27, 33, 34, 50	25, 35, 38	
Painter	38.O		38	
Painter	38.W	23, 45	25	
Painter	4- Buf,Nia,Olean	2, 15, 19, 32, 37, 61	5, 7, 26, 51	
Painter	4-Jamestown		5, 7	
Sheetmetal Worker	46	26, 28, 35, 50, 59, 62		
Sheetmetal Worker	46r	26, 28, 35, 50, 59, 62		
Teamsters – Heavy & Highway	294h/h	1, 11, 18, 20, 29, 42, 46, 47, 48, 58	57	
Teamsters – Heavy & Highway	317bhh	6, 12, 50, 51, 55, 62	2	
Teamsters - Building/Heavy & Highway	456	40, 60		

Introduction to the Prevailing Rate Schedule

Information About Prevailing Rate Schedule

This information is provided to assist you in the interpretation of particular requirements for each classification of worker contained in the attached Schedule of Prevailing Rates.

Classification

It is the duty of the Commissioner of Labor to make the proper classification of workers taking into account whether the work is heavy and highway, building, sewer and water, tunnel work, or residential, and to make a determination of wages and supplements to be paid or provided. It is the responsibility of the public work contractor to use the proper rate. If there is a question on the proper classification to be used, please call the district office located nearest the project. District office locations and phone numbers are listed below.

Prevailing Wage Schedules are issued separately for "General Construction Projects" and "Residential Construction Projects" on a county-by-county basis.

General Construction Rates apply to projects such as: Buildings, Heavy & Highway, and Tunnel and Water & Sewer rates.

Residential Construction Rates generally apply to construction, reconstruction, repair, alteration, or demolition of one family, two family, row housing, or rental type units intended for residential use.

Some rates listed in the Residential Construction Rate Schedule have a very limited applicability listed along with the rate. Rates for occupations or locations not shown on the residential schedule must be obtained from the General Construction Rate Schedule. Please contact the local Bureau of Public Work office before using Residential Rate Schedules, to ensure that the project meets the required criteria.

Payrolls and Payroll Records

Contractors and subcontractors are required to establish, maintain, and preserve for not less than six (6) years, contemporaneous, true, and accurate payroll records.

Every contractor and subcontractor shall submit to the Department of Jurisdiction (Contracting Agency), within thirty (30) days after issuance of its first payroll and every thirty (30) days thereafter, a transcript of the original payrolls, subscribed and affirmed as true under penalty of perjury.

Paid Holidays

Paid Holidays are days for which an eligible employee receives a regular day's pay, but is not required to perform work. If an employee works on a day listed as a paid holiday, this remuneration is in addition to payment of the required prevailing rate for the work actually performed.

Overtime

At a minimum, all work performed on a public work project in excess of eight hours in any one day or more than five days in any workweek is overtime. However, the specific overtime requirements for each trade or occupation on a public work project may differ. Specific overtime requirements for each trade or occupation are contained in the prevailing rate schedules.

Overtime holiday pay is the premium pay that is required for work performed on specified holidays. It is only required where the employee actually performs work on such holidays.

The applicable holidays are listed under HOLIDAYS: OVERTIME. The required rate of pay for these covered holidays can be found in the OVERTIME PAY section listings for each classification.

Supplemental Benefits

Particular attention should be given to the supplemental benefit requirements. Although in most cases the payment or provision of supplements is straight time for all hours worked, some classifications require the payment or provision of supplements, or a portion of the supplements, to be paid or provided at a premium rate for premium hours worked. Supplements may also be required to be paid or provided on paid holidays, regardless of whether the day is worked. The Overtime Codes and Notes listed on the particular wage classification will indicate these conditions as required.

Effective Dates

When you review the schedule for a particular occupation, your attention should be directed to the dates above the column of rates. These are the dates for which a given set of rates is effective. The rate listed is valid until the next effective rate change or until the new annual determination which takes effect on July 1 of each year. All contractors and subcontractors are required to pay the current prevailing rates of wages and supplements. If you have any questions please contact the Bureau of Public Work or visit the New York State Department of Labor website (www.labor.state.ny.us) for current wage rate information.

Apprentice Training Ratios

The following are the allowable ratios of registered Apprentices to Journey-workers.

For example, the ratio 1:1,1:3 indicates the allowable initial ratio is one Apprentice to one Journeyworker. The Journeyworker must be in place on the project before an Apprentice is allowed. Then three additional Journeyworkers are needed before a second Apprentice is allowed. The last ratio repeats indefinitely. Therefore, three more Journeyworkers must be present before a third Apprentice can be hired, and so on.

Please call Apprentice Training Central Office at (518) 457-6820 if you have any questions.

Title (Trade)	Ratio
Boilermaker (Construction)	1:1,1:4
Boilermaker (Shop)	1:1,1:3
Carpenter (Bldg.,H&H, Pile Driver/Dockbuilder)	1:1,1:4
Carpenter (Residential)	1:1,1:3
Electrical (Outside) Lineman	1:1,1:2
Electrician (Inside)	1:1,1:3
Elevator/Escalator Construction & Modernizer	1:1,1:2
Glazier	1:1,1:3
Insulation & Asbestos Worker	1:1,1:3
Iron Worker	1:1,1:4
Laborer	1:1,1:3
Mason	1:1,1:4
Millwright	1:1,1:4
Op Engineer	1:1,1:5
Painter	1:1,1:3
Plumber & Steamfitter	1:1,1:3
Roofer	1:1,1:2
Sheet Metal Worker	1:1,1:3
Sprinkler Fitter	1:1,1:2

If you have any questions concerning the attached schedule or would like additional information, please contact the nearest BUREAU of PUBLIC WORK District Office or write to:

New York State Department of Labor
Bureau of Public Work
State Office Campus, Bldg. 12
Albany, NY 12240

District Office Locations:	Telephone #	FAX #
Bureau of Public Work - Albany	518-457-2744	518-485-0240
Bureau of Public Work - Binghamton	607-721-8005	607-721-8004
Bureau of Public Work - Buffalo	716-847-7159	716-847-7650
Bureau of Public Work - Garden City	516-228-3915	516-794-3518
Bureau of Public Work - Newburgh	845-568-5287	845-568-5332
Bureau of Public Work - New York City	212-932-2419	212-775-3579
Bureau of Public Work - Patchogue	631-687-4882	631-687-4902
Bureau of Public Work - Rochester	585-258-4505	585-258-4708
Bureau of Public Work - Syracuse	315-428-4056	315-428-4671
Bureau of Public Work - Utica	315-793-2314	315-793-2514
Bureau of Public Work - White Plains	914-997-9507	914-997-9523
Bureau of Public Work - Central Office	518-457-5589	518-485-1870

Cattaraugus County General Construction

Boilermaker

08/01/2018

JOB DESCRIPTION Boilermaker

DISTRICT 12

ENTIRE COUNTIES

Allegany, Cattaraugus, Chautauqua, Chemung, Erie, Genesee, Livingston, Monroe, Niagara, Ontario, Orleans, Schuyler, Steuben, Wayne, Wyoming, Yates

WAGES

Per hours: 07/01/2018

Boilermaker \$ 33.00

The wage rate will be 90% of the above for Maintenance work on boilers less than 100,000 pph.

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour: \$ 28.49*

*NOTE: \$27.25 of this amount is for every Hour "Paid"

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

1st Term 12 Months, Terms 3-8 at 6 Months

Per Hour:

1st \$ 22.45
3rd \$ 24.10
4th \$ 25.75
5th \$ 27.40
6th \$ 29.05
7th \$ 29.70
8th \$ 31.35

Supplemental Benefits per hour:

1st to 6th \$ 27.49**
7th to 8th \$28.49***

**NOTE: \$26.25 of this amount is for every Hour "Paid"

***NOTE: \$27.25 of this amount is for every Hour "Paid"

12-7

Carpenter - Building

08/01/2018

JOB DESCRIPTION Carpenter - Building

DISTRICT 12

ENTIRE COUNTIES

Chautauqua

PARTIAL COUNTIES

Allegany: Entire county except the Township of Alfred.
Cattaraugus: Entire county except the Township of Perrysburg and the Village of Gowanda.

WAGES

Per hour: 07/01/2018

Carpenter \$ 26.60

Floorlayer	26.60
Certified Welder	27.60
Hazardous Waste Worker	28.10
Diver-Dry Day	27.60
Dive Tender	27.60
Diver-Wet Day**	61.25

Hazardous Waste Worker: Hazardous sites requiring personal protective equipment.

** Diver rate applies to all hours worked on the day of dive.

Depth pay for divers:	0' to 80'	no additional fee
	81' to 100'	additional \$0.50 per foot
	101' to 150'	additional \$0.75 per foot
	151' and deeper	additional \$1.25 per foot

Penetration pay:	0' to 50'	no additional fee
	51' to 100'	additional \$0.75 per foot
	101' and deeper	additional \$1.00 per foot

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work Schedule,' as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour worked:

Carpenter(s)	\$ 18.85
Diver Wet	18.85
Diver Dry & Tender	18.85

OVERTIME PAY

See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

One year terms at the following percentage of Journeyman's base wage:

Indentured Prior to 1/1/2016

1st	2nd	3rd	4th
50%	60%	70%	80%

Indentured After 01/01/2016

1st	2nd	3rd	4th	5th
50%	60%	65%	70%	80%

Supplemental benefits per hour worked:

1st	2nd	3rd	4th	5th
\$11.24	\$11.24	\$13.84	\$13.84	\$13.84

12-276B-All

Carpenter - Building

08/01/2018

JOB DESCRIPTION Carpenter - Building

DISTRICT 12

ENTIRE COUNTIES

Erie

PARTIAL COUNTIES

Cattaraugus: Townships of Persia and Perrysburg

WAGES

Per hour: 07/01/2018

Building:

Carpenter \$ 32.15

FloorLayer	32.15
Certified Welder	33.15
Hazardous Waste Worker	33.65
Diver-Dry Day	33.15
Diver Tender	33.15
Diver-Wet Day***	61.25

Hazardous Waste Worker: Hazardous sites requiring personal protective equipment.

*** Diver rate applies to all hours worked on the day of dive.

Depth pay for divers:	0' to 80'	no additional fee
	81' to 100'	additional \$0.50 per foot
	101' to 150'	additional \$0.75 per foot
	151' and deeper	additional \$1.25 per foot

Penetration pay:	0' to 50'	no additional fee
	51' to 100'	additional \$0.75 per foot
	101' and deeper	additional \$1.00 per foot

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule' as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour worked:

Carpenter(s)	\$ 27.88
Diver(s)	27.88

OVERTIME PAY

See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY

Paid:	See (1) on HOLIDAY PAGE
Overtime:	See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

One year terms at the following percentage of Journeyman's base wage:

Indentured Prior to 01/01/2016

1st	2nd	3rd	4th
50%	60%	70%	80%

Indentured After 01/01/2016

1st	2nd	3rd	4th	5th
50%	60%	65%	70%	80%

Supplemental Benefits per hour worked:

1st	2nd	3rd	4th	5th
\$11.35	\$11.35	\$13.95	\$13.95	\$13.95

12-276B-Cat

Carpenter - Building / Heavy&Highway

08/01/2018

JOB DESCRIPTION Carpenter - Building / Heavy&Highway

DISTRICT 2

ENTIRE COUNTIES

Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Wyoming, Yates

PARTIAL COUNTIES

Orange: The area lying on Northern side of Orange County demarcated by a line drawn from the Bear Mountain Bridge continuing east to the Bear Mountain Circle, continue North on 9W to the town of Cornwall where County Road 107 (also known as Quaker Rd) crosses under 9W, then east on County Road 107 to Route 32, then north on Route 32 to Orrs Mills Rd, then west on Orrs Mills Rd to Route 94, continue west and south on Route 94 to the Town of Chester, to the intersection of Kings Highway, continue south on Kings Highway to Bellvale Rd, west on Bellvale Rd to Bellvale Lakes Rd, then south on Bellvale Lakes Rd to Kain Rd, southeast on Kain Rd to Route 17A, then north and southeast along Route 17A to Route 210, then follow Route 210 to NJ Border.

WAGES

Wages per hour: 07/01/2018

Carpenter - ONLY for
Artificial Turf/Synthetic
Sport Surface \$ 30.40

Note - Does not include the operation of equipment. Please see Operating Engineers rates.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman \$ 22.43

OVERTIME PAY

See (B, E, Q, X) on OVERTIME PAGE

HOLIDAY

Paid: See (2, 17) on HOLIDAY PAGE
Overtime: See (5, 6, 16) on HOLIDAY PAGE

Notes:

When a holiday falls upon a Saturday, it shall be observed on the preceding Friday. When a holiday falls upon a Sunday, it shall be observed on the following Monday.

An employee taking an unexcused day off the regularly scheduled day before or after a paid Holiday shall not receive Holiday pay.

REGISTERED APPRENTICES

Wages per hour:

One year terms at the following percentage of Journeyman's wage:

1st	2nd	3rd	4th
50%	60%	70%	80%

Supplemental Benefits per hour:

1st year term	\$ 11.15
2nd year term	11.15
3rd year term	13.75
4th year term	13.75

2-42AtSS

Carpenter - Heavy&Highway

08/01/2018

JOB DESCRIPTION Carpenter - Heavy&Highway

DISTRICT 12

ENTIRE COUNTIES

Allegany, Cattaraugus, Chautauqua

WAGES

Per hour: 07/01/2018

Carpenter	\$ 30.40
Certified Welder	31.90
Diver-Dry Day	31.40
Diver-Wet Day**	55.40
Dive Tender	31.40
Hazardous Waste Worker	32.40
Pile Driver	34.89
Millwright	33.38
Effluent & Slurry Diver-Wet Day	47.10

Hazardous Waste Worker: Hazardous sites requiring personal protective equipment.

** Diver rate applies to all hours worked on the day of the dive.

Depth pay for divers:	0' to 50'	no additional fee
	51' to 100'	additional \$0.50 per foot
	101' to 150'	additional \$0.75 per foot
	151' to 200'	additional \$1.25 per foot

Penetration pay:	0' to 50'	no additional fee
	51' to 100'	additional \$0.75 per foot
	101' to deeper	additional \$1.00 per foot

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour worked:

Carpenter(s)	\$ 22.43
Diver Wet	23.77
Diver Dry & Tender	23.77
Pile Driver	23.77

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid:	See (2, 17) on HOLIDAY PAGE
Overtime:	See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

One year terms at the following percentage of Journeyman's wage:

Indentured Prior to 01/01/2016

1st	2nd	3rd	4th
50%	60%	70%	80%

Indentured After 01/01/2016

1st	2nd	3rd	4th	5th
50%	60%	65%	70%	80%

Supplemental benefits per hour worked:

1st	2nd	3rd	4th	5th
\$11.15	\$11.15	\$13.75	\$13.75	\$13.75

12-276HH-All

Electrician

08/01/2018

JOB DESCRIPTION Electrician

DISTRICT 3

ENTIRE COUNTIES

Erie

PARTIAL COUNTIES

Cattaraugus: Only the Townships of Ashford, East Otto, Ellicottville, Farmersville, Freedom, Franklinville, Lyndon, Machias, Mansfield, New Albion, Otto, Perrysburg, Persia and Yorkshire.

Genesee: Only the Townships of Alabama, Alexander, Darien, Oakfield, Pembroke and that portion of the Towns of Batavia and Elba that are west of Little Tonawanda Creek; Tonawanda Creek; the City limits of Batavia (in effect prior to Feb. 1, 1970) and State Highway 98 north of the City of Batavia, then north on Highway 98 to the Orleans County line.

Wyoming: Only the Townships of Arcade, Attica, Bennington, Eagle, Java, Orangeville, Sheldon and Wethersfield.

WAGES

Per hour:	07/01/2018	05/27/2019	06/01/2020
		Additional	Additional
Electrician*	\$ 35.24	\$1.60	\$1.80

* Includes teledata work

When shift work is mandated either in the job specification or by the contracting agency the following premiums apply:

17.3% for work from 4:30PM - 1:00AM

31.4% for work from 12:30AM - 9:00AM

Additional \$0.50/hr in shafts over 25 ft. deep and in underground tunnels over 75 ft. long.

Additional \$0.75/hr for work on toothpicks, structural steel, temporary platforms, swinging scaffolds, boatswain chairs, smoke stacks or water towers 30 ft above the floor or for work on rolling scaffolds and ladders over 50 ft.

Additional \$1.50/hr for Cable Splicers on such work as lead, and shielded cable and splices or terminations on cable 5KV and above.

Additional \$1.00/hr for Hot work (Atomic plants).

Additional \$2.00/hr for work on radio, TV, light towers and floating platforms or climbing ladders in excess of 100 ft. high.

SUPPLEMENTAL BENEFITS

Per hour:

\$ 26.90*

* NOTE - add 3% of the posted straight time or applicable premium wage rate.

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

Hour terms at the following wages:

0 to 1000 to 2000 to 3500 to 5000 to 6500 to 8000
\$ 13.05 \$ 14.10 \$ 15.85 \$ 19.40 \$ 24.65 \$ 28.20

Supplemental benefits per hour:

0 to 1000 to 5000 to 8000
\$ 12.31* \$ 21.95* \$ 26.90*

* NOTE - add 3% of the posted straight time or applicable premium wage rate.

3-41

Electrician

08/01/2018

JOB DESCRIPTION Electrician

DISTRICT 3

ENTIRE COUNTIES

Chautauqua

PARTIAL COUNTIES

Allegany: Only the Townships of Alma, Bolivar, Centerville, Clarksville, Cuba, Friendship, Genesee, New Hudson, Rushford, Wirt and that portion of the Townships of Amity, Angelica, Belfast, Caneadea and Scio that are west of the Genesee River.
Cattaraugus: Only the Townships of Allegany, Carrollton, Cold Spring, Conewango, Dayton, Great Valley, Hinsdale, Humphrey, Ischua, Leon, Little Valley, Napoli, Olean, Portville, Red House, Randolph, Salamanca and South Valley.

WAGES

Per hour: 07/01/2018

Electrician* \$ 35.55

* Includes teledata work.

When shift work is mandated either in the job specification or by the contracting agency the following premiums apply:

17.3% for work from 4:30PM - 1:00AM

31.4% for work from 12:30AM - 9:00AM

Additional 15% above wage for work 40" above floor, or in underground mines or tunnels or from suspension-type personnel lift equipment.

SUPPLEMENTAL BENEFITS

Per hour:

\$ 21.87*

NOTE - add 3% of the posted straight time or applicable premium wage rate.

* NOTE - \$10.47 of this amount is paid at straight time, the remaining balance of \$11.40 is paid at the same premium as the wages.

OVERTIME PAY

See (B, *E, Q) on OVERTIME PAGE

* Double-time for all work on Saturday in excess of 10 hours.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

Hour terms at the following percentage of Journeyman's wage:

0 to	1001 to	2001 to	2751 to	3501 to	4251 to	5001 to	5751 to	6601 to	7351 to
1000	2000	2750	3500	4250	5000	5750	6600	7350	8200
40%	45%	55%	60%	65%	70%	75%	80%	85%	90%

Supplemental benefits per hour:

07/01/2018									
\$ 8.08	\$ 8.08	\$14.54*	\$14.91*	\$17.88*	\$18.45*	\$19.02*	\$19.59*	\$20.16*	\$20.73*

NOTE - add 3% of the posted straight time or applicable premium wage rate to all terms.

* Note - \$10.47 of this amount is paid at straight time, the remaining balance is paid at the same premium as the wages.

3-106

Elevator Constructor

08/01/2018

JOB DESCRIPTION Elevator Constructor

DISTRICT 3

ENTIRE COUNTIES

Allegany, Cattaraugus, Chautauqua, Erie, Genesee, Niagara, Orleans, Wyoming

WAGES

Per hour:	07/01/2018
Elevator Constructor	\$ 48.26
Helper	33.78

**** IMPORTANT NOTICE - EFFECTIVE 04/01/2009 ****

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday or Tuesday thru Friday.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour:	\$ 32.65

Note - add 6% of regular hourly rate for all hours worked.

OVERTIME PAY

See (D, O) on OVERTIME PAGE

HOLIDAY

Paid:	See (5, 6, 15, 16) on HOLIDAY PAGE
Overtime:	See (5, 6, 15, 16) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

One year (1,700 hour each) terms at the following percentage of Journeyman's wage:

1st*	2nd	3rd	4th
55%	65%	70%	80%

Supplemental benefits per hour:

\$ 32.65

* Note - 0-6 months of the 1st year term is paid at 50% of Journeyman's wage with no Supplemental benefits.

Note - add 6% of regular hourly rate for all hours worked.

3-14

Glazier

08/01/2018

JOB DESCRIPTION Glazier

DISTRICT 3

ENTIRE COUNTIES

Allegany, Cattaraugus, Chautauqua, Erie, Genesee, Niagara, Orleans, Wyoming

WAGES

Per hour:	07/01/2018	05/01/2019	05/01/2020
		Additional	Additional
Glazier	\$ 26.75	\$1.25	\$1.25
Working off Suspended			
Scaffold (Swing Stage)	27.75	1.25	1.25
Maintenance	16.74*	0.85	0.90

* Note - This rate to be used only for all repair and replacement work such as glass breakage, glass replacement, door repair and board ups.

**** IMPORTANT NOTICE ****

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour:

Journeymen Glazier	\$21.67
Maintenance	13.60

OVERTIME PAY

See (B, E2, F, R) on OVERTIME PAGE

HOLIDAY

Paid:	See (1) on HOLIDAY PAGE for Glazier and Glazier Apprentices.
Paid:	See (5, 6) on HOLIDAY PAGE for Maintenance
Overtime:	See (5, 6) on HOLIDAY PAGE.

REGISTERED APPRENTICES

Wages per hour:

Glazier: 1000 hour terms at the following percentage of Journeyman's wage:

1st	2nd	3rd	4th	5th	6th	7th	8th
50%	55%	60%	65%	70%	75%	80%	90%

Supplemental benefits per hour:

1st & 2nd terms	\$ 7.95
3rd & 4th terms	8.80
All other terms	10.20

3-660

Insulator - Heat & Frost

08/01/2018

JOB DESCRIPTION Insulator - Heat & Frost

DISTRICT 3

ENTIRE COUNTIES

Allegany, Cattaraugus, Chautauqua, Erie, Niagara, Wyoming

PARTIAL COUNTIES

Genesee: Only the Townships of Alabama, Alexander, Darien, Oakfield and Pembroke.

WAGES

Per Hour:	07/01/2018
Heat & Frost Insulator	\$ 33.25

SUPPLEMENTAL BENEFITS

Per hour:	\$ 23.09

OVERTIME PAY

See (B, *E, **Q) on OVERTIME PAGE

* Note - Double time after 10 hours on Saturday.

** Note - Triple time on Labor Day if WORKED.

HOLIDAY

Paid:	See (1) on HOLIDAY PAGE
Overtime:	See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

One year terms at the following percentage of Journeyman's wage:

1st	2nd	3rd	4th
50%	60%	70%	80%

Supplemental Benefits per hour:

1st and 2nd	\$ 18.69
All other terms	\$ 23.09

3-4

Ironworker**08/01/2018****JOB DESCRIPTION** Ironworker**DISTRICT 3****ENTIRE COUNTIES**

Cattaraugus, Chautauqua

PARTIAL COUNTIES

Allegany: Entire county except the Towns of Birdsall, Burns and Grove.

Erie: All except the Town of Grand Island north of Whitehaven Road.

Genesee: Only the Townships of Alabama, Alexander, Darien and Pembroke

Steuben: Only the Townships of Canisteo, Freemont, Greenwood, Hartsville, Hornell, Hornellsville, Howard, Jasper, Troupsburg and West Union

Wyoming: Only the Townships of Arcade, Attica, Bennington, Eagle, Gainsville, Java, Orangeville, Pike, Sheldon, Warsaw and Wethersfield.

WAGES

Per hour:	07/01/2018	07/01/2019 Additional	07/01/2020 Additional
Structural	\$ 30.58	\$ 1.25	\$ 1.25
Ornamental	30.58	1.25	1.25
Layout	30.58	1.25	1.25
Rodmen	30.58	1.25	1.25
Reinforcing	30.58	1.25	1.25
Welders	30.58	1.25	1.25
Riggers & Mach. Movers	30.58	1.25	1.25
Curtain Wall Erector	30.58	1.25	1.25
Window Erector	28.23	1.25	1.25
Fence Erector	29.15	1.25	1.25

SUPPLEMENTAL BENEFITS

Per hour:

Fence erectors	\$ 26.42
All others	27.92

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

One year terms at the following wage:

1st	2nd	3rd	4th
\$ 16.50	\$ 18.50	\$ 20.50	\$ 22.50

Supplemental benefits per hour:

1st	2nd	3rd	4th
\$ 11.75	\$ 21.12	\$ 22.45	\$ 23.79

3-6

Laborer - Building**08/01/2018****JOB DESCRIPTION** Laborer - Building**DISTRICT 3****ENTIRE COUNTIES**

Allegany, Chautauqua

PARTIAL COUNTIES

Cattaraugus: Entire county except the Town of Perrysburg and the Village of Gowanda.

WAGES

Per hour:	07/01/2018	07/01/2019 Additional	07/01/2020 Additional
Basic and Flagman	\$ 23.97	\$ 1.00	\$ 1.00
Blaster, Nozzelman, Curb	24.97	1.00	1.00
and Flatwork Formsetter not	24.97	1.00	1.00
on structures, Pipelayer	24.97	1.00	1.00
Work 40 ft. and up	24.12	1.00	1.00
Hazardous Waste	25.47	1.00	1.00
Deleader & Asbestos Removal	25.97	1.00	1.00

OSHA Level C or	25.97	1.00	1.00
greater protective suit or	25.97	1.00	1.00
any anti-contamination	25.97	1.00	1.00
clothing is required	25.97	1.00	1.00
With supplied air respirator	26.97	1.00	1.00

**** IMPORTANT NOTICE ****

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day. Saturday may be used as a make-up day at time and one half of the hourly rate.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour:

\$ 16.57

OVERTIME PAY

See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

1000 hour terms at the following percentage of Journeyman's wage:

1st	2nd	3rd	4th
70%	80%	85%	90%

Supplemental benefits per hour:

\$ 16.57

3-621b

Laborer - Building

08/01/2018

JOB DESCRIPTION Laborer - Building

DISTRICT 3

ENTIRE COUNTIES

Erie

PARTIAL COUNTIES

Cattaraugus: Only the Townships of Perrysburg and the Village Gowanda.

WAGES

CLASS A: Basic, Safety Man, Flagman, Tool Room Man, Nurseryman, Demolition Worker, Top Man, Wrecker, IBC Barriers Except on Structures, Guard Rail, Asphalt Shovelers, Foundation Laborer over 8' in Depth, Hod Carriers, Plaster Tender, Plaster Scaffold Builder, Pneumatic Gas, Electric Tool Operator including all forms of Busters, Jackhammers and Chipping Guns, Steel Burners.

CLASS B: Mortar Mixer, Asphalt Smoothers, Pneumatic Gas, Electric Tool Operator including all forms of Busters, Jackhammers and Chipping Guns over 8' in depth.

CLASS C: Worker on any Swing Scaffold, Blaster, Plumbing Laborer, Wagon Drill Operator, Bottomman (caisson or cofferdam), Laser Setter, Asphalt Rakers, Asphalt Screed Man.

CLASS D: Stone Cutter, Curb Setter and Flag Layer.

CLASS E: Wearing of replaceable cartridge respirator.

CLASS F: Asbestos Removal, Deleader.

CLASS G: Hazardous Waste Worker.

Per hour:	07/01/2018	07/01/2019	07/01/2020
Building Laborer:		Additional	Additional
CLASS A	\$ 26.83	\$ 1.25	\$ 1.75
CLASS B	27.00	1.25	1.75
CLASS C	27.11	1.25	1.75
CLASS D	27.58	1.25	1.75

CLASS E	27.83	1.25	1.75
CLASS F	28.33	1.25	1.75
CLASS G	28.83	1.25	1.75

SUPPLEMENTAL BENEFITS

Per hour:

\$ 25.70

OVERTIME PAY

See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (22) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

Hour terms at the following percentage of Journeyman's wage:

0 to 500	to 1000	to 1500	to 2000	to 2500	to 3000	to 4000
55%	60%	65%	70%	75%	80%	90%

Supplemental benefits per hour:

\$ 25.70

3-210b

Laborer - Heavy&Highway

08/01/2018

JOB DESCRIPTION Laborer - Heavy&Highway

DISTRICT 3

ENTIRE COUNTIES

Allegany, Cattaraugus

PARTIAL COUNTIES

Chautauqua: Only the Townships of Busti, Carroll, Chautauqua, Clymer, Ellery, Ellicott, Ellington, French Creek, Gerry, Harmony, Kiantone, Mina, North Harmony, Poland, Sherman, Stockton and the City of Jamestown.

WAGES

GROUP A: Basic, Drill Helper, Flagman, Outboard and Hand Boats. Chain Saw, Concrete Aggregate Bin, Concrete Bootmen, Gin Buggy, Hand or Machine Vibrator, Jack Hammer, Mason Tender, Mortar Mixer, Pavement Breaker, Handlers of Steel Mesh, Small Generators for Laborers' Tools, Pipe Layers, Vibrator Type Rollers, Tamper, Drill Doctor, Water Pump Operator (2" and Single Diaphragm), Nozzle (Asphalt, Gunite, Seeding, and Sand Blasting), Laborers on Chain Link Fence Erection, Rock Splitter and Power Unit, Pusher Type Concrete Saw and all other Gas, Electric, Oil and Air Tool Operators, Wrecking Laborer, Grade Checker.

GROUP B: All Rock or Drilling Machine Operators (Except Quarry Master and Similar Type), Acetylene Torch Operators and Powderman. Blasters, Curb and Flatwork Formsetters not on structures, Stone or Granite Curb Setters, Designated Asphalt Rakers (not on cold patch), Tail or Screw Operator on Asphalt Paver.

Per hour: 07/01/2018

GROUP A \$ 27.39

GROUP B 27.79

Hazardous waste removal, lead abatement, asbestos abatement add \$ 1.50

SUPPLEMENTAL BENEFITS

Per hour:

\$ 21.10

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per:

1000 hour terms at the following percentage of Journeyman's wage:

1st	2nd	3rd	4th
70%	80%	85%	90%

Supplemental benefits per hour:

\$ 21.10

3-621h Zone 1

Lineman Electrician

08/01/2018

JOB DESCRIPTION Lineman Electrician

DISTRICT 6

ENTIRE COUNTIES

Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Wyoming, Yates

WAGES

Per hour:

NOTE: Includes Teledata Work within ten (10) feet of High Voltage Transmission Lines

Below rates applicable on all overhead and underground distribution and maintenance work, and all overhead and underground transmission line work and the installation of fiber optic cable where no other construction trades are or have been involved. (Ref #14.01.01)

	07/01/2018	05/06/2019	05/04/2020
Lineman, Technician	\$ 50.60	\$ 52.05	\$ 53.50
Crane, Crawler Backhoe	50.60	52.05	53.50
Welder, Cable Splicer	50.60	52.05	53.50
Digging Mach. Operator	45.54	46.85	48.15
Tractor Trailer Driver	43.01	44.24	45.48
Groundman, Truck Driver	40.48	41.64	42.80
Equipment Mechanic	40.48	41.64	42.80
Flagman	30.36	31.23	32.10

Additional \$1.00 per hour for entire crew when a helicopter is used.

Below rates applicable on all electrical sub-stations, switching structures, fiber optic cable and all other work not defined as "Utility outside electrical work". (Ref #14.02.01-A)

Lineman, Technician	\$ 50.60	\$ 52.05	\$ 53.50
Crane, Crawler Backhoe	50.60	52.05	53.50
Cable Splicer	55.66	57.26	58.85
Certified Welder -			
Pipe Type Cable	53.13	54.65	56.18
Digging Mach. Operator	45.54	46.85	48.15
Tractor Trailer Driver	43.01	44.24	45.48
Groundman, Truck Driver	40.48	41.64	42.80
Equipment Mechanic	40.48	41.64	42.80
Flagman	30.36	31.23	32.10

Additional \$1.00 per hour for entire crew when a helicopter is used.

Below rates apply on switching structures, maintenance projects, railroad catenary install/maintenance third rail installation, bonding of rails and pipe type cable and installation of fiber optic cable. (Ref #14.02.01-B)

Lineman, Tech, Welder	\$ 51.92	\$ 53.37	\$ 54.82
Crane, Crawler Backhoe	51.92	53.37	54.82
Cable Splicer	57.11	58.71	60.30
Certified Welder -			
Pipe Type Cable	54.52	56.04	57.56
Digging Mach. Operator	46.73	48.03	49.34
Tractor Trailer Driver	44.13	45.36	46.60
Groundman, Truck Driver	41.54	42.70	43.86
Equipment Mechanic	41.54	42.70	43.86
Flagman	31.15	32.02	32.89

Additional \$1.00 per hour for entire crew when a helicopter is used.

Below rates applicable on all overhead and underground transmission line work & fiber optic cable where other construction trades are or have been involved. This applies to transmission line work only, not other construction. (Ref #14.03.01)

Lineman, Tech, Welder	\$ 53.11	\$ 54.56	\$ 56.01
Crane, Crawler Backhoe	53.11	54.56	56.01
Cable Splicer	53.11	54.56	56.01
Digging Mach. Operator	47.80	49.10	50.41
Tractor Trailer Driver	45.14	46.38	47.61
Groundman, Truck Driver	42.49	43.65	44.81
Equipment Mechanic	42.49	43.65	44.81
Flagman	31.87	32.74	33.61

Additional \$1.00 per hour for entire crew when a helicopter is used.

NOTE: THE FOLLOWING RATES WILL APPLY ON ALL CONTRACTING AGENCY MANDATED MULTIPLE SHIFTS OF AT LEAST FIVE (5) DAYS DURATION WORKED BETWEEN THE HOURS LISTED BELOW:

1ST SHIFT	8:00 AM to 4:30 PM REGULAR RATE
2ND SHIFT	4:30 PM to 1:00 AM REGULAR RATE PLUS 17.3 %
3RD SHIFT	12:30 AM to 9:00 AM REGULAR RATE PLUS 31.4 %

**** IMPORTANT NOTICE ****

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.
*Effective 05/06/2013, Tuesday thru Friday may be worked with no make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour worked (also required on non-worked holidays):

The following SUPPLEMENTAL BENEFITS apply to all classification categories of CONSTRUCTION, TRANSMISSION and DISTRIBUTION.

Journeyman	\$ 23.40 *plus 6.75% of hourly wage	\$ 24.15 *plus 6.75% of hourly wage	\$ 24.90 *plus 6.75% of hourly wage

*The 6.75% is based on the hourly wage paid, straight time rate or premium rate.

OVERTIME PAY

See (B, E, Q,) on OVERTIME PAGE. *Note* Double time for all emergency work designated by the Dept. of Jurisdiction.
NOTE: WAGE CAP...Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked.
Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY

Paid See (5, 6, 8, 13, 25) on HOLIDAY PAGE plus Governor of NYS Election Day.
Overtime See (5, 6, 8, 13, 25) on HOLIDAY PAGE plus Governor of NYS Election Day.

NOTE: All paid holidays falling on Saturday shall be observed on the preceding Friday. All paid holidays falling on Sunday shall be observed on the following Monday. Supplements for holidays paid at straight time.

REGISTERED APPRENTICES

WAGES: 1000 hour terms at the following percentage of the applicable Journeyman Lineman wage.

1st	2nd	3rd	4th	5th	6th	7th
60%	65%	70%	75%	80%	85%	90%

SUPPLEMENTAL BENEFITS: Same as Journeyman

6-1249a

Lineman Electrician - Teledata

08/01/2018

JOB DESCRIPTION Lineman Electrician - Teledata
ENTIRE COUNTIES

DISTRICT 6

Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES

Per hour:

For outside work, stopping at first point of attachment (demarcation).

	07/01/2018	01/01/2019	01/01/2020	01/01/2021
Cable Splicer	\$ 31.83	\$ 32.78	\$ 33.77	\$ 34.78
Installer, Repairman	30.21	\$ 31.12	\$ 32.05	\$ 33.01
Teledata Lineman	30.21	\$ 31.12	\$ 32.05	\$ 33.01
Tech., Equip. Operator	30.21	\$ 31.12	\$ 32.05	\$ 33.01
Groundman	16.01	\$ 16.49	\$ 16.99	\$ 17.50

NOTE: EXCLUDES Teledata work within ten (10) feet of High Voltage (600 volts and over) transmission lines. For this work please see LINEMAN.

NOTE: THE FOLLOWING RATES WILL APPLY ON ALL CONTRACTING AGENCY MANDATED MULTIPLE SHIFTS OF AT LEAST FIVE (5) DAYS DURATION WORKED:

1ST SHIFT	REGULAR RATE
2ND SHIFT	REGULAR RATE PLUS 10%
3RD SHIFT	REGULAR RATE PLUS 15%

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman	\$ 4.73	\$ 4.73	\$ 4.73	\$ 4.73
	*plus 3% of wage paid	*plus 3% of wage paid	*plus 3% of wage paid	*plus 3% of wage paid

*The 3% is based on the hourly wage paid, straight time rate or premium rate.

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

NOTE: WAGE CAP...Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6, 16) on HOLIDAY PAGE

6-1249LT - Teledata

Lineman Electrician - Traffic Signal, Lighting

08/01/2018

JOB DESCRIPTION Lineman Electrician - Traffic Signal, Lighting

DISTRICT 6

ENTIRE COUNTIES

Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Cortland, Delaware, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Warren, Washington, Wayne, Wyoming, Yates

WAGES

Lineman/Technician shall perform all overhead aerial work. A Lineman/Technician on the ground will install all electrical panels, connect all grounds, install and connect all electrical conductors which includes, but is not limited to road loop wires; conduit and plastic or other type pipes that carry conductors, flex cables and connectors, and to oversee the encasement or burial of such conduits or pipes.

A Groundman/Groundman Truck Driver shall: Build and set concrete forms, handle steel mesh, set footer cages, transport concrete in a wheelbarrow, hand or machine concrete vibrator, finish concrete footers, mix mortar, grout pole bases, cover and maintain footers while curing in cold weather, operate jack hammer, operate hand pavement breaker, tamper, concrete and other motorized saws, as a drill helper, operate and maintain generators, water pumps, chainsaws, sand blasting, operate mulching and seeding machine, air tools, electric tools, gas tools, load and unload materials, hand shovel and/or broom, prepare and pour mastic and other fillers, assist digger operator equipment operator in ground excavation and restoration, landscape work and painting. Only when assisting a lineman technician, a groundman/groundman truck driver may assist in installing conduit, pipe, cables and equipment.

A flagger's duties shall consist of traffic control only.
(Ref #14.01.01)

Per hour:

	07/01/2018	05/06/2019	05/04/2020
Lineman, Technician	\$ 43.80	\$ 45.00	\$ 46.20
Crane, Crawler Backhoe	43.80	45.00	46.20
Certified Welder	45.99	47.25	48.51
Digging Machine	39.42	40.50	41.58
Tractor Trailer Driver	37.23	38.25	39.27
Groundman, Truck Driver	35.04	36.00	36.96
Equipment Mechanic	35.04	36.00	36.96
Flagman	26.28	27.00	27.72

Above rates applicable on all Lighting and Traffic Signal Systems with the installation, testing, operation, maintenance and repair of all traffic control and illumination projects, traffic monitoring systems, road weather information systems and the installation of Fiber Optic Cable.

NOTE: THE FOLLOWING RATES WILL APPLY ON ALL CONTRACTING AGENCY MANDATED MULTIPLE SHIFTS OF AT LEAST FIVE (5) DAYS DURATION WORKED BETWEEN THE HOURS LISTED BELOW:

1ST SHIFT	8:00 AM TO 4:30 PM	REGULAR RATE
2ND SHIFT	4:30 PM TO 1:00 AM	REGULAR RATE PLUS 17.3%
3RD SHIFT	12:30 AM TO 9:00 AM	REGULAR RATE PLUS 31.4%

**** IMPORTANT NOTICE ****

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

*Effective 05/06/2013, Tuesday thru Friday may be worked with no make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour worked (but also required on non-worked holidays):

Journeyman	\$ 23.40	\$ 24.15	\$ 24.90
	*plus 6.75% of hourly wage	*plus 6.75% of hourly wage	*plus 6.75% of hourly wage

*The 6.75% is based on the hourly wage paid, straight time rate or premium rate.

Supplements paid at STRAIGHT TIME rate for holidays.

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE. *Note* Double time for all emergency work designated by the Dept. of Jurisdiction.

NOTE: WAGE CAP...Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked.

Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY

Paid: See (5, 6, 8, 13, 25) on HOLIDAY PAGE plus Governor of NYS Election Day.

Overtime: See (5, 6, 8, 13, 25) on HOLIDAY PAGE plus Governor of NYS Election Day.

NOTE: All paid holidays falling on Saturday shall be observed on the preceding Friday. All paid holidays falling on Sunday shall be observed on the following Monday. Supplements for holidays paid at straight time.

REGISTERED APPRENTICES

WAGES: Per hour. 1000 hour terms.

	07/01/2018	05/06/2019	05/04/2020
1st term	\$ 26.28	\$ 27.00	\$ 27.72
2nd term	28.47	29.25	30.03
3rd term	30.66	31.50	32.34
4th term	32.85	33.75	34.65
5th term	35.04	36.00	36.96
6th term	37.23	38.25	39.27
7th term	39.42	40.50	41.58

SUPPLEMENTAL BENEFITS: Same as Journeyman

6-1249a-LT

Lineman Electrician - Tree Trimmer

08/01/2018

JOB DESCRIPTION Lineman Electrician - Tree Trimmer

DISTRICT 6

ENTIRE COUNTIES

Albany, Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Rensselaer, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Wyoming, Yates

WAGES

Per hour:

Applies to line clearance, tree work and right-of-way preparation on all new or existing energized overhead or underground electrical, telephone and CATV lines. This also would include stump removal near underground energized electrical lines, including telephone and CATV lines.

	07/01/2018	01/01/2019
Tree Trimmer	\$ 25.10	\$ 25.79
Equipment Operator	22.20	22.81
Equipment Mechanic	22.20	22.81
Truck Driver	18.48	18.99
Groundman	15.22	15.64
Flag person	10.97	11.27

SUPPLEMENTAL BENEFITS

Per hour worked (but also required on non-worked holidays):

Journeyman	\$ 9.98	\$ 9.98
	*plus 3% of hourly wage	*plus 3% of hourly wage

* The 3% is based on the hourly wage paid, straight time rate or premium rate.

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

NOTE: WAGE CAP...Double the straight time hourly base wage shall be the maximum hourly wage compensation for any hour worked. Contractor is still responsible to pay the hourly benefit amount for each hour worked.

HOLIDAY

Paid: See (5, 6, 8, 15, 16, 25) on HOLIDAY PAGE

Overtime: See (5, 6, 8, 15, 16, 25) on HOLIDAY PAGE

NOTE: All paid holidays falling on a Saturday shall be observed on the preceding Friday.

All paid holidays falling on a Sunday shall be observed on the following Monday.

6-1249TT

Mason - Building

08/01/2018

JOB DESCRIPTION Mason - Building

DISTRICT 5

ENTIRE COUNTIES

Chautauqua

PARTIAL COUNTIES

Allegany: Entire county except the Townships of Alfred, Almond, Andover and Burns.

Cattaraugus: Entire county except the Township of Perrysburg and the Village of Gowanda.

WAGES

Per hour:	07/01/2018	07/01/2019	07/01/2020
Building:		Additional	Additional
Bricklayer Cement	\$ 31.67	\$ 0.95	\$ 1.00
Mason, Plasterer, Stone			
Mason, Tuck Pointer			

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work Schedule,' as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman	\$ 20.08

OVERTIME PAY

See (B,E,E2*,Q) on OVERTIME PAGE

*Note - Or other conditions beyond the employer's control such as fire or natural disaster.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

One year terms at the following percentage of Journeyman's wage:

1st	2nd	3rd	4th
\$14.99	\$18.89	\$21.37	\$24.42

Supplemental benefits per hour:

1st	2nd	3rd	4th
\$10.79	\$13.38	\$15.47	\$17.56

5-3B - Jam - Z2

Mason - Building

08/01/2018

JOB DESCRIPTION Mason - Building

DISTRICT 5

ENTIRE COUNTIES

Erie, Niagara

PARTIAL COUNTIES

Cattaraugus: Only the Township of Perrysburg and the Village of Gowanda.

WAGES

Per Hour: 07/01/2018
Building:
Bricklayer \$ 31.32
Stone Mason 31.32
Tuck Pointer 31.32

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman \$ 26.68

OVERTIME PAY

See (B,E,E2*,Q) on OVERTIME PAGE

*Note - Or other conditions beyond the employer's control such as fire or natural disaster.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

1250 hour terms at the following wage:

1st	2nd	3rd	4th
\$ 18.41	\$ 18.91	\$ 21.82	\$ 25.77

Supplemental benefits per hour:

1st	2nd	3rd	4th
\$ 10.58	\$ 17.33	\$ 19.53	\$ 21.32

5-3B-Z3

Mason - Building

08/01/2018

JOB DESCRIPTION Mason - Building

DISTRICT 3

ENTIRE COUNTIES

Erie, Niagara

PARTIAL COUNTIES

Cattaraugus: Only the Township of Perrysburg and the Village of Gowanda.

WAGES

Per hour:	07/01/2018	04/01/2019
Plasterer	\$ 29.65	\$ 30.15

Additional \$3.00/hr for work on swing stage over 20 feet.

SUPPLEMENTAL BENEFITS

Per hour:	\$ 19.74	\$ 20.49

OVERTIME PAY

Exterior work only See (B, E, E2, Q) on OVERTIME PAGE.

All other work See (B, E, Q) on OVERTIME PAGE.

HOLIDAY

Paid:	See (1) on HOLIDAY PAGE
Overtime:	See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

Hour terms at the following dollar amounts:

0	to 1000	to 2000	to 3000	to 4000	to 4700	to 5400	to 6000	to 7000	to 8000
\$ 12.00	\$ 14.00	\$ 15.00	\$ 16.00	\$ 17.00	\$ 18.00	\$ 19.00	\$ 20.00	\$ 21.00	

Supplemental benefits per hour:

Hour terms at the following dollar amounts:

0	to 4000	to 4700	to 5400	to 6000	to 8000
\$ 2.50	\$ 3.50	\$ 4.50	\$ 5.50	\$ 7.50	

3-9-Pltr

Mason - Building / Heavy&Highway

08/01/2018

JOB DESCRIPTION Mason - Building / Heavy&Highway

DISTRICT 3

ENTIRE COUNTIES

Erie

PARTIAL COUNTIES

Cattaraugus: Only the Township of Perrysburg and the Village of Gowanda.

WAGES

Per hour:	07/01/2018	07/01/2019	07/01/2020
		Additional	Additional
Cement Mason	\$ 30.00	\$ 1.00	\$ 1.25

Additional \$0.25 per hr for Swing scaffold or exterior scaffold 42' or higher.

Additional \$1.00 per hr when required to wear respirator.

SUPPLEMENTAL BENEFITS

Per hour:	\$ 30.67

OVERTIME PAY

See (B, E, Q, V) on OVERTIME PAGE

HOLIDAY

Paid:	See (1) on HOLIDAY PAGE
Overtime:	See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

750 hour terms at the following dollar amounts:

1st	2nd	3rd	4th	5th	6th
\$ 13.65	\$ 14.65	\$ 17.65	\$ 19.65	\$ 21.65	\$ 23.65

Supplemental benefits per hour:

1st	2nd	3rd	4th	5th	6th

\$ 8.91 \$ 11.82 \$ 13.55 \$ 16.77 \$ 19.06 \$ 22.49

3-111Erie

Mason - Heavy&Highway

08/01/2018

JOB DESCRIPTION Mason - Heavy&Highway

DISTRICT 5

ENTIRE COUNTIES

Allegany, Broome, Cattaraugus, Chautauqua, Chemung, Chenango, Cortland, Delaware, Erie, Genesee, Livingston, Monroe, Niagara, Ontario, Orleans, Otsego, Schuyler, Seneca, Steuben, Tioga, Tompkins, Wayne, Wyoming, Yates

WAGES

Per hour:	07/01/2018	07/01/2019	07/01/2020
Heavy & Highway:		Additional	Additional
Cement Mason	\$30.91	\$ 0.95	\$ 1.00
Bricklayer	30.91	0.95	0.95

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman \$ 21.65

OVERTIME PAY

See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

1500 hour terms at the following percentage of Journeyman's wage:

1st	2nd	3rd	4th
50%	60%	70%	80%

Supplemental benefits per hour:

1st term	\$ 13.75
2nd - 4th term	21.65

5-3h

Mason - Tile Finisher

08/01/2018

JOB DESCRIPTION Mason - Tile Finisher

DISTRICT 5

ENTIRE COUNTIES

Chautauqua

PARTIAL COUNTIES

Allegany: Entire County with the exception of the Towns of Alfred, Almond, Andover and Burns.
Cattaraugus: With the exception of the Township of Perrysburg and the Village of Gowanda.

WAGES

Per hour:	07/01/2018	07/01/2019	07/01/2020
Building:		Additional	Additional
Marble, Slate, Terrazzo and Tile Finisher	\$ 26.69	\$ 0.95	\$ 1.00

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour: \$ 17.27

OVERTIME PAY

See (B,E,E2*,Q) on OVERTIME PAGE

*Note - Or other conditions beyond the employer's control such as fire or natural disaster.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

1st and 2nd term 1200 hours and 3rd term 1300 hours at the following percentage of Journeyman's rate:

1st	2nd	3rd
\$13.65	\$16.16	\$21.49

Supplemental benefits per hour:

1st	2nd	3rd
\$ 8.23	\$ 10.14	\$ 13.64

5-3TF - Z2

Mason - Tile Finisher

08/01/2018

JOB DESCRIPTION Mason - Tile Finisher

DISTRICT 5

ENTIRE COUNTIES

Erie, Niagara, Orleans

PARTIAL COUNTIES

Cattaraugus: Only the Township of Perrysburg and the Village of Gowanda.

WAGES

Per hour: 07/01/2018

Building:

Marble, Slate, Terrazzo \$ 29.13
and Tile Finisher

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour: \$ 16.05

OVERTIME PAY

See (B,E,E2*,Q) on OVERTIME PAGE

*Note - Or other conditions beyond the employer's control such as fire or natural disaster.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

1200 hours 1st and 2nd term and 1300 hours 3rd term at the following wage:

1st	2nd	3rd
\$ 15.26	\$ 17.92	\$ 24.01

Supplemental benefits per hour:

1st	2nd	3rd
\$ 7.23	\$ 9.11	\$ 12.09

5-3TF - Z3

Mason - Tile Setter

08/01/2018

JOB DESCRIPTION Mason - Tile Setter

DISTRICT 5

ENTIRE COUNTIES

Erie, Niagara, Orleans

PARTIAL COUNTIES

Cattaraugus: Only in the Township of Perrysburg and the Village of Gowanda.

WAGES

Per hour: 07/01/2018
Building:
Marble, Slate, Terrazzo and Tile Setter \$ 31.57

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour: \$ 25.76

OVERTIME PAY

See (B,E,E2*,Q) on OVERTIME PAGE

*Note - Or other conditions beyond the employer's control such as fire or natural disaster.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

1250 hour terms at the following wage:

1st	2nd	3rd	4th
\$ 18.14	\$ 18.68	\$ 21.63	\$ 25.79

Supplemental benefits per hour:

1st	2nd	3rd	4th
\$ 10.43	\$ 17.08	\$ 19.19	\$ 20.72

5-3TS - Z3

Mason - Tile Setter

08/01/2018

JOB DESCRIPTION Mason - Tile Setter

DISTRICT 5

ENTIRE COUNTIES

Chautauqua

PARTIAL COUNTIES

Allegany: Entire County with the exception of the towns of Alfred, Almond, Andover and Burns.
Cattaraugus: With the exception of the Township of Perrysburg and the Village of Gowanda.

WAGES

Per hour:	07/01/2018	07/01/2019	07/01/2020
Building:		Additional	Additional
Marble, Slate, Terrazzo and Tile Setter	\$ 31.69	\$ 0.95	\$ 1.00

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman \$ 17.71

OVERTIME PAY

See (B,E,E2*,Q) on OVERTIME PAGE

*Note - Or other conditions beyond the employer's control such as fire or natural disaster.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

One year terms at the following percentage of Journeyman's wage:

1st	2nd	3rd	4th
\$15.32	\$19.43	\$21.70	\$24.53

Supplemental benefits per hour:

1st	2nd	3rd	4th
\$ 9.28	\$ 11.37	\$ 13.46	\$ 15.55

5-3TS - Z2

Millwright

08/01/2018

JOB DESCRIPTION Millwright

DISTRICT 7

ENTIRE COUNTIES

Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Herkimer, Madison, Seneca, Tioga, Yates

WAGES

Per Hour	07/01/2018	05/01/2019	07/01/2019 Additional	07/01/2020 Additional
Building	\$ 27.78	\$27.78	\$ 1.60	\$ 1.60
Heavy & Highway*	N/A	29.78	1.60	1.60

*Effective 5/1/2019, all Heavy and Highway Millwright construction will be paid at the rate indicated above.

NOTE - ADDITIONAL PREMIUMS PAID FOR THE FOLLOWING WORK LISTED BELOW (amount subject to any overtime premiums):

- Certified Welders shall receive \$1.75 per hour in addition to the current Millwright's rate, provided he/she is directed to perform certified welding.
- If a work site has been declared a hazardous site by the Owner and the use of protective gear (including, as a minimum, air purifying canister-type chemical respirators) is required, then that employee shall receive a \$1.50 premium per hour.
- An employee performing the work of a machinist shall receive \$2.00 per hour in addition to the current Millwright's rate. For the purpose of this premium to apply, a "machinist" is a person who uses a lathe, Bridgeport, milling machine or similar type of tool to make or modify parts.
- When performing work underground at 500 feet and below, the employee shall receive an additional \$0.25. This amount will increase to \$0.50 on 7/1/2019 and to \$1.00 on 7/1/2020.

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman \$ 20.85

OVERTIME PAY

See (B, E, *E2, Q) on OVERTIME PAGE

*Note - Saturday may be used as a make-up day and worked at the straight time rate of pay during a work week when conditions such as weather, power failure, fire, or natural disaster prevent the performance of work on a regular scheduled work day.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6) on HOLIDAY PAGE

NOTE: Any holiday that falls on Sunday shall be observed the following Monday. Any holiday that falls on a Saturday shall be observed the preceding Friday.

REGISTERED APPRENTICES

WAGES: (1) year terms at the following percentage of Journeyman's wage.

1st	2nd	3rd	4th
60%	70%	80%	90%

SUPPLEMENTAL BENEFITS per hour worked:

Appr. 1st year	\$ 10.15
Appr. 2nd year	17.65
Appr. 3rd year	18.71
Appr. 4th year	19.79

7-1163 Zone 2

Operating Engineer - Building

08/01/2018

JOB DESCRIPTION Operating Engineer - Building

DISTRICT 12

ENTIRE COUNTIES

Cattaraugus, Chautauqua, Erie, Orleans, Wyoming

PARTIAL COUNTIES

Genesee: Only that portion of the county that lies west of a line down the center of Route 98 excluding that area that lies within the City of Batavia.

WAGES

CLASS A: Air Hoist, All Boom Type Equipment, All Pans and Carry-Alls, Archer Hoist, Asphalt Curb and Gutter Machines, Asphalt Roller, Asphalt Spreader or Paver, Automatic Fine Grade Machine (CMI or similar, first and second operator), Backhoe and Pullhoe, Backhoe and Pullhoe (tractor mounted, rubber tired), Back Filling Machine, Belt Placer (CMI or similar type), Bending Machine (Pipe), Bituminous Spreader and Mixer, Blacktop Plants (Automated and Non-automated), Blast or Rotary Drill (Truck or Track Mounted), Blower for Burning Brush, Boiler (when used for power), Boom Truck (excluding pick-up and delivery), Boring Machine, Bulldozer, Cableway, Cage Hoist, Caisson Auger, Central Mix Plant (and all concrete batching plants), Cherry Picker, Concrete Cleaning Decontamination Machine Operator, Concrete Curb and Gutter Machine, Concrete Curing Machine, Concrete Cutters (Vermeer or Similar Type), Concrete Mixer (over 1/2 cu yd.), Concrete Pavement Spreaders and Finishers, Concrete Paver, Concrete Pump, Conveyor, Core Drill, Crane, Crusher, Decon of Equipment, Derrick, Dragline, Dredge, Drill Rig (Tractor Mounted), Dual Drum Paver, Electric Pump used in conjunction with Well Point Systems, Elevating Grader (self propelled or towed), Elevator, Excavator (all purpose, hydraulically operated), Farm Tractor with Accessories, Fine Grade Machine, Forklift, Front End Loader, Generator (10 outlets or more), Gradall, Grader, Grout or Guniting Machine, Head Tower, Heavy Equipment Robotics Operator/Mechanic, Helicopter (when used for hoisting), Hoist (one drum), Hoisting Engine, Horizontal Directional Drill Locator, Horizontal Directional Drill Operator, Hydraulic Boom, Hydraulic Hammer (self-propelled), Hydraulic Pipe Jack Machine (or similar type machine), Hydraulic Rock Expander (or similar type machine), Hydraulic System Pumps, Hydro Crane, Hydro Hammer (or similar type), Industrial Tractor, Jersey Spreader, Kolman Plant Loader (and similar type loaders), Laser Screed, Locomotive, Lubrication Truck, Maintenance Engineer, Maintenance, Lubrication Unit or Truck, Mine Hoist, Mixer for Stabilized Base (self-propelled), Monorail, Motorized Hydraulic Pin Puller, Motorized Hydraulic Seeder, Mucking Machine, Mulching Machine, Multiple Drum Hoist (more than one drum in use), Overhead Crane, Peine Crane (or similar type), Pile Driver, Plant Engineer, Pneumatic Mixer, Post Hole Digger and Driver, Power Broom, Pump Crete, Push Button Hoist, Push or Snatch Cat, Quarry Master or equivalent, Road Widener, Rock Bit Sharpener (all types), Roller (all), Rolling Machine (pipe), Rotomill, Scissors Trucks, Lift, or Boom Lift of any type (when used for hoisting), Scoopmobile, Shovel, SideBoom, Skidsteer/Bobcat (Similar Type), Skimmer, Slip Form Paver (CMI or similar type), Snorkel/Vacuum Truck, Strato-Tower, Stump Chipping Machine, Tire Truck and Drivers performing tire repair (exclude outside vendor), Towed Roller, Tractor Drawn Belt-Type Grader/Loader, Tractor Shovel, Tractor with Towed Accessories, Tractor (when using winch power), Tractors, Trencher, Truck Crane, Truck Mechanic and Helper (exclude Teamsters when repairing their own trucks), Tunnel Shovel, Tube Finisher (CMI and similar type), Ultra High Pressure Waterjet Cutting Tool System Operator/Mechanic, Vacuum Blasting Machine Operator/Mechanic, Vibratory Compactor, Vibro Tamp, Well Drilling Machine, Well Point, Winch, Winch Truck with A Frame.

CLASS B: Aggregate Bin, Aggregate Plant, Apprentice Engineer, Apprentice Engineer Driver, Articulated Off Road Material Hauler, Boiler (used in conjunction with production), CMI and similar type Concrete Spreads (Apprentice Engineer), Cement Bin, Chipping Machine and Chip Spreader, Compressors (4 or less), Compressors (any size, but subject to other provisions for Compressors, Dust Collectors, Generators, Mechanical Heaters, Pumps, Welding Machines - four of any type or combination), Concrete Mixer (1/2 cu. yd. and under), Fireman, Form Tamper, Form Trucks (excluding Teamster or delivery), Fuel Truck or Drivers (exclude Teamster or delivery), Heaters, Heating Boiler (used for temporary heat), Helper on Lubrication Unit or Truck, Jeep Trencher, Power Heaterman, Power Plant in excess of 10 K.W., Pumps, Revinus Widener, Steam Boilers (if manning or license by local law is required), Steam Cleaner (when used for cleaning equipment on the job site), Welding Machine (1 machine over 300 amps or 2 or 3 machines regardless of amps).

Operating Engineer- Building:

Per hour:	07/01/2018
Class A	\$ 36.86
Class B	32.38
Crane(boom over 100ft)	37.39
" (boom over 200ft)	37.86
" (boom over 300ft)	38.36

Additional \$3.00/hr. for Lattice Boom

Additional \$3.00/hr. for Hydraulic Crane over 60 tons.

Additional \$2.50/hr. for Hazardous Work Site

Additional \$1.00/hr. for Tunnel Work

Additional \$1.50/hr. for Mandated Off-Shift Work

SUPPLEMENTAL BENEFITS

Per Hour:

Journeyman \$ 28.45*

*Note: For Overtime Hours \$20.25 of this amount is paid a straight time, the remaining balance of \$8.20 is paid at the same premium as the wage.

OVERTIME PAY

See (B, E, *E2, P) on OVERTIME PAGE

* Only Saturdays between October 15th and April 15th.

HOLIDAY

Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (1) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

1 year Terms

1st	2nd	3rd	4th
\$26.70	\$27.59	\$28.47	\$29.36

Supplemental benefits Per Hour:

All Apprentices \$27.55*

*Note: For Overtime Hours \$20.25 of this amount to be paid a straight time rate
remaining balance of \$7.30 is paid at same premium as the wage.

12-17b

Operating Engineer - Heavy&Highway

08/01/2018

JOB DESCRIPTION Operating Engineer - Heavy&Highway

DISTRICT 12

ENTIRE COUNTIES

Cattaraugus, Chautauqua, Erie, Orleans, Wyoming

PARTIAL COUNTIES

Genesee: Only that portion of the county that lies west of a line down the center of Route 98 excluding that area that lies within the City of Batavia.

WAGES

CLASS A: Air Hoist, All Boom Type Equipment, All Pans and Carry-Alls, Asphalt Curb and Cutter Machines, Asphalt Roller, Asphalt Spreader or Paver, Automatic Fine Grade Machine (CMI or similar, first and second operator), Backhoe and Pullhoe (all), Back Filling Machine, Belt Placer (CMI or similar type), Bending Machine (pipe), Bituminous Spreader and Mixer, Blacktop Plant (all), Blast or Rotary Drill (Truck or Track Mounted), Blower for Burning Brush, Boiler (when used for power), Boom Truck, Boring Machine, Bulldozer, Cableway, Cage Hoist, Caisson Auger, Central Mix Plant (and all Concrete Batching Plants), Cherry Picker, Concrete Cleaning Decontamination Machine, Concrete Curb and Gutter Machine, Concrete Curing Machine, Concrete Mixer (over 1/2 cu. yd.), Concrete Pavement Spreaders and Finishers, Concrete Paver, Concrete Pump, Concrete Saw (self propelled), Conveyor, Conveying Vehicles Conveying Engineer's Equipment, Core Drill, Crane, Crusher, Decontamination of Equipment, Derrick, Dragline, Dredge, Drill Rig (Tractor Mounted), Dual Drum Paver, Electric Pump used in conjunction with Well Point Systems, Elevating Grader (self propelled or towed), Elevator, Excavator (all purpose, hydraulically operated), Farm Tractor with Accessories, Fine Grade Machine, Forklift, Front End Loader, Gradall, Grader, Grout or Gunite Machine, Head Tower, Heavy Equipment Robotics Operator/Mechanic, Hoist (all types), Hoisting Engine, Horizontal Directional Drill Locator, Horizontal Directional Drill Operator, Hydraulic Boom, Hydraulic Hammer (self propelled), Hydraulic Pipe Jack Machine, (or similar type machine), Hydraulic Rock Expander (or similar type machine), Hydraulic System Pumps, Industrial Tractor, Jersey Spreader, Kolman Plant Loader (and similar type Loaders), Laser Screed, Locomotive, Log Skidder (similar type), Maintenance Engineer, Maintenance, Lubrication Unit or Truck, Mine Hoist, Mixer for Stabilized Base (self propelled), Monorail, Motorized Hydraulic Pin Puller, Motorized Hydraulic Seeder, Mucking Machine, Mulching Machine, Overhead Crane, Parts Chasing, Peine Crane (or similar type), Pile Driver, Plant Engineer, Pneumatic Mixer, Post Hole Digger and Post Driver, Power Broom, Pump Crete, Push Button Hoist, Push or Snatch Cat, Quarry Master (or equivalent), Road Widener, Rock Bit Sharpener (all types), Roller (all), Rolling Machine (Pipe), Rotomill, Scoopmobile, Shovel, Side Boom, Skidsteer/Bobcat (similar type), Skimmer, Slip Form Paver (CMI or similar, first and second operator), Snorkel/Vacuum Truck, Strato-Tower, Tire Truck & Repair, Towed Roller, Tractor Drawn Belt-Type Grader/Loader, Tractor Shovel, Tractor with Towed Accessories, Tractors (when using winch power), Trencher, Truck Crane, Tug Boats, Tunnel Shovel, Tube Finisher (CMI and similar), Vacuum Blasting Machine Operator/Mechanic, Vibratory Compactor, Vibro Tamp, Waterjet Cutting Tool System Operator/Mechanic (Ultra High Pressure), Well Drilling Machine, Well Point, Winch, Winch Truck with A Frame.

CLASS B: Aggregate Bin, Aggregate Plant, Apprentice Engineer, Apprentice Engineer Driver, Articulated Off Road Material Hauler, CMI and similar type Concrete Spreads (Apprentice Engineer), Cement Bin, Chipping Machine and Chip Spreader, Compressors (4 or less), Compressors: any size, but subject to other provisions for Compressors, Dust Collectors, Generators, Mechanical Heaters, Pumps, Welding Machines (four of any type or combination), Concrete Mixer (1/2 cu. yd. and under), Fireman, Form Tamper, Fuel Truck, Heating Boiler (used for temporary heat), Helper on Lubrication Unit or Truck, Jeep Trencher, Power Heaterman, Power Plant in excess of 10 K.W., Pumps (4" or over), Revinus Widener, Steam Cleaner, Stump Chipping Machine, Welding Machine (1 machine over 300 amps or 2 or 3 machines regardless of amps).

Operating Engineer- Building Site, Heavy/Highway, Sewer/Water, Tunnel:

Per hour:	07/01/2018
Class A	\$ 38.09
Class B	33.59
Crane(boom over 100ft)	38.84
" (boom over 200ft)	39.09

" (boom over 300ft) 39.59

Additional \$3.00/hr. for Lattice Boom
Additional \$3.00/hr. for Hydraulic Crane over 60 tons
Additional \$2.50/hr. for Hazardous Work Site
Additional \$1.00/hr. for Tunnel Work
Additional \$1.50/hr. for Mandated Off-Shift Work

SUPPLEMENTAL BENEFITS

Per hour:

Journeyman \$ 30.31*

*Note: For Overtime Hours \$22.61 of the amount paid at straight time, the remaining balance of \$7.70 is paid at the same premium as the wage.

OVERTIME PAY

See (B, E, Q, T) on OVERTIME PAGE

HOLIDAY

Paid: See (*5, **6) on HOLIDAY PAGE

Overtime: See (***5, ****6) on HOLIDAY PAGE

*,** NOTE: If Holiday falls on a Sunday it will be celebrated on Monday

,* NOTE: If employee works that Monday use "T" under Overtime Pay.

REGISTERED APPRENTICES

Wages per hour:

Apprentices at 1 year terms

1st	2nd	3rd	4th
\$30.59	\$31.59	\$32.59	\$33.59

Supplemental Benefits

All Apprentices \$29.91*

Note: For Overtime Hours \$22.61 of this amount is paid at straight time , the remaining balance of \$7.30 is paid at the same premium as the wage.

12-17 hh/sw/t

Operating Engineer - Survey Crew

08/01/2018

JOB DESCRIPTION Operating Engineer - Survey Crew

DISTRICT 12

ENTIRE COUNTIES

Cattaraugus, Chautauqua, Erie, Orleans, Wyoming

PARTIAL COUNTIES

Genesee: Only that portion of the county that lies west of a line down the center of Route 98 excluding that area that lies within the City of Batavia.

WAGES

These rates apply to Building and Heavy Highway.

Per hour:

SURVEY CLASSIFICATIONS:

Party Chief - One who directs a survey party.

Instrument Person - One who operates the surveying instruments.

Rod Person - One who holds the rods and assists the Instrument Person.

07/01/2018

Party Chief	\$ 40.45
Instrument Person	38.17
Rod Person	26.48

Additional \$3.00 per hr. for work in a Tunnel.

Additional \$2.50 per hr. for EPA or DEC certified toxic or hazardous waste work.

SUPPLEMENTAL BENEFITS

Per hour worked:

Journeyman \$ 25.75

OVERTIME PAY

See (B, E, P, T) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

WAGES: 1000 hour terms for at percentage of Wage:

07/01/2018

0-1000 Hrs	60%
1001-2000 Hrs	70%
2001-3000 Hrs	80%

SUPPLEMENTAL BENEFITS per hour worked:

0-1000 Hrs	\$ 15.83
1001-2000 Hrs	18.48
2001-3000 Hrs	21.13

12-17D Sur

Operating Engineer - Survey Crew - Consulting Engineer

08/01/2018

JOB DESCRIPTION Operating Engineer - Survey Crew - Consulting Engineer

DISTRICT 12

ENTIRE COUNTIES

Cattaraugus, Chautauqua, Erie, Orleans, Wyoming

PARTIAL COUNTIES

Genesee: Only that portion of the county that lies west of a line down the center of Route 98 excluding that area that lies within the City of Batavia.

WAGES

These rates apply to feasibility and preliminary design surveying, line of grade surveying for inspection or supervision of construction when performed under a Consulting Engineer Agreement.

Per hour:

SURVEY CLASSIFICATIONS:

Party Chief - One who directs a survey party.

Instrument Person - One who operates the surveying instruments.

Rod Person - One who holds the rods and assists the Instrument Person.

07/01/2018

Party Chief	\$ 40.45
Instrument Person	38.17
Rod Person	26.48

SUPPLEMENTAL BENEFITS

Per hour worked:

Journeyman \$ 25.75

OVERTIME PAY

See (B, E, P, T) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

WAGES: 1000 hour terms based on the Percentage of Rod Persons Wage:

07/01/2018

0-1000	60%
1001-2000	70%
2001-3000	80%

SUPPLEMENTAL BENEFITS per hour worked:

0-1000	\$ 15.83
1001-2000	18.48
2001-3000	21.13

12-17D Con Eng

Painter

08/01/2018

JOB DESCRIPTION Painter

DISTRICT 3

ENTIRE COUNTIES

Allegany, Erie, Genesee, Niagara, Orleans, Wyoming

PARTIAL COUNTIES

Cattaraugus: Entire County except the Townships of Conewango, Leon, Napoli, New Albion, Randolph and South Valley.

Chautauqua: Only the Townships of Awkright, Dunkirk, Hanover, Pomfret, Portland, Sheridan and Villenova.

Livingston: Only the Townships of North Dansville, Nunda, Ossian, Portage, Sparta, Spring Water and West Sparta.

Steuben: Only the Townships of Avoca, Canisteo, Cohocton, Dansville, Fremont, Greenwood, Hartsville, Hornellsville, Howard, Jasper, Prattsburg, Pulteney, Troupsburg, Tuscarora, Urbana, Wayland, Wayne, Woodhull, West Union, Wheeler, and the City of Hornell.

WAGES

Per hour:	07/01/2018	05/01/2019
		Additional
Basic Rate (Brush & Roll)	\$ 25.95	\$ 1.00
Spray painting, wallcovering	25.95	1.00
Abrasive and hydroblasting	25.95	1.00
Taping/DryWall Finisher	26.45	1.00
Skeleton Steel*	26.70	1.00

* Skeleton Steel: No floors, walls or ceiling are constructed, including radio and television towers, flagpoles, smokestacks, cranes and the abatement of coatings with lead, asbestos and/or arsenic, etc. All work within the confines of a plant shall be paid the skeleton steel rate (except in-plant tank work (see Tank Rate)).

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour:

\$ 24.84

OVERTIME PAY

Exterior work only See (B, E4, F*, R) on OVERTIME PAGE.

All other work See (B, F*, R) on OVERTIME PAGE.

* Note - Saturday is payable at straight time if the employee misses work, except where a doctor's or hospital verification of illness is produced Monday through Friday when work was available to the employee.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

Painter/Decorator: 750 hour terms at the following percentage of Journeyman's Basic wage rate:

1st	2nd	3rd	4th	5th	6th	7th	8th
50%	55%	60%	65%	70%	75%	80%	90%

Taper/Drywall Finisher: 750 hour terms at the following percentage of Journeyman's Taper wage:

1st	2nd	3rd	4th	5th	6th
50%	55%	60%	65%	75%	85%

Supplemental benefits per hour:

Painter/Decorator and Taper/Drywall Finisher:

1st	2nd	3rd	4th	5th	6th	7th	8th
\$ 2.30	\$ 4.30	\$ 5.30	\$ 5.80	\$ 6.30	\$ 6.80	\$ 7.30	\$ 7.55

3-4-Buf, Nia, Olean

Painter

08/01/2018

JOB DESCRIPTION Painter

DISTRICT 3

ENTIRE COUNTIES

PARTIAL COUNTIES

Cattaraugus: Only the Townships of Conewango, Leon, Napoli, New Albion, Randolph and South Valley.
Chautauqua: Only the Townships of Busti, Carroll, Charlotte, Chautauqua, Cherry Creek, Clymer, Ellery, Ellicott, Ellington, French Creek, Gerry, Harmony, Kiantone, Mina, North Harmony, Poland, Ripley, Sherman, Stockton, Westfield and the City of Jamestown.

WAGES

Per hour:	07/01/2018	05/01/2019 Additional
Brush & Roller, taping,	\$ 25.65	\$ 1.00
wallcovering, swing & bosun	25.65	1.00
under 3 stories or under 35 ft	25.65	1.00
Swing & bosun over 3 stories or	25.90	1.00
over 35 feet, steel painting	25.90	1.00
All spraying, steam cleaning &	26.30	1.00
sandblasting, all toxic coating	26.30	1.00
Stacks	26.95	1.00

Four (4), ten (10) hour days may be worked at straight time during a week, Monday thru Thursday. Friday may be used as a make-up day.

NOTE - In order to use the '4 Day/10 Hour Work schedule', as your normal schedule, you must submit an 'Employer Registration for Use of 4 Day/10 Hour Work Schedule,' form PW30.1; and there must be a dispensation of hours in place on the project. If the PW30.1 is not submitted you may be liable for overtime payments for work over 8 hours per day.

SUPPLEMENTAL BENEFITS

Per hour:

\$ 17.58

OVERTIME PAY

Exterior work only See (B, E4, F*, R) on OVERTIME PAGE.

All other work See (B, F*, R) on OVERTIME PAGE.

* Note - Saturday is payable at straight time if the employee misses work, except where a doctor's or hospital verification of illness is produced Monday through Friday when work was available to the employee.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

Painter/Decorator: 750 hour terms at the following percentage of Journeyman's Basic wage rate:

1st	2nd	3rd	4th	5th	6th	7th	8th
50%	55%	60%	65%	70%	75%	80%	90%

Taper/Drywall Finisher: 750 hour terms at the following percentage of Journeyman's Taper wage:

1st	2nd	3rd	4th	5th	6th
50%	55%	60%	65%	75%	85%

Supplemental benefits per hour:

Painter/Decorator and Taper/Drywall Finisher:

1st	2nd	3rd	4th	5th	6th	7th	8th
\$ 2.30	\$ 4.30	\$ 5.30	\$ 5.80	\$ 6.30	\$ 6.80	\$ 7.30	\$ 7.55

3-4-Jamestown

Painter

08/01/2018

JOB DESCRIPTION Painter

DISTRICT 3

ENTIRE COUNTIES

Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Cortland, Delaware, Erie, Genesee, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Schuyler, Seneca, St. Lawrence, Steuben, Tioga, Tompkins, Wayne, Wyoming, Yates

WAGES

Per hour:	07/01/2018	05/01/2019 Additional
Bridge	\$ 38.00	\$ 1.05
Tunnel	38.00	1.05
Tank*	36.00	1.05

For Bridge Painting Contracts, ALL WORKERS on and off the bridge (including Flagmen) are to be paid Painter's Rate; the contract must be ONLY for Bridge Painting.

Tank rate applies to indoor and outdoor tanks, tank towers, standpipes, digesters, waste water treatment tanks, chlorinator tanks, etc. Covers all types of tanks including but not limited to steel tanks, concrete tanks, fiberglass tanks, etc.

Note an additional \$2.00 per hour is required when the contracting agency or project specification requires any shift to start prior to 6:00am or after 12:00 noon.

SUPPLEMENTAL BENEFITS

Per hour:

\$ 28.15

OVERTIME PAY

Exterior work only See (B, E4, F*, R) on OVERTIME PAGE.

All other work See (B, F*, R) on OVERTIME PAGE.

*Note - Saturday is payable at straight time if the employee misses work, except where a doctor's or hospital verification of illness is produced Monday through Friday when work was available to the employee.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

750 hour terms at the following percentage of Journeyman's wage rate:

1st	2nd	3rd	4th	5th	6th
50%	55%	60%	65%	75%	85%

Supplemental benefits per hour:

1st & 2nd terms	\$ 5.40
3rd & 4th terms	5.40
5th & 6th terms	6.40

3-4-Bridge, Tunnel, Tank

Painter - Metal Polisher

08/01/2018

JOB DESCRIPTION Painter - Metal Polisher

DISTRICT 8

ENTIRE COUNTIES

Albany, Allegany, Bronx, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Kings, Lewis, Livingston, Madison, Monroe, Montgomery, Nassau, New York, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Suffolk, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES

07/01/2018

Metal Polisher	\$ 30.58
Metal Polisher*	31.53
Metal Polisher**	34.08

*Note: Applies on New Construction & complete renovation

** Note: Applies when working on scaffolds over 34 feet.

SUPPLEMENTAL BENEFITS

Per Hour: 07/01/2018

Journeyworker:

All classification \$ 7.72

OVERTIME PAY

See (B, E, P, T) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 6, 11, 15, 16, 25, 26) on HOLIDAY PAGE

Overtime: See (5, 6, 9, 11, 15, 16, 25, 26) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

One (1) year term at the following wage rates:

	07/01/2018	01/01/2019
1st year	\$ 13.00	\$ 15.00
2nd year	13.00	15.00
3rd year	15.75	15.75
1st year*	\$ 15.39	\$ 17.39
2nd year*	15.44	17.44
3rd year*	16.29	18.29
1st year**	\$ 17.50	19.50
2nd year**	17.50	19.50
3rd year**	18.25	20.25

*Note: Applies on New Construction & complete renovation

** Note: Applies when working on scaffolds over 34 feet.

Supplemental benefits:
Per hour:

1st year	\$ 5.52	\$ 5.52
2nd year	5.52	5.52
3rd year	5.52	5.52

8-8A/28A-MP

Plumber

08/01/2018

JOB DESCRIPTION Plumber

DISTRICT 3

ENTIRE COUNTIES

PARTIAL COUNTIES

Allegany: Only the Townships of Alma, Amity, Bolivar, Clarksville, Cuba, Friendship, Genesee, Wirt and that portion of Scio which lies west of Rt. 19.

Cattaraugus: Only the Townships of Allegany, Carrollton, Conewango, Cold Spring, Great Valley, Hinsdale, Humphrey, Ischua, Little Valley, Napoli, Olean, Portville, Randolph, Red House, Salamanca, South Valley, the City of Olean, the City of Salamanca, and the Allegany Indian Reservation.

Chautauqua: Only the Townships of Busti, Carroll, Chautauqua, Clymer, Ellery, Ellicott, Ellington, French Creek, Gerry, Harmony, Kiantone, Mina, North Harmony, Poland, Sherman, and the City of Jamestown.

WAGES

Per hour: 07/01/2018

Plumber	\$ 32.56
Steamfitter	\$ 32.56

Note - Add 10% (ten-percent) to wage when HAZMAT training is required or when OSHA compliant respirator protection is required.

SUPPLEMENTAL BENEFITS

Per hour: \$ 25.31

Note - \$3.20 of this amount must be paid at the same premium as the wage.

OVERTIME PAY

See (*B, **E, Q) on OVERTIME PAGE

* Double time after 11 hours per day on Weekdays.

** Double time after 10 hours per day on Saturday.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 16) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

One year terms at the following percentage of Journeyman's wage:

1st	2nd	3rd	4th	5th
45%	55%	65%	75%	90%

Note - Add 10% (ten-percent) to wage when HAZMAT training is required or when OSHA compliant respirator protection is required.

Supplemental benefits per hour:

\$ 20.85

Note - \$3.20 of this amount must be paid at the same premium as the wage.

3-22-Southern

Plumber**08/01/2018**

JOB DESCRIPTION Plumber**DISTRICT 3****ENTIRE COUNTIES**

Erie, Niagara, Wyoming

PARTIAL COUNTIES

Allegany: Only the Townships of Allen, Angelica, Belfast, Caneadea, Centerville, Granger, Hume, New Hudson and Rushford

Cattaraugus: Only the Townships of Ashford, Dayton, East Otto, Ellicottville, Farmersville, Franklinville, Freedom, Leon, Lyndon, Machias, Mansfield, New Albion, Otto, Perrysburg, Persia and Yorkshire.

Chautauqua: Only the Townships of Arkwright, Charlotte, Cherry Creek, Dunkirk, Hanover, Pomfret, Portland, Ripley, Sheridan, Stockton, Villenova, Westfield, City of Dunkirk and Village of Fredonia.

Genesee: Only the Townships of Alabama, Alexander, Batavia, Darien, Elba, Oakfield, Pembroke and the City of Batavia.

Orleans: Only the Townships of Ridgeway, Shelby and Yates.

WAGES

Per hour: 07/01/2018

Plumber \$ 34.65

Steamfitter \$ 34.65

Note - Add 10% (ten-percent) to wage when HAZMAT training is required or when OSHA compliant respirator protection is required.

SUPPLEMENTAL BENEFITS

Per hour: \$ 25.31

Note - \$3.20 of this amount must be paid at the same premium as the wage.

OVERTIME PAY

See (*B, **E, Q) on OVERTIME PAGE

* Double time after 11 hours per day on Weekdays.

** Double time after 10 hours per day on Saturday.

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6, 16) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

One year terms at the following percentage of Journeyman's wage:

1st	2nd	3rd	4th	5th
45%	55%	65%	75%	90%

Note - Add 10% (ten-percent) to wage when HAZMAT training is required or when OSHA compliant respirator protection is required.

Supplemental benefits per hour:

\$ 20.85

Note - \$3.20 of this amount must be paid at the same premium as the wage.

3-22-Buffalo, Niagara

Roofer**08/01/2018**

JOB DESCRIPTION Roofer**DISTRICT 3****ENTIRE COUNTIES**

Allegany, Cattaraugus, Chautauqua

WAGES

Per hour: 07/01/2018 05/01/2019

Additional

Roofer \$ 30.48 \$ 1.00

Waterproofing 30.48 1.00

Asbestos Removal with respirator or protective suit add \$1.00 per hour.

SUPPLEMENTAL BENEFITS

Per hour: \$ 13.47

OVERTIME PAY

See (B, E, E2, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per hour:

750 hour terms at the following percentage of Journeyman's wage:

1st	2nd	3rd	4th	5th	6th
50%	50%	60%	70%	80%	90%

Supplemental benefits per hour:

1st & 2nd terms	\$ 0.50
All other terms	13.47

3-210

Sheetmetal Worker

08/01/2018

JOB DESCRIPTION Sheetmetal Worker

DISTRICT 3

ENTIRE COUNTIES

Cattaraugus, Chautauqua

WAGES

Per hour: 07/01/2018

Sheet Metal Worker \$ 27.00

Additional \$1.00 per hour for work performed at a height of fifty (50) feet or more on boatswains chair, swing (of any type), picks and plank.

The following premiums apply when shift work is mandated in the job specification or by the contracting agency:

15% when the majority of the hours are worked between the hours of 3:30PM - 1:00AM

20% when the majority of the hours are worked between the hours of 11:00PM - 9:00AM

SUPPLEMENTAL BENEFITS

Per hour: \$ 23.51

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

REGISTERED APPRENTICES

Wages per:

1000 hour year terms:

1st	2nd	3rd	4th	5th	6th	7th	8th
\$ 13.00	\$ 13.50	\$ 14.50	\$ 15.50	\$ 16.50	\$ 17.55	\$ 18.90	\$ 20.25

Supplemental Benefits

07/01/2018

1st term	\$ 11.91
2nd term	12.60
3rd term	14.70
4th term	15.51
5th term	16.35
6th term	17.17
7th term	18.01
8th term	18.82

3-112-Jamestown

Sprinkler Fitter

08/01/2018

JOB DESCRIPTION Sprinkler Fitter

DISTRICT 1

ENTIRE COUNTIES

Allegany, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Lewis, Livingston, Madison, Monroe, Montgomery, Niagara, Oneida, Onondaga, Ontario, Orleans, Oswego, Otsego, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Tioga, Tompkins, Washington, Wayne, Wyoming, Yates

WAGES

Per hour	07/01/2018	01/01/2019
Sprinkler	\$ 34.91	34.91
Fitter		

SUPPLEMENTAL BENEFITS

Per hour

Journeyman	\$ 23.14	23.69

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (1) on HOLIDAY PAGE

Overtime: See (5, 6) on HOLIDAY PAGE

Note: When a holiday falls on Sunday, the following Monday shall be considered a holiday and all work performed on either day shall be at the double time rate. When a holiday falls on Saturday, the preceding Friday shall be considered a holiday and all work performed on either day shall be at the double time rate.

REGISTERED APPRENTICES

Wages per hour

For Apprentices HIRED ON OR AFTER 04/01/2010:

One Half Year terms at the following percentage of journeyman's wage.

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
45%	50%	55%	60%	65%	70%	75%	80%	85%	90%

Supplemental Benefits per hour worked

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
\$ 8.93	\$ 8.97	\$ 17.09	\$ 17.13	\$ 17.68	\$ 17.72	\$ 17.77	\$ 17.81	\$ 17.86	\$ 17.90

For Apprentices HIRED ON OR AFTER 04/01/2013:

One Half Year terms at the following percentage of journeyman's wage.

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
45%	50%	55%	60%	65%	70%	75%	80%	85%	90%

Supplemental Benefits per hour worked

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
\$ 8.27	\$ 8.27	\$ 17.24	\$ 17.24	\$ 17.49	\$ 17.49	\$ 17.49	\$ 17.49	\$ 17.49	\$ 17.49

1-669

Teamster - Building / Heavy&Highway

08/01/2018

JOB DESCRIPTION Teamster - Building / Heavy&Highway

DISTRICT 3

ENTIRE COUNTIES

Cattaraugus, Chautauqua

PARTIAL COUNTIES

Allegany: Entire county except the Townships of Alfred, Almond, Burns and West Almond.

WAGES

GROUP 1: Warehousemen, Yardmen, Truck Helpers, Panel Trucks, Flatboy Material Trucks (straight jobs), Single Axle Dump Trucks, Dumpsters, Material Checkers and Receivers, Greasers, Truck Tiremen, Mechanics Helpers and Parts Chasers, Tandems and Batch Trucks, Mechanics, Dispatcher, Semi-Trailers, Low-boy Trucks, Asphalt Distributor Trucks, and Agitator, Mixer Trucks and Dumpcrete type vehicles, Truck Mechanic, Fuel Trucks.

GROUP 2: Specialized Earth Moving Equipment, Euclid type, or similar off-highway where not self-loading and self-contained concrete mobile unit, Off-highway Tandem Back-Dump, Twin Engine Equipment and Double-Hitched Equipment where not self-loading, Water Tanks, Sprinkler Trucks and Winch Trucks.

Per hour: 07/01/2018
GROUP 1 \$ 37.60
GROUP 2 37.60

Add \$ 2.00 when required to use personal protection when performing hazardous waste removal work.
Add \$ 2.00 while operating articulating truck.

SUPPLEMENTAL BENEFITS

Per hour:
\$ 13.94

OVERTIME PAY

See (B, E, Q) on OVERTIME PAGE

HOLIDAY

Paid: See (5, 20) on HOLIDAY PAGE
Overtime: See (5, 6) on HOLIDAY PAGE

3-264

Welder

08/01/2018

JOB DESCRIPTION Welder

DISTRICT 1

ENTIRE COUNTIES

Albany, Allegany, Bronx, Broome, Cattaraugus, Cayuga, Chautauqua, Chemung, Chenango, Clinton, Columbia, Cortland, Delaware, Dutchess, Erie, Essex, Franklin, Fulton, Genesee, Greene, Hamilton, Herkimer, Jefferson, Kings, Lewis, Livingston, Madison, Monroe, Montgomery, Nassau, New York, Niagara, Oneida, Onondaga, Ontario, Orange, Orleans, Oswego, Otsego, Putnam, Queens, Rensselaer, Richmond, Rockland, Saratoga, Schenectady, Schoharie, Schuyler, Seneca, St. Lawrence, Steuben, Suffolk, Sullivan, Tioga, Tompkins, Ulster, Warren, Washington, Wayne, Westchester, Wyoming, Yates

WAGES

Per hour 07/01/2018

Welder: To be paid the same rate of the mechanic performing the work.*

*EXCEPTION: If a specific welder certification is required, then the 'Certified Welder' rate in that trade tag will be paid.

OVERTIME PAY

HOLIDAY

1-As Per Trade

Overtime Codes

Following is an explanation of the code(s) listed in the OVERTIME section of each classification contained in the attached schedule. Additional requirements may also be listed in the HOLIDAY section.

NOTE: Supplemental Benefits are 'Per hour worked' (for each hour worked) unless otherwise noted

- (AA) Time and one half of the hourly rate after 7 and one half hours per day
- (A) Time and one half of the hourly rate after 7 hours per day
- (B) Time and one half of the hourly rate after 8 hours per day
- (B1) Time and one half of the hourly rate for the 9th & 10th hours week days and the 1st 8 hours on Saturday.
Double the hourly rate for all additional hours
- (B2) Time and one half of the hourly rate after 40 hours per week
- (C) Double the hourly rate after 7 hours per day
- (C1) Double the hourly rate after 7 and one half hours per day
- (D) Double the hourly rate after 8 hours per day
- (D1) Double the hourly rate after 9 hours per day
- (E) Time and one half of the hourly rate on Saturday
- (E1) Time and one half 1st 4 hours on Saturday; Double the hourly rate all additional Saturday hours
- (E2) Saturday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather
- (E3) Between November 1st and March 3rd Saturday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather, provided a given employee has worked between 16 and 32 hours that week
- (E4) Saturday and Sunday may be used as a make-up day at straight time when a day is lost during that week due to inclement weather
- (E5) Double time after 8 hours on Saturdays
- (F) Time and one half of the hourly rate on Saturday and Sunday
- (G) Time and one half of the hourly rate on Saturday and Holidays
- (H) Time and one half of the hourly rate on Saturday, Sunday, and Holidays
- (I) Time and one half of the hourly rate on Sunday
- (J) Time and one half of the hourly rate on Sunday and Holidays
- (K) Time and one half of the hourly rate on Holidays
- (L) Double the hourly rate on Saturday
- (M) Double the hourly rate on Saturday and Sunday
- (N) Double the hourly rate on Saturday and Holidays
- (O) Double the hourly rate on Saturday, Sunday, and Holidays
- (P) Double the hourly rate on Sunday
- (Q) Double the hourly rate on Sunday and Holidays
- (R) Double the hourly rate on Holidays
- (S) Two and one half times the hourly rate for Holidays, if worked

- (S1) Two and one half times the hourly rate the first 8 hours on Sunday or Holidays One and one half times the hourly rate all additional hours.
- (T) Triple the hourly rate for Holidays, if worked
- (U) Four times the hourly rate for Holidays, if worked
- (V) Including benefits at SAME PREMIUM as shown for overtime
- (W) Time and one half for benefits on all overtime hours.
- (X) Benefits payable on Paid Holiday at straight time. If worked, additional benefit amount will be required for worked hours. (Refer to other codes listed.)

Holiday Codes

PAID Holidays:

Paid Holidays are days for which an eligible employee receives a regular day's pay, but is not required to perform work. If an employee works on a day listed as a paid holiday, this remuneration is in addition to payment of the required prevailing rate for the work actually performed.

OVERTIME Holiday Pay:

Overtime holiday pay is the premium pay that is required for work performed on specified holidays. It is only required where the employee actually performs work on such holidays. The applicable holidays are listed under HOLIDAYS: OVERTIME. The required rate of pay for these covered holidays can be found in the OVERTIME PAY section listings for each classification.

Following is an explanation of the code(s) listed in the HOLIDAY section of each classification contained in the attached schedule. The Holidays as listed below are to be paid at the wage rates at which the employee is normally classified.

- (1) None
- (2) Labor Day
- (3) Memorial Day and Labor Day
- (4) Memorial Day and July 4th
- (5) Memorial Day, July 4th, and Labor Day
- (6) New Year's, Thanksgiving, and Christmas
- (7) Lincoln's Birthday, Washington's Birthday, and Veterans Day
- (8) Good Friday
- (9) Lincoln's Birthday
- (10) Washington's Birthday
- (11) Columbus Day
- (12) Election Day
- (13) Presidential Election Day
- (14) 1/2 Day on Presidential Election Day
- (15) Veterans Day
- (16) Day after Thanksgiving
- (17) July 4th
- (18) 1/2 Day before Christmas
- (19) 1/2 Day before New Years
- (20) Thanksgiving
- (21) New Year's Day
- (22) Christmas
- (23) Day before Christmas
- (24) Day before New Year's
- (25) Presidents' Day
- (26) Martin Luther King, Jr. Day
- (27) Memorial Day
- (28) Easter Sunday



New York State Department of Labor - Bureau of Public Work
State Office Building Campus
Building 12 - Room 130
Albany, New York 12240

REQUEST FOR WAGE AND SUPPLEMENT INFORMATION

As Required by Articles 8 and 9 of the NYS Labor Law

Fax (518) 485-1870 or mail this form for new schedules or for determination for additional occupations.

This Form Must Be Typed

Submitted By:

(Check Only One)

☐

Contracting Agency

☐

Architect or Engineering Firm

☐

Public Work District Office

Date:

A. Public Work Contract to be let by: (Enter Data Pertaining to Contracting/Public Agency)

1. Name and complete address ☐ (Check if new or change)

Telephone: ()

Fax: ()

E-Mail:

2. NY State Units (see Item 5)

☐ 01 DOT

☐ 02 OGS

☐ 03 Dormitory Authority

☐ 04 State University
Construction Fund

☐ 05 Mental Hygiene
Facilities Corp.

☐ 06 OTHER N.Y. STATE UNIT

☐ 07 City

☐ 08 Local School District

☐ 09 Special Local District, i.e.,
Fire, Sewer, Water District

☐ 10 Village

☐ 11 Town

☐ 12 County

☐ 13 Other Non-N.Y. State
(Describe)

3. SEND REPLY TO ☐ (check if new or change)
Name and complete address:

Telephone:()

Fax: ()

E-Mail:

4. SERVICE REQUIRED. Check appropriate box and provide project information.

☐ New Schedule of Wages and Supplements.

APPROXIMATE BID DATE :

☐ Additional Occupation and/or Redetermination

PRC NUMBER ISSUED PREVIOUSLY FOR
THIS PROJECT :

OFFICE USE ONLY

B. PROJECT PARTICULARS

5. Project Title

Description of Work

Contract Identification Number

Note: For NYS units, the OSC Contract No.

6. Location of Project:

Location on Site

Route No/Street Address

Village or City

Town

County

7. Nature of Project - Check One:

☐ 1. New Building

☐ 2. Addition to Existing Structure

☐ 3. Heavy and Highway Construction (New and Repair)

☐ 4. New Sewer or Waterline

☐ 5. Other New Construction (Explain)

☐ 6. Other Reconstruction, Maintenance, Repair or Alteration

☐ 7. Demolition

☐ 8. Building Service Contract

8. OCCUPATION FOR PROJECT :

☐ Construction (Building, Heavy
Highway/Sewer/Water)

☐ Tunnel

☐ Residential

☐ Landscape Maintenance

☐ Elevator maintenance

☐ Exterminators, Fumigators

☐ Fire Safety Director, NYC Only

☐ Guards, Watchmen

☐ Janitors, Porters, Cleaners,
Elevator Operators

☐ Moving furniture and
equipment

☐ Trash and refuse removal

☐ Window cleaners

☐ Other (Describe)

9. Has this project been reviewed for compliance with the Wicks Law involving separate bidding?

YES ☐

NO ☐

10. Name and Title of Requester

Signature



NEW YORK STATE DEPARTMENT OF LABOR
Bureau of Public Work - Debarment List

**LIST OF EMPLOYERS INELIGIBLE TO BID ON OR BE
AWARDED ANY PUBLIC WORK CONTRACT**

Under Article 8 and Article 9 of the NYS Labor Law, a contractor, sub-contractor and/or its successor shall be debarred and ineligible to submit a bid on or be awarded any public work or public building service contract/sub-contract with the state, any municipal corporation or public body for a period of five (5) years from the date of debarment when:

- Two (2) final determinations have been rendered within any consecutive six-year (6) period determining that such contractor, sub-contractor and/or its successor has WILLFULLY failed to pay the prevailing wage and/or supplements;
- One (1) final determination involves falsification of payroll records or the kickback of wages and/or supplements.

The agency issuing the determination and providing the information, is denoted under the heading 'Fiscal Officer'. DOL = New York State Department of Labor; NYC = New York City Comptroller's Office; AG = New York State Attorney General's Office; DA = County District Attorney's Office.

Debarment Database: To search for contractors, sub-contractors and/or their successors debarred from bidding or being awarded any public work contract or subcontract under NYS Labor Law Articles 8 and 9, or under NYS Workers' Compensation Law Section 141-b, access the database at this link: <https://applications.labor.ny.gov/EDList/searchPage.do>

For inquiries where WCB is listed as the "Agency", please call 1-866-546-9322

NYSDOL Bureau of Public Work Debarment List 08/07/2018

Article 8

AGENCY	Fiscal Officer	FEIN	EMPLOYER NAME	EMPLOYER DBA NAME	ADDRESS	DEBARMENT START DATE	DEBARMENT END DATE
DOL	DOL	*****0996	A-1 CONSTRUCTION & RENOVATION INC		1973 81ST ST - SUITE A-5 BROOKLYN NY 11214	01/08/2015	01/08/2020
DOL	NYC		ABDUL KARIM		C/O NORTH AMERICAN IRON W 1560 DECATUR STREETRIDGWOOD NY 11385	05/15/2015	05/15/2020
DOL	DOL	*****8488	ABELCRAFT OF NEW YORK CORP		640 ASHFORD AVENUE ARDSLEY NY 10502	08/27/2013	08/27/2018
DOL	DOL	*****4539	ACCOMPLISHED WALL SYSTEMS INC		112 OSCAWANA HEIGHTS ROAD PUTNAM VALLEY NY 10542	08/27/2013	08/27/2018
DOL	DOL	*****8018	ACCURATE MECHANICAL LLC		9547 BUSTLETON AVENUE PHILADELPHIA PA 19115	02/05/2014	02/05/2019
DOL	DOL		ACCURATE MECHANICAL OF PHILADELPHIA LLC		9547 BUSTLETON AVENUE PHILADELPHIA PA 19115	02/05/2014	02/05/2019
DOL	DOL	*****3344	ACT INC		6409 LAND O LAKES BLVD LAND O LAKES FL 34638	11/10/2015	11/10/2020
DOL	NYC		ADRIANA SELA	C/O COLONIAL ROOFING COMPANY INC	247 48TH STREET BROOKLYN NY 11220	02/05/2014	02/05/2019
DOL	DOL	*****1687	ADVANCED SAFETY SPRINKLER INC		261 MILL ROAD P O BOX 296EAST AURORA NY 14052	07/29/2015	07/29/2020
DOL	NYC	*****6775	ADVENTURE MASONRY CORP.		1535 RICHMOND AVENUE STATEN ISLAND NY 10314	12/13/2017	12/13/2022
DOL	DOL		AJ TORCHIA		10153 ROBERTS RD SAUQUOIT NY 13456	08/09/2016	08/09/2021
DOL	DOL	*****3344	ALL CATASTROPHE CONSTRUCTION TEAM INC	ACT INC	6409 LAND O LAKES BLVD LAND O LAKES FL 34638	11/10/2015	11/10/2020
DOL	DOL	*****8740	ALLSTATE ENVIRONMENTAL CORP		C/O JOSE MONTAS 27 BUTLER PLACEYONKERS NY 10710	03/18/2011	03/19/2020
DOL	DOL		AMADEO J TORCHIA	TORCHIA'S HOME IMPROVEMENT	10153 ROBERTS RD SAUQUOIT NY 13456	08/09/2016	08/09/2021
DOL	NYC		ANISUL ISLAM		C/O RELIANCE GENERAL CONS 644 OCEAN PARKWAYBROOKLYN NY 11230	09/02/2015	09/02/2020
DOL	DOL	*****7004	ANNEX CONTRACTING LTD		3005 WYNSUM AVENUE MERRICK NY 11566	08/18/2014	08/18/2019
DOL	DOL	*****7004	ANNEX GENERAL CONTRACTING INC		3005 WYNSUM AVENUE MERRICK NY 11566	08/18/2014	08/18/2019
DOL	DA		ANTHONY CARDINALE		58-48 59TH STREET MASPETH NY 11378	05/16/2012	05/08/2020
DOL	DOL		ANTHONY J MINGARELLI JR		C/O T & T CONCRETE INC 2560 HAMBURG TURNPIKELACKAWANNA NY 14218	07/08/2015	07/08/2020
DOL	DOL		ANTHONY PERGOLA		3 WEST MAIN ST/SUITE 208 ELMSFORD NY 10323	01/23/2017	01/23/2022
DOL	DOL		ANTONIO ESTIVEZ		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL	*****3020	APCO CONTRACTING CORP		24 SOUTH MARYLAND AVENUE PORT WASHINGTON NY 11050	09/24/2012	09/02/2020
DOL	DOL	*****3219	APOLLO CONSTRUCTION SERVICES CORP	APOLLO PAINTING CO	157 TIBBETTS ROAD YONKERS NY 10705	03/12/2014	03/12/2019
DOL	DOL		APOLLO PAINTING CO		157 TIBBETTS ROAD YONKERS NY 10705	03/12/2014	03/12/2019
DOL	DOL	*****3295	APOLLO PAINTING CORP		3 ALAN B SHEPART PLACE YONKERS NY 10705	03/12/2014	03/12/2019
DOL	AG	*****0194	APPLIED CONSTRUCTION INC		46 RUGBY ROAD WESTBURY NY 11590	11/20/2013	11/20/2018
DOL	NYC	*****8403	AQUA JET PAINTING CORP		10 VIKING DRIVE WEST ISLIP NY 11795	04/16/2014	04/16/2019
DOL	NYC	*****9232	ARKAY CONSTRUCTION INC		102-104 GREYLOCK AVENUE BELLEVILLE NJ 07109	07/15/2015	07/15/2020
DOL	DOL	*****3953	ASCAPE LANDSCAPE & CONSTRUCTION CORP		634 ROUTE 303 BLAUVELT NY 10913	07/26/2012	11/19/2018
DOL	NYC	*****4779	ASTORIA GENERAL CONTRACTING CORP		35-34 31ST STREET LONG ISLAND CITY NY 11106	09/02/2015	09/02/2020
DOL	NYC	*****7217	ASTRO COMMUNICATIONS OF NY CORP		79 ALEXANDER AVE- STE 36A BRONX NY 10454	10/30/2015	10/30/2020

NYSDOL Bureau of Public Work Debarment List 08/07/2018

Article 8

DOL	NYC	*****6046	ATLANTIC SUN CONSTRUCTION CORP		58-46 59TH AVENUE MASPETH NY 11378	05/08/2015	05/08/2020
DOL	NYC	*****6683	ATLAS RESTORATION CORP.		35-12 19TH AVENUE ASTORIA NY 11105	08/02/2017	08/02/2022
DOL	NYC		AUDLEY O'BRIEN		1273 NORTH AVENUE/#1 CP NEW ROCHELLE NY 10804	04/07/2015	04/07/2020
DOL	DOL		AVIS R HILL		3510 HICKORY WALK LANE ELLENWOOD GA 32094	01/22/2015	01/22/2020
DOL	AG		AVTAR SINGH		116-24 127TH STREET SOUTH OZONE PARK NY 11420	12/22/2015	12/22/2020
DOL	AG		BALDEV SINGH		116-24 127TH STREET SOUTH OZONE PARK NY 11420	12/22/2015	12/22/2020
DOL	DOL		BARBARA CASSIDY		7 BLENIS PLACE VALHALLA NY 10595	04/02/2015	04/02/2020
DOL	DOL		BARRY KINNEY		6409 LAND O LAKES BLVD LAND O LAKES FL 34638	11/10/2015	11/10/2020
DOL	NYC	*****3915	BEACON RESTORATION INC		SUITE B-8 782 PELHAM PARKWAY SOUTHBRONX NY 10462	04/21/2016	04/21/2021
DOL	DOL		BEVERLY F WILLIAMS		1238 PRESIDENT STREET BROOKLYN NY 11225	11/18/2013	11/18/2018
DOL	DOL		BIAGIO CANTISANI			06/12/2018	06/12/2023
DOL	DOL	*****4512	BOB BRUNO EXCAVATING, INC.		5 MORNINGSIDE DRIVE AUBURN NY 13021	11/15/2016	11/15/2021
DOL	DOL	*****4512	BOB BRUNO EXCAVATING, INC.		5 MORNINGSIDE DRIVE AUBURN NY 13021	11/15/2016	11/15/2021
DOL	DOL	*****8551	BRANDY'S MASONRY		216 WESTBROOK STREET P O BOX 304SAYRE PA 18840	08/09/2016	08/09/2021
DOL	NYC	*****6555	BROOKLYN WELDING CORP		1273 NORTH AVENUE/ #1 CP NEW ROCHELLE NY 10804	04/07/2015	04/07/2020
DOL	DOL	*****1449	BRRESTORATION NY INC		140 ARCADIA AVENUE OSWEGO NY 13126	09/12/2016	09/12/2021
DOL	DOL		BRUCE MORSEY		C/O KENT HOLLOW SIDING LL 29A BRIDGE STREETNEW MILFORD CT 06776	01/15/2016	01/15/2021
DOL	DOL	*****6156	C & J LANDSCAPING & MAINTENANCE INC		520 PINE HILL ROAD CHESTER NY 10940	06/23/2014	06/23/2019
DOL	DOL	*****8809	C.B.E. CONTRACTING CORPORATION		310 MCGUINNESS BLVD GREENPOINT NY 11222	03/07/2017	03/07/2022
DOL	DOL		CANTISANI & ASSOCIATES LTD		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CANTISANI HOLDING LLC			06/12/2018	06/12/2023
DOL	DOL		CARIBBEAN POOLS		C/O DOUGLAS L MALARKEY 64 VICTORIA DRIVEBINGHAMTON NY 13904	02/04/2016	02/04/2021
DOL	DOL	*****3812	CARMODY "2" INC			06/12/2018	06/12/2023
DOL	DOL	*****1143	CARMODY BUILDING CORP	CARMODY CONTRACTIN G AND CARMODY CONTRACTIN G CORP.	442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CARMODY CONCRETE CORPORATION			06/12/2018	06/12/2023
DOL	DOL		CARMODY ENTERPRISES, LTD.		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CARMODY INC		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL	*****3812	CARMODY INDUSTRIES INC			06/12/2018	06/12/2023
DOL	DOL		CARMODY MAINTENANCE CORPORATION		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		CARMODY MASONRY CORP		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	NYC	*****9172	CASSIDY EXCAVATING INC		14 RAILROAD AVENUE VALHALLA NY 10595	05/15/2014	04/02/2020
DOL	DOL	*****6745	CATSKILL FENCE INSTALLATIONS INC		5445 ROUTE 32 CATSKILL NY 12414	08/22/2014	08/22/2019
DOL	DOL	*****8530	CAZ CONTRACTING CORP		37-11 35TH AVENUE LONG ISLAND CITY NY 11101	08/26/2013	08/26/2018
DOL	DOL	*****8809	CBE CONTRACTING CORP		142 EAST MARKET STREET LONG BEACH NY 11561	03/07/2017	03/07/2022

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DOL	AG		CESAR J. AGUDELO		81-06 34TH AVENUE APT. 6EJACKSON HEIGHTS NY 11372	02/07/2018	02/07/2023
DOL	DOL	*****7655	CHAMPION CONSTRUCTION SERVICES CORP		2131 SCHENECTADY AVENUE BROOKLYN NY 11234	11/18/2015	11/18/2020
DOL	NYC		CHARLES CASSIDY JR		14 RAILROAD AVENUE VALHALLA NY 10595	05/15/2014	04/02/2020
DOL	DOL		CHARLES ZIMMER JR		216 WESTBROOK STREET P O BOX 304SAYRE PA 18840	08/09/2016	08/09/2021
DOL	DOL		CHRISTINE J HEARNE		C/O CJ-HEARNE CONSTRUCTIO 131 PONCE DE LEON AVE NEATLANTA GA 30308	12/01/2015	12/01/2020
DOL	DOL	*****3360	CITY LIMITS GROUP INC		2279 HOLLERS AVENUE BRONX NY 10475	01/07/2014	06/23/2019
DOL	DOL	*****0671	CJ-HEARNE CONSTRUCTION CO		SUITE 204 131 PONCE DE LEON AVENUEATLANTA GA 30308	12/01/2015	12/01/2020
DOL	NYC	*****2905	COLONIAL ROOFING COMPANY INC		247 48TH STREET BROOKLYN NY 11220	02/05/2014	02/05/2019
DOL	NYC	*****3182	COLORTECH INC		5990 58TH AVENUE MASPETH NY 11378	11/18/2013	11/18/2018
DOL	DOL	*****2703	CONKLIN'S TECH- MECHANICAL INC		5 PARKER AVENUE POUGHKEEPSIE NY 12601	03/25/2014	03/25/2019
DOL	DOL		CONSTANTINOS ZERVAS		37-11 35TH AVENUE LONG ISLAND CITY NY 11101	08/26/2013	08/26/2018
DOL	NYC	*****4468	CRAFT CONTRACTING GROUP INC		3256 BRUNER AVENUE BRONX NY 10469	07/29/2014	07/29/2019
DOL	NYC	*****8507	CRAFT FENCE INC		3256 BRUNER AVENUE BRONX NY 10469	07/29/2014	07/29/2019
DOL	NYC	*****2164	CREATIVE TRUCKING INC		58-83 54TH STREET MASPETH NY 11378	02/26/2016	02/26/2021
DOL	DOL	*****7761	D L MALARKEY CONSTRUCTION		64 VICTORIA DRIVE BINGHAMTON NY 13904	02/04/2016	02/04/2021
DOL	DOL	*****7888	D L MALARKEY CONSTRUCTION INC		64 VICTORIA DRIVE BINGHAMTON NY 13904	02/04/2016	02/04/2021
DOL	DOL	*****5629	DAKA PLUMBING AND HEATING LLC		2561 ROUTE 55 POUGHQUAG NY 12570	02/19/2016	02/19/2021
DOL	DOL		DANICA IVANOSKI		61 WILLETT ST. PASSAIC NJ 07503	10/26/2016	10/26/2021
DOL	DOL		DARYL T RIEKS		C/O RIEKS CONTRACTING LLC 4804 GAHWILER ROADAUBURN NY 13021	05/01/2015	05/01/2020
DOL	NYC	*****7707	DASSLE CONTRACTING INC		213-37 39TH AVE/SUITE 120 BAYSIDE NY 11360	05/08/2015	05/08/2020
DOL	DOL		DAVID MARTINEZ		C/O EMPIRE TILE INC 6 TREMONT COURTHUNTINGTON STATION NY 11746	03/08/2016	03/08/2021
DOL	NYC		DAWN AVILA AKA DAWN BECHTOLD		1ST FLOOR STORE FRONT 88-10 LITTLE NECK PARKWAYFLORAL PARK NY 11001	06/24/2014	06/24/2019
DOL	NYC		DAWN BECHTOLD AKA DAWN AVILA		1ST FLOOR STORE FRONT 88-10 LITTLE NECK PARKWAYFLORAL PARK NY 11001	06/24/2014	06/24/2019
DOL	DOL		DEAN ROBBINS III		212 OXFORD WAY SCHENECTADY NY 12309	12/11/2012	09/16/2018
DOL	DOL		DEBBIE STURDEVANT		29 MAPLEWOOD DRIVE BINGHAMTON NY 13901	02/21/2017	02/21/2022
DOL	AG		DEBRA MARTINEZ		31 BAY ST BROOKLYN NY 11231	03/28/2018	03/28/2023
DOL	NYC	*****3865	DECOMA BUILDING CORPORATION		134 EVERGREEN PL/STE 101 EAST ORANGE NJ 07018	12/30/2013	12/30/2018
DOL	DOL		DEDA GAZIVODAN		C/O DAKA PLUMBING AND H 2561 ROUTE 55POUGHQUAG NY 12570	02/19/2016	02/19/2021
DOL	DOL	*****1446	DELTA CONTRACTING PAINTING AND DECORATING INC		437 SUNRISE HIGHWAY WEST BABYLON NY 11707	08/12/2013	08/12/2018
DOL	DOL	*****3538	DELTA CONTRACTING PAINTING AND DESIGN INC		75 MCCULLOCH DRIVE DIX HILLS NY 11746	10/19/2010	08/12/2018
DOL	DOL		DENNIS SCHWANDTNER		C/O YES SERVICE AND REPAI 145 LODGE AVEHUNTINGTON STATION NY 11476	08/09/2016	08/09/2021
DOL	DOL	*****9868	DESANTIS ENTERPRISES		161 OSWEGO RIVER ROAD PHOENIX NY 13135	09/24/2013	11/18/2018

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DOL	DOL		DF CONTRACTORS OF ROCHESTER, INC.		1835 DAANSEN RD. PALMYRA NY 14522	05/16/2017	05/16/2022
DOL	DOL		DF CONTRACTORS, INC.		1835 DAANSEN RD. PALMYRA NY 14522	05/16/2017	05/16/2022
DOL	DOL	*****9252	DI BERNARDO TILE AND MARBLE CO INC		15 WALKER WAY ALBANY NY 12205	03/21/2014	03/21/2019
DOL	NYC		DIMITRIOS KOUTSOUKOS		C/O ASTORIA GENERAL CONTR 35-34 31ST STREETLONG ISLAND CITY NY 11106	09/02/2015	09/02/2020
DOL	NYC		DIMITRIOS TSOUMAS		35-12 19TH AVENUE ASTORIA NY 11105	08/02/2017	08/02/2022
DOL	DOL	*****3242	DONALD R. FORSAY	DF LAWN SERVICE	1835 DAANSEN RD. PALMYRA NY 14522	05/16/2017	05/16/2022
DOL	DOL		DONALD R. FORSAY		1835 DAANSEN RD. PALMYRA NY 14522	05/16/2017	05/16/2022
DOL	DOL		DORIS SKODA		C/O APCO CONTRACTING CORP 24 SOUTH MARYLAND AVENUEPORT WASHINGTON NY 11050	09/24/2012	09/02/2020
DOL	NYC	*****7404	DOSANJH CONSTRUCTION CORP		9439 212TH STREET QUEENS VILLAGE NY 11428	02/25/2016	02/25/2021
DOL	DOL		DOUGLAS L MALARKEY	MALARKEY CONSTRUCTION	64 VICTORIA DRIVE B INGHAMTON NY 13904	02/04/2016	02/04/2021
DOL	DOL	*****6982	DUFOUR GROUP INC	DUFOUR MASONRY	353 WEST 56TH STREET #7M NEW YORK NY 10019	06/10/2014	06/10/2019
DOL	DOL		DUFOUR MASONRY		353 WEST 56TH ST #7M NEW YORK NY 10019	06/10/2014	06/10/2019
DOL	DOL		DUFOUR MASONRY & RESTORATION INC		353 WEST 56TH STREET #7M NEW YORK NY 10019	06/10/2014	06/10/2019
DOL	DOL	*****5840	DYNA CONTRACTING INC		363 88TH STREET BROOKLYN NY 11209	11/18/2013	11/18/2018
DOL	DOL		E C WEBB		6409 LAND O LAKES BLVD LAND O LAKES FL 34638	11/10/2015	11/10/2020
DOL	DOL		EARL GALBREATH		640 ASHFORD AVENUE ARDSLEY NY 10502	08/27/2013	08/27/2018
DOL	DOL		EARL L WILSON	WILSON BROTHER DRYWALL CONTRACTORS	36 ABERSOLD STREET ROCHESTER NY 14621	08/31/2015	08/31/2020
DOL	DOL	*****1496	EAST COAST DRYWALL INC		1238 PRESIDENT STREET BROOKLYN NY 11225	11/18/2013	11/18/2018
DOL	DOL		EAST COAST PAVING		2238 BAKER RD GILLET PA 16923	03/12/2018	03/12/2023
DOL	NYC		EDWARD MENKEN		C/O AQUA JET PAINTING 10 VIKING DRIVEWEST ISLIP NY 11795	04/16/2014	04/16/2019
DOL	NYC	*****0900	EF PRO CONTRACTING INC		147 BROOME AVENUE ATLANTIC BEACH NY 11509	03/03/2014	03/03/2019
DOL	NYC		EFSTRATIOS BERNARDIS		23-73 48TH STREET LONG ISLAND CITY NY 11103	04/24/2014	04/24/2019
DOL	DOL		ELIZABETH RAMADANI		C/O RAMADA CONSTRUCTION 80 SAVO LOOPSTATEN ISLAND NY 10309	01/07/2014	01/07/2019
DOL	DOL		ELLEN DESANTIS	DESANTIS ENTERPRISES	161 OSWEGO RIVER ROAD PHOENIX NY 13135	09/24/2013	11/18/2018
DOL	DOL	*****0780	EMES HEATING & PLUMBING CONTR		5 EMES LANE MONSEY NY 10952	01/20/2002	01/20/3002
DOL	AG		EMILIO FRANZA		90 JUNIUS STREET BROOKLYN NY 11212	01/23/2014	01/23/2019
DOL	DOL		EMPIRE CONCRETE SERVICES LLC		101 SULLYS TRAIL/SUITE 20 PITTSFORD NY 14534	11/18/2013	01/07/2019
DOL	DOL	*****0511	EMPIRE CONCRETE SYSTEMS LLC		101 SULLYS TRAIL/ SUITE 2 PITTSFORD NY 14534	11/18/2013	01/07/2019
DOL	DOL	*****2353	EMPIRE CONSTRUCTORS LLC		101 SULLYS TRAIL/SUITE 20 PITTSFORD NY 14534	11/18/2013	01/07/2019
DOL	DOL		EMPIRE PRECAST LLC		101 SULLYS TRAIL/SUITE 20 PITTSFORD NY 14534	11/18/2013	01/07/2019
DOL	DOL	*****3270	EMPIRE TILE INC		6 TREMONT COURT HUNTINGTON STATION NY 11746	03/08/2016	03/08/2021
DOL	NYC		EVERTON CARLESS		134 EVERGREEN PL/STE 101 EAST ORANGE NJ 07018	12/30/2013	12/30/2018
DOL	DOL	*****7403	F & B PAINTING CONTRACTING INC		2 PARKVIEW AVENUE HARRISON NY 10604	09/26/2016	09/26/2021

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DOL	DOL		F KALAFATIS		2279 HOLLERS AVENUE BRONX NY 10475	01/07/2014	06/23/2019
DOL	DOL		FANTASTIC PAINTING		493 LANSING ROAD FULTONVILLE NY 12072	11/18/2013	11/18/2018
DOL	DOL		FAY MATTHEW		C/O CHAMPION CONSTRUCTION 2131 SCHENECTADY AVENUE BROOKLYN NY 11234	11/18/2015	11/18/2020
DOL	DOL		FAZIA GINA ALI-MOHAMMED	C/O CHAMPION CONSTRUCTI ON	2131 SCHENECTADY AVENUE BROOKLYN NY 11234	11/18/2015	11/18/2020
DOL	DOL	*****1311	FLOZ-ON PAINTING & DECORATING INC		12 DUNDERBERG ROAD TOMKINS NY 10986	10/16/2013	10/16/2018
DOL	DOL	*****8961	FLOZ-ON PAINTING INC		12 DUNDERBERG ROAD TOMKINS NY 10986	10/16/2013	10/16/2018
DOL	DOL		FRAN MICELI		2279 HOLLERS AVENUE BRONX NY 10475	01/07/2014	06/23/2019
DOL	DOL		FRANCES KALAFATIS		2279 HOLLERS AVENUE BRONX NY 10475	01/07/2014	06/23/2019
DOL	DOL		FRANCES KALAFATIS-MICELI		2279 HOLLERS AVENUE BRONX NY 10475	01/07/2014	06/23/2019
DOL	DOL		FRANK BENEDETTO		C/O F & B PAINTING CONTRA 2 PARKVIEW AVENUE HARRISON NY 10604	09/26/2016	09/26/2021
DOL	DOL		FRANK DEMARTINO		101-61 99TH STREET OZONE PARK NY 11416	02/15/2017	02/15/2022
DOL	DOL		FRANK DEMARTINO		101-61 99TH STREET OZONE PARK NY 11416	02/15/2017	02/15/2022
DOL	DOL		FRANK J MERCANDO		134 MURRAY AVENUE YONKERS NY 10704	12/11/2009	02/03/2019
DOL	DOL		FRANK MICELI JR	C/O FRANK MICELI JR CONTRACTIN G INC	19 CLIFF STREET NEW ROCHELLE NY 10801	10/16/2013	10/16/2018
DOL	DOL	*****1321	FRANK MICELI JR CONTRACTING INC		19 CLIFF STREET NEW ROCHELLE NY 10801	10/16/2013	10/16/2018
DOL	DOL	*****2724	FRESH START PAINTING CORP		157 TIBBETS ROAD YONKERS NY 10705	03/12/2014	03/12/2019
DOL	DOL		G FUCCI CONSTRUCTION SERVICES		3 ALAN B SHEPARD PLACE YONKERS NY 10705	03/12/2014	03/12/2019
DOL	DOL	*****6767	G FUCCI PAINTING INC		C/O SPIEGEL & UTRERA 1 MAIDEN LANE - 5TH FL NEW YORK NY 10038	03/12/2014	03/12/2019
DOL	DOL	*****4546	GAF PAINTING LLC		157 TIBBETS ROAD YONKERS NY 10705	03/12/2014	03/12/2019
DOL	DOL		GALINDA ROTENBERG		C/O GMDV TRANS INC 67-48 182ND STREET FRESH MEADOWS NY 11365	06/24/2016	06/24/2021
DOL	DOL		GARDEN STATE PAINTING		157 TIBBETTS ROAD YONKERS NY 10705	03/12/2014	03/12/2019
DOL	DOL		GEORGE DI BERNARDO		C/O DI BERNARDO TILE 15 WALKER WAY ALBANY NY 12205	03/21/2014	03/21/2019
DOL	DA		GEORGE LUCEY		150 KINGS STREET BROOKLYN NY 11231	01/19/1998	01/19/2998
DOL	DOL	*****5674	GMDV TRANS INC		67-48 182ND STREET FRESH MEADOWS NY 11365	06/24/2016	06/24/2021
DOL	DOL	*****0090	GOLDS FLOORING INSTALLATIONS INC		25 HAMILTON ROAD MONTICELLO NY 12701	10/16/2013	10/16/2018
DOL	DOL		GREGORY A FUCCI		C/O PAF PAINTING SERVICES 157 TIBBETTS ROAD YONKERS NY 10705	03/12/2014	03/12/2019
DOL	DOL		GREGORY FUCCI JR		C/O APOLLO CONSTRUCTION 157 TIBBETTS ROAD YONKERS NY 10705	03/12/2014	03/12/2019
DOL	DOL		GREGORY S. OLSON		P.O BOX 100 200 LATTA BROOK PARK HORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	NYC	*****0346	H N H CONTRACTORS CORP		4558 BROADWAY # 6 NEW YORK NY 10040	08/04/2014	08/04/2019
DOL	DOL		HALSSAM FOSTOK		5 HANSEN PLACE WAYNE NJ 07470	09/18/2013	09/18/2018
DOL	NYC		HAMEEDUL HASAN		240 HOME STREET TEANECK NJ 07666	08/04/2014	08/04/2019
DOL	AG	*****9918	HARA ELECTRIC CORP		2461 47TH STREET ASTORIA NY 11103	09/26/2013	09/26/2018
DOL	NYC		HARMEL SINGH		15 CLINTON LANE HICKSVILLE NY 11801	02/25/2016	02/25/2021

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DOL	NYC		HAROLD KUEMMEL		58-83 54TH STREET MASPETH NY 11378	02/26/2016	02/26/2021
DOL	AG		HARVINDER SINGH PAUL		90 JUNIUS STREET BROOKLYN NY 11212	01/23/2014	01/23/2019
DOL	DOL		HENRY VAN DALRYMPLE		2663 LANTERN LANE ATLANTA GA 30349	12/01/2015	12/01/2020
DOL	DOL	*****6370	HILLIANO CONSTRUCTION & ELECTRICAL INC		354 MAGNOLIA STREET ROCHESTER NY 14611	01/22/2015	01/22/2020
DOL	DOL	*****8282	IDEMA DEVELOPMENT INC		91 COLLEGE AVENUE POUGHKEEPSIE NY 12603	12/04/2015	12/04/2020
DOL	DOL	*****8282	IDEMA GENERAL CONTRACTORS INC		91 COLLEGE AVENUE POUGHKEEPSIE NY 12603	12/04/2015	12/04/2020
DOL	DOL	*****7001	INTEGRATED CONSTRUCTION & POWER SYSTEMS INC		SUITE 100 2105 W GENESEE STREETS YRACUSE NY 13219	01/06/2016	01/06/2021
DOL	AG		J A M CONSTRUCTION CORP		SUITE 125 265 SUNRISE HIGHWAY ROCKVILLE CENTRE NY 10457	04/07/2016	04/07/2021
DOL	DOL	*****7598	J M RICH LLC		P O BOX 268 STILLWATER NY 12170	09/16/2013	03/21/2019
DOL	DOL	*****3478	J N P CONSTRUCTION CORP		50 LOUIS COURT P O BOX 1907 SOUTH HACKENSACK NY 07606	03/21/2014	03/21/2019
DOL	DOL		J N RICH LLC		P O BOX 268 STILLWATER NY 12170	09/16/2013	03/21/2019
DOL	DOL	*****4910	J V MAGIC TOUCH CORPORATION		94-25 57TH AVENUE, APT 5G ELMHURST NY 11373	01/12/2015	01/12/2020
DOL	DOL		J.A. HIRES CADWALLADER		P.O BOX 100 200 LATT A BROOK PARK HORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL		JACQUELINE HOWE		C/O FLOZ-ON PAINTING INC 12 DUNDERBERG ROAD TOMKINS NY 10986	10/16/2013	10/16/2018
DOL	DOL	*****8627	JAG I LLC		635 LUZERNE ROAD QUEENSBURY NY 12804	09/16/2013	09/16/2018
DOL	DOL	*****2868	JAG INDUSTRIES INC		175 BROAD ST - SUITE 320 GLENS FALLS NY 12801	09/16/2013	09/16/2018
DOL	DOL		JAMES B RHYNDERS		91 COLLEGE AVENUE POUGHKEEPSIE NY 12603	12/04/2015	12/04/2020
DOL	DOL		JAMES BOYCE		C/O EMPIRE CONCRETE SYST 101 SULLYS TRAIL/SUITE 20 PITTSFORD NY 14534	11/18/2013	01/07/2019
DOL	DOL		JAMES E RHYNDERS		91 COLLEGE AVENUE POUGHKEEPSIE NY 12603	12/04/2015	12/04/2020
DOL	AG		JAMES FALCONE		SUITE 125 265 SUNRISE HIGHWAY ROCKVILLE CENTRE NY 10457	04/07/2016	04/07/2021
DOL	DOL		JAMES RHYNDERS SR		91 COLLEGE AVENUE POUGHKEEPSIE NY 12603	12/04/2015	12/04/2020
DOL	DOL		JAMES SICKAU		3090 SHIRLEY ROAD NORTH COLLINS NY 14111	04/19/2011	07/08/2020
DOL	DOL		JASON M RICH		P O BOX 268 STILLWATER NY 12170	09/16/2013	03/21/2019
DOL	DOL		JASON W MILLIMAN		C/O ROCHESTER ACOUSTICAL P O BOX 799 HILTON NY 14468	02/19/2016	02/19/2021
DOL	DOL		JEFF P BRADLEY		520 PINE HILL ROAD CHESTER NY 10940	06/23/2014	06/23/2019
DOL	NYC		JEFFREY CASSIDY		14 RAILROAD AVENUE VALHALLA NY 10595	05/15/2014	04/02/2020
DOL	DOL		JERALD HOWE		C/O FLOZ-ON PAINTING INC 12 DUNDERBERG ROAD TOMKINS NY 10986	10/16/2013	10/16/2018
DOL	DOL		JEROME LACITIGNOLA		C/O CATSKILL FENCE INSTAL 5445 ROUTE 32 CATSKILL NY 12414	08/22/2014	08/22/2019
DOL	DOL		JESSICA WHITESIDE		C/O BR RESTORATION NY INC 140 ARCADIA AVENUE OSWEGO NY 13126	09/12/2016	09/12/2021
DOL	AG		JOHN ANTHONY MASSINO		36-49 204TH STREET BAYSIDE NY 11372	02/07/2018	02/07/2023
DOL	DOL		JOHN DESCUL		437 SUNRISE HIGHWAY A WEST BABYLON NY 11704	08/12/2013	08/12/2018
DOL	DOL		JOHN F. CADWALLADER		200 LATT A BROOK PARK HORSEHEADS NY 14845	03/08/2018	03/08/2023

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DOL	DOL	*****4612	JOHN F. CADWALLADER, INC.	THE GLASS COMPANY	P O BOX 100 200 LATTA BROOK PARKHORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	AG	*****0600	JOHNCO CONTRACTING, INC.		36-49 204TH STREET BAYSIDE NY 11372	02/07/2018	02/07/2023
DOL	DOL		JON E DEYOUNG		261 MILL ROAD P O BOX 296EAST AURORA NY 14052	07/29/2015	07/29/2020
DOL	DOL		JORGE VILLALOBOS		94-25 57TH AVENUE - APT 5 ELMHURST NY 11373	01/12/2015	01/12/2020
DOL	DOL		JOSE MONTAS		27 BUTLER PLACE YONKERS NY 10710	03/18/2011	03/19/2020
DOL	AG		JOSEPH FALCONE		SUITE 125 265 SUNRISE HIGHWAYROCKVILLE CENTRE NY 10457	04/07/2016	04/07/2021
DOL	DOL	*****9273	JOSEPH M LOVETRO		P O BOX 812 BUFFALO NY 14220	08/09/2016	08/09/2021
DOL	NYC		JOSEPH MARTINO		1535 RICHMOND AVENUE STATEN ISLAND NY 10314	12/13/2017	12/13/2022
DOL	DOL		JOSEPH MARTONE		112 OSCAWANA HEIGHTS ROAD PUTNAM VALLEY NY 10542	08/27/2013	08/27/2018
DOL	DOL		JOSHUA DEBOWSKY		9547 BUSTLETON AVENUE PHILADELPHIA PA 19115	02/05/2014	02/05/2019
DOL	DOL		JOYA MUSCOLINO		10 ST CHARLES STREET THORNWOOD NY 10594	09/03/2013	09/03/2018
DOL	DOL		JUANA MARTINEZ		C/O LEAD CONSTRUCTION 27 BUTLER PLACEYONKERS NY 10710	03/19/2015	03/19/2020
DOL	DOL	*****4340	JUBCO SITE DEVELOPMENT LLC		462 LAKEVIEW AVENUE VALHALLA NY 10595	12/16/2013	12/16/2018
DOL	DOL		JULIUS AND GITA BEHREND		5 EMES LANE MONSEY NY 10952	11/20/2002	11/20/3002
DOL	DOL	*****5062	K R F SITE DEVELOPMENT INC		375 LAKE SHORE DRIVE PUTNAM VALLEY NY 10579	01/23/2017	01/23/2022
DOL	NYC		KATHLEEN SELA	C/O COLONIAL ROOFING COMPANY INC	247 48TH STREET BROOKLYN NY 11220	02/05/2014	02/05/2019
DOL	DOL		KATIE BURDICK		2238 BAKER RD GILLET PA 16923	03/12/2018	03/12/2023
DOL	DOL		KENNETH FIORENTINO		375 LAKE SHORE DRIVE PUTNAM VALLEY NY 10579	01/23/2017	01/23/2022
DOL	DOL	*****9732	KENT HOLLOW SIDING LLC		29A BRIDGE STREET NEW MILFORD CT 06776	01/15/2016	01/15/2021
DOL	DOL		KEVIN BABCOCK JR		P O BOX 46 THOMPSON RIDGE NY 10985	08/22/2014	08/22/2019
DOL	DOL		KEVIN M BABCOCK		P O BOX 46 THOMPSON RIDGE NY 10985	08/22/2014	08/22/2019
DOL	DOL		KIM SOROCENSKI		C/O SOLUTION MATTERS INC 198 NORWOOD ROADPORT JEFFERSON NY 11776	11/19/2015	11/19/2020
DOL	AG		KOSTAS "GUS" ANDRIKOPOULOS		2461 47TH STREET ASTORIA NY 11103	09/26/2013	09/26/2018
DOL	DA	*****8816	LAKE CONSTRUCTION AND DEVELOPMENT CORPORATION		150 KINGS STREET BROOKLYN NY 11231	08/19/1998	08/19/2998
DOL	DOL	*****6224	LAKESIDE FIRE SPRINKLERS LLC		125 CHAUTAUQUA AVENUE LAKEWOOD NY 14750	06/24/2015	06/24/2020
DOL	AG	*****4643	LALO DRYWALL, INC.		221 OLD FORD ROAD NEW PLATZ NY 12561	05/20/2016	05/20/2021
DOL	DOL	*****4505	LARAPINTA ASSOCIATES INC		29 MAPLEWOOD DRIVE BINGHAMTON NY 13901	02/21/2017	02/21/2022
DOL	DOL		LAURI MARTONE		112 OSCAWANA HEIGHTS ROAD PUTNAM VALLEY NY 10542	08/27/2013	08/27/2018
DOL	DOL		LAVERN GLAVE		161 ROBYN RD MONROE NY 10950	09/15/2014	09/15/2019
DOL	DOL		LAVERN GLAVE		161 ROBYN RD MONROE NY 10950	01/30/2018	01/30/2023
DOL	DOL		LAWRENCE J RUGGLES		P O BOX 371 ROUND LAKE NY 12151	05/12/2014	05/12/2019
DOL	DOL	*****1364	LEAD CONSTRUCTION SERVICES INC		3 ALAN B SHEPARD PLACE YONKERS NY 10705	03/19/2015	03/19/2020
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	06/24/2016	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	06/24/2016	09/19/2022

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DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	01/17/2017	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL	*****4388	LEN.J CONSTRUCTION, LLC		PO BOX 10007 ALBANY NY 12201	08/14/2017	09/19/2022
DOL	AG		LEONID FRIDMAN		APT 5 200 BRIGHTON, 15TH STBROOKLYN NY 11235	01/23/2014	01/23/2019
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	09/19/2017	09/19/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	08/14/2017	08/14/2022
DOL	DOL		LEROY NELSON JR		PO BOX 10007 ALBANY NY 12201	01/17/2017	09/19/2022
DOL	DOL		LINDSEY R CRILL		143 FILLMORE AVENUE BUFFALO NY 14210	01/08/2015	01/08/2020
DOL	AG	*****4216	LOTUS-C CORP.		81-06 34TH AVENUE APT. 6EJACKSON HEIGHTS NY 11372	02/07/2018	02/07/2023
DOL	AG		LUIS MARTINEZ	LALO DRYWALL	211 MAIN ST. NEW PALTZ NY 12561	05/20/2016	05/20/2021
DOL	NYC	*****2850	M A 2 FLAGS CONTRACTING CORP		25-18 100TH STREET EAST ELMHURST NY 11369	08/21/2013	08/21/2018
DOL	DOL		M ANVER BEIG		142 EAST MARKET STREET LONG BEACH NY 11561	03/07/2017	03/07/2022
DOL	AG	*****6957	M B DIN CONSTRUCTION INC		8831 20TH AVENUE/SUITE 6E BROOKLYN NY 11214	11/17/2015	11/17/2020
DOL	NYC	*****6317	M S QUALITY CONSTRUCTION LLC		27 MAPLEWOOD AVENUE COLONIA NJ 07067	02/04/2015	02/04/2020
DOL	DOL		M. ANVER BEIG		142 EAST MARKET STREET LONG BEACH NY 11561	03/07/2017	03/07/2022
DOL	NYC		MACIEJ SONTOWSKI		27 MAPLEWOOD AVENUE COLONIA NJ 07067	02/04/2015	02/04/2020
DOL	NYC	*****9590	MACK GLASSNAUTH IRON WORKS INC		137 LIBERTY AVENUE BROOKLYN NY 11212	12/21/2015	12/21/2020
DOL	NYC	*****3141	MACKIE REED ELECTRIC INC		1ST FLOOR STORE FRONT 88-10 LITTLE NECK PARKWAYFLORAL PARK NY 11001	06/24/2014	06/24/2019
DOL	DOL	*****1784	MADISON AVE CONSTRUCTION CORP		39 PENNY STREET WEST ISLIP NY 11795	11/02/2016	11/02/2021
DOL	DOL		MALARKEY'S BAR & GRILL LLC		64 VICTORIA DRIVE BINGHAMTON NY 13904	02/04/2016	02/04/2021
DOL	DOL	*****0705	MALARKEY'S PUB & GRUB LLC		64 VICTORIA DRIVE BINGHAMTON NY 13904	02/04/2016	02/04/2021
DOL	DA		MANUEL P TOBIO		150 KINGS STREET BROOKLYN NY 14444	08/19/1998	08/19/2998
DOL	DA		MANUEL TOBIO		150 KINGS STREET BROOKLYN NY 11231	08/19/1998	08/19/2998
DOL	DOL		MARIACHI'S PIZZERIA		C/O DOUGLAS L MALARKEY 64 VICTORIA DRIVEBINGHAMTON NY 13904	02/04/2016	02/04/2021
DOL	DOL		MARK MIONIS		6409 LAND O LAKES BLVD LAND O LAKES FL 34638	11/10/2015	11/10/2020
DOL	DOL	*****5533	MARQUISE CONSTRUCTION & DEVELOPMENT CORP		10 ST CHARLES STREET THORNWOOD NY 10594	09/03/2013	09/03/2018
DOL	DOL	*****8810	MARQUISE CONSTRUCTION ASSOCIATES INC		20 BOSWELL ROAD PUTNAM VALLEY NY 10579	09/03/2013	09/03/2018
DOL	DOL	*****1134	MARQUISE CONSTRUCTION CORP		10 ST CHARLES STREET THORNWOOD NY 10594	09/03/2013	09/03/2018
DOL	DOL		MARVIN A STURDEVANT		29 MAPLEWOOD DRIVE BINGHAMTON NY 13901	02/21/2017	02/21/2022
DOL	DOL		MASONRY CONSTRUCTION, INC.		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023

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DOL	DOL	*****3333	MASONRY INDUSTRIES, INC.		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL		MATTHEW IDEMA GENERAL CONTRACTORS INC		91 COLLEGE AVENUE POUGHKEEPSIE NY 12603	12/04/2015	12/04/2020
DOL	DOL		MAURICE GAWENO		442 ARMONK RD MOUNT KISCO NY 10549	06/12/2018	06/12/2023
DOL	DOL	*****6416	MCCALL MASONRY		P O BOX 304 SAYRE PA 18840	08/09/2016	08/09/2021
DOL	DOL	*****4259	MERCANDO CONTRACTING CO INC		134 MURRAY AVENUE YONKERS NY 10704	12/11/2009	02/03/2019
DOL	DOL	*****0327	MERCANDO INDUSTRIES LLC		134 MURRAY AVENUE YONKERS NY 10704	12/11/2009	02/03/2019
DOL	NYC	*****5330	METRO DUCT SYSTEMS INC		1219 ASTORIA BOULEVARD LONG ISLAND CITY NY 11102	04/16/2014	11/19/2020
DOL	DOL	*****3368	MICEK CONSTRUCTION CO INC		20 CROSS STREET FALCONER NY 14733	12/02/2014	12/02/2019
DOL	DOL		MICHAEL A PASCARELLA		SUITE 100 2105 WEST GENESEE STREET SYRACUSE NY 13219	01/06/2016	01/06/2021
DOL	NYC		MICHAEL HIRSCH		C/O MZM CORP 163 S MAIN STREET NEW CITY NY 10956	01/28/2016	01/28/2021
DOL	DOL		MICHAEL KTISTAKIS		363 88TH STREET BROOKLYN NY 11209	11/18/2013	11/18/2018
DOL	AG		MICHAEL RIGLIETTI		31 BAY ST BROOKLYN NY 11231	03/28/2018	03/28/2023
DOL	DOL		MICHAEL WILSON	WILSON BROTHER DRYWALL CONTRACTOR S	36 ABERSOLD STREET ROCHESTER NY 14621	08/31/2015	08/31/2020
DOL	DOL		MICHELLE L BARBER		635 LUZERNE ROAD QUEENSBURY NY 12804	09/16/2013	09/16/2018
DOL	NYC		MIGUEL ACOSTA		25-18 100TH STREET EAST ELMHURST NY 11369	08/21/2013	08/21/2018
DOL	NYC		MILANCE HADZIC		22 CALIFORNIA AVE - STE 1 PATERSON NJ 07503	03/11/2015	03/11/2020
DOL	AG		MOHAMMAD RIAZ		46 RUGBY ROAD WESTBURY NY 11590	11/20/2013	11/20/2018
DOL	AG		MOHAMMED N CHATHA		8831 20TH AVENUE/SUITE 6E BROOKLYN NY 11214	11/17/2015	11/17/2020
DOL	DOL	*****2737	MOUNTAIN'S AIR INC		2471 OCEAN AVENUE- STE 7A BROOKLYN NY 11229	09/24/2012	09/18/2020
DOL	AG		MSR ELECTRICAL CONSTRUCTION CORP.		31 BAY ST BROOKLYN NY 11231	03/28/2018	03/28/2023
DOL	DOL		MUHAMMAD BEIG		142 EAST MARKET STREET LONG BEACH NY 11561	03/07/2017	03/07/2022
DOL	DOL		MUHAMMAD BEIG		142 EAST MARKET STREET LONG BEACH NY 11561	03/07/2017	03/07/2022
DOL	DOL		MUHAMMAD PERVAIZ		C/O CHAMPION CONSTRUCTION 2131 SCHENECTADY AVENUE BROOKLYN NY 11234	11/18/2015	11/18/2020
DOL	NYC	*****3613	MZM CORP		163 S MAIN STREET NEW CITY NY 10956	01/28/2016	01/28/2021
DOL	NYC	*****1284	NEW AMERICAN RESTORATION INC		22 CALIFORNIA AVE - STE 1 PATERSON NJ 07503	03/11/2015	03/11/2020
DOL	DA	*****6988	NEW YORK INSULATION INC		58-48 59TH STREET MASPETH NY 11378	05/16/2012	05/08/2020
DOL	NYC	*****4839	NEW YORK RIGGING CORP		58-83 54TH STREET MASPETH NY 11378	02/26/2016	02/26/2021
DOL	NYC		NICHOLAS PROVENZANO		147 BROOME AVENUE ATLANTIC BEACH NY 11509	03/03/2014	03/03/2019
DOL	NYC		NICHOLAS PROVENZANO		147 BROOME AVENUE ATLANTIC BEACH NY 11509	03/03/2014	03/03/2019
DOL	NYC	*****1968	NORTH AMERICAN IRON WORKS INC		1560 DECATUR STREET RIDGWOOD NY 11385	05/15/2015	05/15/2020
DOL	DOL	*****6966	NORTH COUNTRY DRYWALL AND PAINT		23167 COUNTY ROUTE 59 DEXTER NY 13634	10/24/2016	10/24/2021
DOL	DOL	*****0065	NORTHEAST LANDSCAPE AND MASONRY ASSOC		3 WEST MAIN ST/SUITE 208 ELMSFORD NY 10523	01/23/2017	01/23/2022
DOL	DOL	*****1845	OC ERECTERS, LLC A/K/A OC ERECTERS OF NY INC.		1207 SW 48TH TERRACE DEERFIELD BEACH FL 33442	01/16/2018	01/16/2023
DOL	NYC	*****8337	OPTIMUM CONSTRUCTION INC		23-73 48TH STREET LONG ISLAND CITY NY 11103	04/24/2014	04/24/2019

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DOL	NYC		ORSON ARROYO		C/O METRO DUCT SYSTEMS 12-19 ASTORIA BOULEVARDLONG ISLAND CITY NY 11102	04/16/2014	11/19/2020
DOL	DOL	*****4546	PAF PAINTING CORP		161 TIBBETTS ROAD YONKERS NY 10705	03/12/2014	03/12/2019
DOL	DOL	*****5242	PAF PAINTING SERVICES INC	GARDEN STATE PAINTING	157 TIBBETTS ROAD YONKERS NY 10103	03/12/2014	03/12/2019
DOL	DOL		PAF PAINTING SERVICES OF WESTCHESTER INC		C/O SPIEGEL & UTRERA 1 MAIDEN LANE - 5TH FLNEW YORK NY 10038	03/12/2014	03/12/2019
DOL	DOL	*****8802	PAT'S HEATING AND AIR CONDITIONING LTD		P O BOX 371 ROUND LAKE NY 12151	05/12/2014	05/12/2019
DOL	DOL		PATRICIA M RUGGLES		P O BOX 371 ROUND LAKE NY 12151	05/12/2014	05/12/2019
DOL	NYC	*****9422	PELIUM CONSTRUCTION, INC.		22-33 35TH ST. ASTORIA NY 11105	12/30/2016	12/30/2021
DOL	DOL		PETER M PERGOLA		3 WEST MAIN ST/SUITE 208 ELMSFORD NY 10523	01/23/2017	01/23/2022
DOL	NYC		PETER TRITARIS		5990 58TH AVENUE MASPETH NY 11378	11/18/2013	11/18/2018
DOL	DOL		PIERRE LAPORT		224 COUNTY HIGHWAY 138 BROADALBIN NY 12025	03/07/2017	03/07/2022
DOL	DOL	*****1543	PJ LAPORT FLOORING INC		224 COUNTY HIGHWAY 138 BROADALBIN NY 12025	03/07/2017	03/07/2022
DOL	DOL	*****2989	PROFESSIONAL ESTIMATING & BUSINESS CORP		157 TIBBETS ROAD YONKERS NY 10705	03/12/2014	03/12/2019
DOL	DOL	*****6895	PROLINE CONCRETE OF WNY INC		3090 SHIRLEY ROAD NORTH COLLINS NY 14111	04/19/2011	07/08/2020
DOL	DA	*****6817	QUADRANT METAL BUILDINGS LLC		2740 SW MARTIN DOWNS BLVD PALM CITY FL 34990	08/25/2016	08/25/2021
DOL	DOL	*****0015	RAMADA CONSTRUCTION CORP		80 SAVO LOOP STATEN ISLAND NY 10309	01/07/2014	01/07/2019
DOL	NYC		RAMESHWAR ASU		137 LIBERTY AVENUE BROOKLYN NY 11212	12/21/2015	12/21/2020
DOL	DOL		RANA A KAHN		1973 81ST ST - SUITE A-5 BROOKLYN NY 11214	01/08/2015	01/08/2020
DOL	NYC		RANTIK PARIKH		13 LORIANN ROAD WARREN NJ 07059	07/15/2015	07/15/2020
DOL	DOL	*****2633	RAW POWER ELECTRIC CORP		3 PARK CIRCLE MIDDLETOWN NY 10940	09/16/2013	09/15/2019
DOL	DOL	*****2633	RAW POWER ELECTRIC CORP		3 PARK CIRCLE MIDDLETOWN NY 10940	01/30/2018	01/30/2023
DOL	NYC		RAYMOND PEARSON		P O BOX 957 PORT JEFFERSON STA NY 11776	03/12/2014	03/12/2019
DOL	AG	*****7015	RCM PAINTING INC.		69-06 GRAND AVENUE 2ND FLOORMASPETH NY 11378	02/07/2018	02/07/2023
DOL	DOL		REGINALD WARREN		161 ROBYN RD MONROE NY 10950	09/15/2014	09/15/2019
DOL	DOL		REGINALD WARREN		161 ROBYN RD MONROE NY 10950	01/30/2018	01/30/2023
DOL	NYC	*****3461	RELIANCE GENERAL CONSTRUCTION INC		644 OCEAN PARKWAY BROOKLYN NY 11230	09/02/2015	09/02/2020
DOL	DOL		REVOLUTIONARY FLOORS LLC		P O BOX 268 STILLWATER NY 12170	09/16/2013	03/21/2019
DOL	DOL		RHINO CONCRETE LLC		101 SULLYS TRAIL/SUITE 20 PITTSFORD NY 14534	11/18/2013	01/07/2019
DOL	DA		RIANN MULLER		2740 SW MARTIN DOWNS BLVD PALM CITY FL 34990	08/25/2016	08/25/2021
DOL	DOL		RICHARD WILSON		C/O DUFOUR GROUP INC 353 WEST 56TH STREET #7MNEW YORK NY 10019	06/10/2014	06/10/2019
DOL	DOL	*****8618	RIEKS CONTRACTING LLC		4804 GAHWILER ROAD AUBURN NY 13021	05/01/2015	05/01/2020
DOL	DOL		ROBBYE BISSEAR		89-51 SPRINGFIELD BLVD QUEENS VILLAGE NY 11427	01/11/2003	01/11/3003
DOL	DOL		ROBERT BRUNO		3 GAYLORD ST AUBURN NY 13021	11/15/2016	11/15/2021
DOL	DOL	*****1855	ROBERT D BISHOP JR	ROBERT D BISHOP JR	P O BOX 112 MORRISONVILLE NY 12962	07/15/2014	07/15/2019
DOL	DOL		ROBERT D BISHOP JR		P O BOX 112 MORRISONVILLE NY 12962	07/15/2014	07/15/2019

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DOL	NYC		ROBERT GUIDO		3256 BRUNER AVENUE BRONX NY 10469	07/29/2014	07/29/2019
DOL	DOL		ROBERT TORDELLA		125 CHAUTAUQUA AVENUE LAKEWOOD NY 14750	06/24/2015	06/24/2020
DOL	DOL	*****3859	ROCHESTER ACOUSTICAL CORP		P O BOX 799 HILTON NY 14468	02/19/2016	02/19/2021
DOL	NYC		RODNEY SCOTT		201 HEMPSTEAD AVENUE WEST HEMPSTEAD NY 11552	10/30/2015	10/30/2020
DOL	DOL		ROMEO WARREN		161 ROBYN RD MONROE NY 10950	09/16/2013	09/15/2019
DOL	DOL		ROMEO WARREN		161 ROBYN RD MONROE NY 10950	01/30/2018	01/30/2023
DOL	DOL		ROSEANNE CANTISANI			06/12/2018	06/12/2023
DOL	DOL		ROSS J MUSCOLINO		10 ST CHARLES STREET THORNWOOD NY 10594	09/03/2013	09/03/2018
DOL	DOL		RYAN ALBIE		21 S HOWELLS POINT ROAD BELLPORT NY 11713	02/21/2017	02/21/2022
DOL	DOL	*****3347	RYAN ALBIE CONTRACTING INC		21 S HOWELLS POINT ROAD BELLPORT NY 11713	02/21/2017	02/21/2022
DOL	NYC		SABIR MUHAMMED		SUITE B-8 782 PELHAM PARKWAY SOUTHBRONX NY 10462	04/21/2016	04/21/2021
DOL	NYC		SAEED HASAN		4558 BROADWAY #6 NEW YORK NY 10040	08/04/2014	08/04/2019
DOL	NYC	*****2117	SCOTT ELECTRICAL LLC		201 HEMPSTEAD AVENUE WEST HEMPSTEAD NY 11552	10/30/2015	10/30/2020
DOL	DOL	*****9751	SCW CONSTRUCTION		544 OLD ROUTE 23 ACRE NY 12405	02/14/2017	02/14/2022
DOL	DOL		SEAN BURBAGE	C/O SEAN BURBAGE CORP	445 ROOSA GAP ROAD BLOOMINGBURG NY 12721	04/14/2014	04/14/2019
DOL	DOL	*****6586	SEAN BURBAGE CORP		445 ROOSA GAP ROAD BLOOMINGBURG NY 12721	04/14/2014	04/14/2019
DOL	AG		SERGIO RAYMUNDO		109 DUBOIS RD. NEW PALTZ NY 12561	05/20/2016	05/20/2021
DOL	DOL	*****1961	SHANE BURDICK	CENTRAL TRAFFIC CONTROL, LLC.	2238 BAKER ROAD GILLET PA 16923	03/12/2018	03/12/2023
DOL	DOL		SHANE BURDICK		2238 BAKER ROAD GILLET PA 16923	03/12/2018	03/12/2023
DOL	DOL	*****6904	SIGNING STAR LIMITED LIABILITY COMPANY		5 HANSEN PLACE WAYNE NJ 07470	09/18/2013	09/18/2018
DOL	DOL	*****4025	SOLUTION MATTERS INC		198 NORWOOD ROAD PORT JEFFERSON NY 11776	11/19/2015	11/19/2020
DOL	NYC	*****4934	SPHINX CONTRACTING CORP		240 HOME STREET TEANECK NJ 07666	08/04/2014	08/04/2019
DOL	DOL	*****3496	STAR INTERNATIONAL INC		89-51 SPRINGFIELD BLVD QUEENS VILLAGE NY 11427	08/11/2003	08/11/3003
DOL	DOL		STEPHEN BIANCHI		462 LAKEVIEW AVENUE VALHALLA NY 10595	12/16/2013	12/16/2018
DOL	DOL	*****9751	STEPHEN C WAGAR		544 OLD ROUTE 23 ACRE NY 12405	02/14/2017	02/14/2022
DOL	DOL		STEPHEON SHELTON	FANTASTIC PAINTING	493 LANSING ROAD FULTONVILLE NY 12072	11/18/2013	11/18/2018
DOL	DOL		STEVEN P SUCATO		15-68 208TH STREET BAYSIDE NY 11360	06/23/2016	06/23/2021
DOL	DOL		STEVEN SAGGESE		3005 WYNSUM AVENUE MERRICK NY 11566	08/18/2014	08/18/2019
DOL	DOL		STEVEN TESTA		50 SALEM STREET - BLDG B LYNNFIELD MA 01940	01/23/2017	01/23/2022
DOL	DOL		STUART CHAITIN		634 ROUTE 303 BLAUVEY NY 10913	07/26/2012	11/19/2018
DOL	NYC	*****9432	SUBLINK LTD		346 THIRD AVENUE PELHAM NY 10803	11/19/2015	11/19/2020
DOL	DOL		SUZANNE G GOLD	C/O GOLDS FLOORING INSTALLATION S INC	25 HAMILTON ROAD MONTICELLO NY 12701	10/16/2013	10/16/2018
DOL	DOL	*****7441	T & T CONCRETE INC		2560 HAMBURG TURNPIKE P O BOX 367LACKAWANNA NY 14218	07/08/2015	07/08/2020
DOL	DOL	*****7417	TADCO CONSTRUCTION		101-61 99TH STREET OZONE PARK NY 11416	02/15/2017	02/15/2022
DOL	DOL		TADCO CONSTRUCTION		101-61 99TH STREET OZONE PARK NY 11416	02/15/2017	02/15/2022

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DOL	DOL	*****7417	TADCO CONSTRUCTION CORP		101-61 99TH STREET OZONE PARK NY 11416	02/15/2017	02/15/2022
DOL	DOL		TALAILA OCAMPA		1207 SW 48TH TERRACE DEERFIELD BEACH FL 33442	01/16/2018	01/16/2023
DOL	DOL		TAMMY LACITIGNOLA		C/O CATSKILL FENCE INSTAL 5445 ROUTE 32CATSKILL NY 12414	08/22/2014	08/22/2019
DOL	DOL	*****9852	TAP STEEL INC		ROUTE 26 3101 P O BOX 457CONSTABLEVILLE NY 13325	01/28/2016	01/28/2021
DOL	DOL		TECH-MECHANICAL FAB DC INC		5 PARKER AVENUE POUGHKEEPSIE NY 12601	03/25/2014	03/25/2019
DOL	DOL	*****5570	TESTA CORP		50 SALEM STREET - BLDG B LYNNFIELD MA 01940	01/23/2017	01/23/2022
DOL	DOL	*****0887	THE BRINSON PAINTING CORPORATION		72 TAUNTON PLACE BUFFALO NY 14216	04/14/2015	04/14/2020
DOL	DOL	*****8174	THE DALRYMPLE CORPORATION		UNIT 278 541 10TH STREET NWLANTA GA 30318	12/01/2015	12/01/2020
DOL	DOL	*****8174	THE DALRYMPLE GROUP LLC		289 JONESBORO RD/ STE 216 MCDONOUGH GA 30253	12/01/2015	12/01/2020
DOL	DOL	*****2070	THE UNIVERSAL GROUP OF NEW YORK INC		212 OXFORD WAY SCHENECTADY NY 12309	12/11/2012	09/16/2018
DOL	DOL	*****9243	THE WELCOME MAT PROPERTY MANAGEMENT LLC		P O BOX 268 STILLWATER NY 12170	09/16/2013	03/21/2019
DOL	DOL		THOMAS DESANTIS	DESANTIS ENTERPRISES	161 OSWEGO RIVER ROAD PHOENIX NY 13135	09/24/2013	11/18/2018
DOL	NYC		THOMAS SCARINCI		130-43 92ND AVENUE RICHMOND HILLS NY 11418	11/27/2013	11/27/2018
DOL	DOL		TIMOTHY A PALUCK		C/O TAP STEEL INC RTE 26 3101/ P O BOX 457CONSTABLEVILLE NY 13325	01/28/2016	01/28/2021
DOL	DOL		TIMOTHY F BARBER		635 LUZERNE ROAD QUEENSBURY NY 12804	09/16/2013	09/16/2018
DOL	NYC	*****1523	TM MECHANICAL CORP		130-43 92ND AVENUE RICHMOND HILLS NY 11418	11/27/2013	11/27/2018
DOL	DOL	*****0600	TOMSON ALLOYS RECYCLING INC		143 FILLMORE AVENUE BUFFALO NY 14210	01/08/2015	01/08/2020
DOL	DOL	*****3453	TORCHIA'S HOME IMPROVEMENT		10153 ROBERTS RD SAUQUOIT NY 13456	08/09/2016	08/09/2021
DOL	DOL	*****6914	TRI-COUNTY RESTORATIONS & CONSTRUCTION INC		13 SUMMERSET DRIVE WALLKILL NY 12589	08/22/2014	08/22/2019
DOL	DOL		TRI-COUNTY RESTORATIONS INC		392 ROCK CUT ROAD WALDEN NY 12586	08/22/2014	08/22/2019
DOL	DOL	*****8311	TRIPLE B FABRICATING, INC.		61 WILLETT ST. PASSAIC NJ 07503	10/26/2016	10/26/2021
DOL	DOL	*****9407	TURBO GROUP INC		15-68 208TH STREET BAYSIDE NY 11360	06/23/2016	06/23/2021
DOL	AG	*****6490	UNIVERSAL STEEL FABRICATORS INC		90 JUNIUS STREET BROOKLYN NY 11212	01/23/2014	01/23/2019
DOL	NYC	*****7174	V&R CONTRACTING		P O BOX 957 PORT JEFFERSON STA NY 11776	03/12/2014	03/12/2019
DOL	NYC		VALERIE VISCONTI		346 THIRD AVENUE PELHAM NY 10803	11/19/2015	11/19/2020
DOL	NYC		VEAP SELA	C/O COLONIAL ROOFING COMPANY INC	247 48TH STREET BROOKLYN NY 11220	02/05/2014	02/05/2019
DOL	NYC		VICK CONSTRUCTION		21 DAREWOOD LANE VALLEY STREAM NY 11581	12/31/2013	12/31/2018
DOL	NYC		VICKRAM MANGRU	VICK CONSTRUCTION	21 DAREWOOD LANE VALLEY STREAM NY 11581	12/31/2013	12/31/2018
DOL	DOL		VICTOR ROTENBERG		C/O GMDV TRANS INC 67048 182ND STREETFRESH MEADOWS NY 11365	06/24/2016	06/24/2021
DOL	NYC		VINCENT PIZZITOLA		P O BOX 957 PORT JEFFERSON STA NY 11776	03/12/2014	03/12/2019
DOL	NYC		VITO GARGANO		1535 RICHMOND AVE STATEN ISLAND NY 10314	12/13/2017	12/13/2022
DOL	DOL		WAYNE LIVINGSTON JR	NORTH COUNTRY DRYWALL AND PAINT	23167 COUNTY ROUTE 59 DEXTER NY 13634	10/24/2016	10/24/2021
DOL	DOL		WHITE PLAINS CARPENTRY CORP		442 ARMONK RD	06/12/2018	06/12/2023

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DOL	DOL		WILLIAM CONKLIN		5 PARKER AVENUE POUGHKEEPSIE NY 12601	03/25/2014	03/25/2019
DOL	DOL		WILLIAM DEAK		C/O MADISON AVE CONSTR CO 39 PENNY STREETWEST ISLIP NY 11795	11/02/2016	11/02/2021
DOL	DOL		WILLIAM MAZZELLA		134 MURRAY AVENUE YONKERS NY 10704	02/03/2014	02/03/2019
DOL	DOL		WILLIE BRINSON		72 TAUNTON PLACE BUFFALO NY 14216	04/14/2015	04/14/2020
DOL	DOL	*****6195	WILSON BROTHER DRYWALL CONTRACTORS		36 ABERSOLD STREET ROCHESTER NY 14621	08/31/2015	08/31/2020
DOL	DOL	*****4043	WINDSHIELD INSTALLATION NETWORK, INC.		200 LATTA BROOK PARK HORSEHEADS NY 14845	03/08/2018	03/08/2023
DOL	DOL	*****7345	YES SERVICE AND REPAIRS CORPORATION		145 LODGE AVE HUNTINGTON STATION NY 11476	08/09/2016	08/09/2021
DOL	DOL		YURIY IVANIN		C/O MOUNTAIN'S AIR INC 2471 OCEAN AVENUE-STE 7ABROOKLYN NY 11229	09/24/2012	09/18/2020

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AGENCY	Fiscal Officer	FEIN	EMPLOYER NAME	EMPLOYER DBA NAME	ADDRESS	DEBARMENT START DATE	DEBARMENT END DATE
DOL	DOL	*****5530	CFM SERVICE CORPORATION INC		P O BOX 548 225 MONTAUK HWY/SUITE 219MORICHES NY 11955	11/28/2012	04/15/2021
DOL	DOL		JOSEPH KLEINPETER	CFM SERVICE CORPORATIO N INC	P O BOX 548 225 MONTAUK HWY/SUITE 219MORICHES NY 11955	11/28/2012	04/15/2021
DOL	NYC		ROBERT SARDINA		C/O TRAFFIC MOVING SYSTEM 66 ALEXANDER STREETYONKERS NY 10701	03/31/2015	03/31/2020
DOL	NYC	*****2049	TRAFFIC MOVING SYSTEMS INC		66 ALEXANDER STREET YONKERS NY 10701	03/31/2015	03/31/2020

SECTION F

TECHNICAL SPECIFICATIONS

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Work covered by the Contract Documents.
 - 2. Type of Contract.
 - 3. Use of premises.
 - 4. Owner's occupancy requirements.
 - 5. Work restrictions.
 - 6. Specification formats and conventions.
- B. Related Sections include the following:
 - 1. Division 1 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. Owner: Cattaraugus County, 303 Court Street, Little Valley, New York 14755.
- B. Architect/Engineer: Wendel, 375 Essjay Road, Suite 200, Williamsville, NY 14221.
- C. The Work consists of the following:
 - 1. The work includes the upgrades to the Civil Defense AHU system including but not limited to: replacement of the duct mounted hot water coil, replacement of AHU supply fan motor, addition of variable speed drive to supply fan, adding transfer grilles, sealing of ductwork, rebalance of the system, and associated electrical work.

1.4 TYPE OF CONTRACT

- A. Project will be constructed under a single lump sum contract using the contract forms presented at the front of this manual.

1.5 WORK SEQUENCE/PHASING

- A. Project will be constructed in a manner to accommodate the operations of the existing facility during the construction process.

1.6 USE OF PREMISES

- A. General: The contractor shall have limited use of premises for construction operations as indicated below.
- B. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Owner Occupancy: Allow for Owner access of Project site.
 - 2. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and the public at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Use of Existing Building: Maintain existing building in a weathertight condition throughout construction period. Repair damage caused by construction operations. Protect building and its occupants during construction period.

1.7 OWNER'S OCCUPANCY REQUIREMENTS

- A. Full Owner Occupancy: The Owner will occupy the surrounding areas of the existing building during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with the Owner's day-to-day operations.
- B. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
 - 1. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's and tenants' operations.
- C. Owner Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed areas of building, before Substantial Completion, provided such occupancy does not interfere with completion of the Work.
 - 1. Before partial Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems.

1.8 WORK RESTRICTIONS

- A. On-Site Work Hours: May proceed during hours as agreed to by the Owner. General work hours are 8am to 5pm.
- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Owner not less than three days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Owner's written permission.

1.9 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 33-division format and CSI/CSC's "Master Format" numbering system.
 - 1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are not used. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.
 - 2. Division 1: Sections in Division 1 govern the execution of the Work of all Sections in the Specifications.
- B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
 - 2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
 - a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

1.10 SUMMARY OF REQUIRED SUBMITTALS

- A. The following is a list of submittals arranged in the order of time milestones. The list is not intended to be complete, but to summarize important submittals in one location convenient for

reference for all parties, for the purpose of helping ensure the submittals are made at the proper time so as not to impede the progress of the work.

1. Submittals required prior to Notice of Award:
 - a. Contractor's Qualification Statement.
 - b. Work to be performed by the bidder with his own forces.
 - c. List of subcontractors and other entities proposed to provide portions of the work.
 - d. Back-up data for proposed substitutions.
 - e. Cost breakdown of the bid.
2. Submittals required prior to Award of Contract:
 - a. Performance and Payment Bonds
 - b. Insurance Certificates
3. Submittals required prior to Mobilization at the Project Site:
 - a. Schedule of Values – Refer to Section 012900.
 - b. Preliminary Project Schedule – Refer to Section 013200.
 - c. Submittals Schedule – Refer to Section 013200.
 - d. Safety Program and name of Safety Coordinator – Refer to General Conditions and Section 011200.
 - e. List of principal staff names and assignments – Refer to Section 013100.
4. Submittals required prior to commencement of each portion of the work:
 - a. Acceptance of existing conditions and substrates upon which work is to be performed. Include verification that existing mechanical and electrical systems are functioning in each area of work. Refer to Section 017300.
 - b. Refer to individual Specification Sections for required shop drawings, product data, samples, test reports, certificates, and other required submittals.
5. Submittals required prior to Substantial Completion and Final Completion: Refer to Section 017700.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Sections include the following:
 - 1. Division 1 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

1.3 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710 or other appropriate form.

1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
 - 2. Within time specified in Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and

finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

- B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change.
 - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - 4. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - 5. Comply with requirements in Division 1 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.
- C. Proposal Request Form: Use AIA Document G709 for Proposal Requests, unless otherwise directed.

1.5 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Proposal Request, the Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 - 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
 - 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Sections include the following:
 - 1. Division 1 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 2. Division 1 Section "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittals Schedule.

1.3 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
 - 1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with Continuation Sheets.
 - b. Submittals Schedule.
 - 2. Submit the Schedule of Values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of the initial Application for Payment.
 - 3. Subschedules: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.

4. Provide separate Schedules of Values for different parts of the work, in accordance with funding requirements, as determined after award of contract.
- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.
1. Provide at least one line item for each of the following as applicable. Some of the items below require submittals by the Contractor. Failure to provide such submittals will result in a credit to the Owner for work not performed, based on the values of each item listed.
 - a. General Conditions
 - b. Daily Construction Reports
 - c. Photographic Documentation
 - d. Two Week Schedule
 - e. Project Schedule Updates
 - f. Progress Meeting Attendance
 - g. Each Specification Section
 - h. Final Cleaning
 - i. Operation and Maintenance Manuals
 2. Identification: Include the following Project identification on the Schedule of Values:
 - a. Project name and location.
 - b. Name of Architect.
 - c. Architect's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 3. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value.
 - 1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100%.
 4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.
 5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 6. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

- a. Differentiate between items stored on-site and items stored off-site. Include evidence of insurance or bonded warehousing if required.
7. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
8. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
9. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by and paid for by Owner.
 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for application for each progress payment is the fifteenth day of each month. The period covered by each Application for Payment starts on the day following the end of the preceding period and ends 15 days before the date for each progress payment.
- C. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment unless otherwise directed. (Sample located at the end of this section.)
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
 1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
 2. Include amounts of changes in the work issued before last day of construction period covered by application.
- E. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

- F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 2. When an application shows completion of an item, submit final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. Waiver Forms: Submit waivers of lien on forms executed in a manner acceptable to Owner.
- G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Contractor's Construction Schedule (preliminary if not final).
 3. Products list.
 4. Schedule of unit prices.
 5. Submittals Schedule (preliminary if not final).
 6. List of Contractor's staff assignments.
 7. List of Contractor's principal consultants.
 8. Copies of building permits.
 9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 10. Initial progress report.
 11. Report of preconstruction conference.
 12. Certificates of insurance and insurance policies.
 13. Performance and payment bonds.
 14. Initial settlement survey and damage report if required.
- H. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- I. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Submit Certificate of Substantial Completion.
 4. Updated final statement, accounting for final changes to the Contract Sum.

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5. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
6. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
7. Evidence that claims have been settled.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General project coordination procedures.
 - 2. Conservation.
 - 3. Coordination Drawings.
 - 4. RFIs
 - 5. Administrative and supervisory personnel.
 - 6. Project meetings.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 1 Section "Construction Progress Documentation" for preparing and submitting the Contractor's Construction Schedule.
 - 2. Division 1 Section "Execution Requirements" for procedures for coordinating general installation.
 - 3. Division 1 Section "Closeout Procedures" for coordinating Contract closeout.

1.3 COORDINATION

- A. Coordination: Coordinate construction operations, included in different Sections of the specification that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. If necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 1. Preparation of Contractor's Construction Schedule.
 2. Installation and removal of temporary facilities and controls.
 3. Delivery and processing of submittals.
 4. Progress meetings.
 5. Preinstallation conferences.
 6. Project closeout activities.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work.

1.4 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
 1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 1. Project name.
 2. Project number.
 3. Date.
 4. Name of Contractor.
 5. Name of Architect.
 6. RFI number, numbered sequentially.
 7. RFI subject.
 8. Specification Section number and title and related paragraphs, as appropriate.
 9. Drawing number and detail references, as appropriate.
 10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.

13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
 - C. RFI Forms: Submit on form at the end of this section.
 - D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
 1. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
 2. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.
 - E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log bi-weekly. Include the following:
 1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect.
 4. RFI number including RFIs that were returned without action or withdrawn.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect's response was received.
 - F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.
- 1.5 SUBMITTALS
- A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.
 1. Indicate relationship of components shown on separate Shop Drawings.
 2. Indicate required installation sequences.

- B. Staff Names: Prior to mobilization at the project site, submit a list of principal staff assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1.6 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

1.7 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
 - 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 - 3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within 3 days of the meeting.
- B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.
 - 1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; manufacturers; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing.
 - d. Designation of responsible personnel.
 - e. Procedures for processing field decisions and Change Orders.
 - f. Procedures for processing Applications for Payment.
 - g. Distribution of the Contract Documents.
 - h. Submittal procedures.
 - i. Preparation of Record Documents.
 - j. Use of the premises.
 - k. Responsibility for temporary facilities and controls.
 - l. Parking availability.
 - m. Office, work, and storage areas.

- n. Equipment deliveries and priorities.
 - o. First aid.
 - p. Security.
 - q. Progress cleaning.
 - r. Working hours.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
 - 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
 - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related Change Orders.
 - d. Purchases.
 - e. Deliveries.
 - f. Submittals.
 - g. Review of mockups.
 - h. Possible conflicts.
 - i. Compatibility problems.
 - j. Time schedules.
 - k. Weather limitations.
 - l. Manufacturer's written recommendations.
 - m. Warranty requirements.
 - n. Compatibility of materials.
 - o. Acceptability of substrates.
 - p. Temporary facilities and controls.
 - q. Space and access limitations.
 - r. Regulations of authorities having jurisdiction.
 - s. Testing and inspecting requirements.
 - t. Required performance results.
 - u. Protection of construction and personnel.
 - 3. Record significant conference discussions, agreements, and disagreements.
 - 4. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Conduct progress meetings twice monthly. Coordinate dates of meetings with preparation of payment requests.
 - 1. Attendees: In addition to representatives of Owner and Architect, Contractor and each subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these

- meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Change Orders.
 - 14) Documentation of information for payment requests.
 - 15) Coordination of work between Contractors.
 3. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.
 - a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

REQUEST FOR INFORMATION

Contractor Name _____

Address: _____
City, State, Zip: _____

Phone: _____
Fax: _____

Wendel Project No. 307659

Contractor RFI No.: _____

DATE: _____

TITLE: _____

CONTRACTOR _____

JOB NO: _____

PROJECT: HVAC Improvements, Emergency Services

**REQUIRED
RESPONSE DATE:** _____

TO: Wendel
375 Essjay Road
Williamsville, NY 14221
Phone: 716-688-0766 Fax: 716-625-6825

ATTN: Angela Cardena (acardena@wendelcompanies.com)

QUESTION:

Requested By: _____
Name

Date: _____

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Contractor's Construction Schedule.
 - 2. Submittals Schedule.
 - 3. Daily construction reports.
 - 4. Material location reports.
 - 5. Field condition reports.
 - 6. Special reports.
- B. Related Sections include the following:
 - 1. Division 1 Section "Payment Procedures" for submitting the Schedule of Values.
 - 2. Division 1 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
 - 3. Division 1 Section "Submittal Procedures" for submitting schedules and reports.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Predecessor activity is an activity that must be completed before a given activity can be started.
- B. Event: The starting or ending point of an activity.
- C. Float: The measure of leeway in starting and completing an activity.
 - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.

2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the following activity.
 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- D. Major Area: A story of construction, a separate building, or a similar significant construction element.
- E. Milestone: A key or critical point in time for reference or measurement.

1.4 SUBMITTALS

- A. Submittals Schedule: Submit three copies of schedule. Arrange the following information in a tabular format:
1. Scheduled date for first submittal.
 2. Specification Section number and title.
 3. Submittal category (action or informational).
 4. Name of subcontractor.
 5. Description of the Work covered.
 6. Scheduled date for Architect's and Owner's final release or approval.
- B. Contractor's Construction Schedule: Submit three printed copies of initial schedule, large enough to show entire schedule for entire construction period.
- C. Daily Construction Reports: Submit two copies at weekly intervals.
- D. Material Location Reports: Submit two copies at weekly intervals.
- E. Field Condition Reports: Submit two copies at time of discovery of differing conditions.
- F. Special Reports: Submit two copies at time of unusual event.

1.5 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
- B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.
1. Secure time commitments for performing critical elements of the Work from parties involved.
 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 SUBMITTALS SCHEDULE

- A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.
 - 1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
 - 2. Initial Submittal: Submit concurrently with preliminary bar-chart schedule. Include submittals required during the first 60 days of construction. List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 - 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Procedures: Comply with procedures contained in AGC's "Construction Planning & Scheduling."
- B. Time Frame: Extend schedule from date established for commencement to the date of Substantial Completion and Final Completion.
 - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- C. Activities: Treat each separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
 - 1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
 - 2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - 3. Submittal Review Time: Include review and resubmittal times indicated in Division 1 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
 - 4. Startup and Testing Time: Include not less than 3 days for startup and testing.
 - 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's and Owner's administrative procedures necessary for certification of Substantial Completion.
- D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
 - 1. Phasing: Arrange list of activities on schedule by phase.

2. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 3. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 1 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 4. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Use of premises restrictions.
 - e. Seasonal variations.
 5. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Fabrication.
 - e. Deliveries.
 - f. Installation.
 - g. Tests and inspections.
 - h. Adjusting.
 - i. Curing.
 - j. Placement into final use and operation.
 6. Area Separations: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities.
- E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, interim milestones, Substantial Completion, and Final Completion.
- F. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragnets to demonstrate the effect of the proposed change on the overall project schedule.
- G. Computer Software: Prepare schedules using a program that has been developed specifically to manage construction schedules.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for commencement of the Work. Base schedule on the dates established for Substantial Completion and Final Completion and whatever updating and feedback was received since the start of Project.

- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
 - 1. For construction activities that require 3 months or longer to complete, indicate an estimated completion percentage in 10% increments within time bar.

2.4 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
 - 1. List of subcontractors at Project site.
 - 2. List of separate contractors at Project site.
 - 3. Approximate count of personnel at Project site.
 - 4. High and low temperatures and general weather conditions.
 - 5. Accidents.
 - 6. Meetings and significant decisions.
 - 7. Unusual events (refer to special reports).
 - 8. Stoppages, delays, shortages, and losses.
 - 9. Meter readings and similar recordings.
 - 10. Emergency procedures.
 - 11. Orders and requests of authorities having jurisdiction.
 - 12. Change Orders received and implemented.
 - 13. Supplemental instructions received and implemented.
 - 14. Services connected and disconnected.
 - 15. Equipment or system tests and startups.
 - 16. Partial Completions and occupancies.
 - 17. Substantial Completions authorized.
- B. Material Location Reports: At monthly intervals, prepare a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.
- C. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare a detailed report. Submit with a request for information on the form required. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.5 SPECIAL REPORTS

- A. General: Submit special reports directly to Owner within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or

effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

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

END OF SECTION 013200

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.
- B. Related Sections include the following:
 - 1. Division 1 Section "Payment Procedures" for submitting Applications for Payment.
 - 2. Division 1 Section "Project Management and Coordination" for submitting Coordination Drawings.
 - 3. Division 1 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule and the Submittals Schedule.
 - 4. Division 1 Section "Quality Requirements" for submitting test and inspection reports and for erecting mockups.
 - 5. Division 1 Section "Closeout Procedures" for submitting warranties and Project Record Documents.
 - 6. Division 1 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Architect's responsive action.
- B. Informational Submittals: Written information that does not require Architect's approval. Submittals may be rejected for not complying with requirements.

1.4 SUBMITTAL PROCEDURES

- A. Electronic Media Request: Electronic copies of CAD Drawings of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals upon receipt of a signed disclaimer (available from Architect) with specific request and payment of a nominal fee of \$50.00 per Drawing.
- B. 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 requires sequential activity.
 2. 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. Submit all items required by each specification section in one package. Piecemeal submittals will not be reviewed and will be returned with appropriate action stamp indicating incomplete submittal.
 - b. Architect will withhold action on a submittal requiring coordination with submittals required by other sections until related submittals are received.
- C. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.
- D. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal.
1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Concurrent Review: Where concurrent review of submittals by Architect's consultants, Owner, or other parties is required, allow 21 days for initial review of each submittal.
 3. If intermediate submittal is necessary, process it in same manner as initial submittal.
 4. Allow same amount of time as above for processing each resubmittal.
 5. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.
- E. Identification: Place a permanent label or title block on each submittal for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately 6 by 6 inches (150 by 150-mm)] on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
 3. Include the following information on label for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor.
 - f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Number and title of appropriate Specification Section.
 - i. Drawing number and detail references, as appropriate.
 - j. Other necessary identification.
- F. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.

- G. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions of the Contract Documents, initial submittal may serve as final submittal.
- H. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a Submittal Transmittal form, located at end of this specification section. Architect will return submittals, without review, received from sources other than Contractor.
 - 1. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements of the Contract Documents, including minor variations and limitations. Include the same label information as the related submittal.
 - 2. Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents.
 - 3. Transmittal Form: Use sample form at end of Section.
- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- J. Use for Construction: Use only final submittals with mark indicating action taken by Architect in connection with construction.
- K. Required Submittals: Refer to individual Specification Sections and elsewhere in the Contract Documents for listing and descriptions of required submittals. The Architect may also request additional submittals to assure compliance with the Contract Documents. Submit these required items only. Submittals not required by the Contract Documents or requested by the Architect will not be reviewed and will be discarded or returned without action.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 - 1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
 - 2. Mark each copy of each submittal to show which products and options are applicable.
 - 3. Include the following information, as applicable:
 - a. Manufacturer's written recommendations.
 - b. Manufacturer's product specifications.
 - c. Color charts showing full range of available colors.

- d. Manufacturer's catalog cuts.
 - e. Wiring diagrams showing factory-installed wiring.
 - f. Printed performance curves.
 - g. Operational range diagrams.
 - h. Mill reports.
 - i. Standard product operating and maintenance manuals.
 - j. Compliance with recognized trade association standards.
 - k. Compliance with recognized testing agency standards.
 - l. Application of testing agency labels and seals.
 - m. Notation of coordination requirements.
 4. Number of Copies: Submit five (5) copies of each submittal. The Architect will retain one copy and return the remainder to the Contractor for distribution.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 1. Preparation: Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Roughing-in and setting diagrams.
 - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
 - f. Shopwork manufacturing instructions.
 - g. Templates and patterns.
 - h. Schedules.
 - i. Design calculations.
 - j. Compliance with specified standards.
 - k. Notation of coordination requirements.
 - l. Notation of dimensions established by field measurement.
 2. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
 3. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than sheet size used for Contract Document Drawings.
 4. Number of Copies: Submit one correctable, translucent, reproducible print and one blue- or black-line print of each submittal. Architect will return the reproducible print.
- D. Coordination Drawings: Comply with requirements in Division 1 Section "Project Management and Coordination."
- E. Samples: Prepare physical units of materials or products, including the following:
 1. Comply with requirements in Division 1 Section "Quality Requirements" for mockups.
 2. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 3. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from the same material to be used for the Work, cured and finished in manner specified,

and physically identical with the product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

4. Preparation: Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Prepare Samples to match Architect's sample where so indicated. Attach label on unexposed side that includes the following:
 - a. Generic description of Sample.
 - b. Product name or name of manufacturer.
 - c. Sample source.
5. Submit Samples for review of kind, color, pattern, and texture for a final check of these characteristics with other elements and for a comparison of these characteristics between final submittal and actual component as delivered and installed.
 - a. If variation in color, pattern, texture, or other characteristic is inherent in the product represented by a Sample, submit at least three sets of paired units that show approximate limits of the variations.
 - b. Refer to individual Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.
6. Number of Samples for Initial Selection: Submit two full sets of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
7. Number of Samples for Verification: Submit three sets of Samples. Architect will retain one Sample set; remainder will be returned. Mark up and retain one returned Sample set as a Project Record Sample.
 - a. Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
8. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

F. Product Schedule or List: Comply with requirements in Division 1 Section "Product Requirements".

- G. Delegated-Design Submittal: Comply with requirements in Division 1 Section "Quality Requirements."
- H. Contractor's Construction Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation".
- I. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation."
- J. Application for Payment: Comply with requirements in Division 1 Section "Payment Procedures."
- K. Schedule of Values: Comply with requirements in Division 1 Section "Payment Procedures."
- L. Subcontract List: Comply with requirements in Division 1 Section "Project Management and Coordination".

2.2 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
 - 1. Number of Copies: Submit two copies of each submittal, unless otherwise indicated. Architect will not return copies.
 - 2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - 3. Test and Inspection Reports: Comply with requirements in Division 1 Section "Quality Requirements."
- B. Qualification Data: 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 architects and owners, and other information specified.
- C. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.
- D. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- E. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project.
- F. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.

- G. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.
- H. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.
- I. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements.
- J. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- K. Field Test Reports: Prepare 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 requirements.
- L. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- M. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - 1. Name of evaluation organization.
 - 2. Date of evaluation.
 - 3. Time period when report is in effect.
 - 4. Product and manufacturers' names.
 - 5. Description of product.
 - 6. Test procedures and results.
 - 7. Limitations of use.
- N. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Division 1 Section "Operation and Maintenance Data."
- O. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
- P. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a

product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:

1. Preparation of substrates.
2. Required substrate tolerances.
3. Sequence of installation or erection.
4. Required installation tolerances.
5. Required adjustments.
6. Recommendations for cleaning and protection.

Q. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

R. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

S. Material Safety Data Sheets: Submit information directly to Owner. If submitted to Architect, Architect will not review this information but will return it with no action taken.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

- A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
1. Architect's Action:
 - a. Final Unrestricted Release: When the Architect marks a submittal "No Exceptions Taken" the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.
 - b. Final-But-Restricted Release: When the Architect marks a submittal "Provide as Corrected," the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract documents. Final payment depends on that compliance.
 - c. Returned for Resubmittal: When the Architect marks a submittal "Revise and Resubmit," do not proceed with Work covered by the submittal, including purchasing, fabrication, deliver, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay.
 - 1) Do not use, or allow others to use, submittals marked "Revise and Resubmit" at the Project Site or elsewhere where Work is in progress.
 - d. Returned for Resubmittal: When the Architect marks a submittal "Rejected", the Architect has not completed a full review, because it is clear that the submittal does not reflect the requirements of the Contract Documents. Do not proceed with work covered by the submittal, including purchasing, fabrication, delivery or other activity. Revise or prepare a new submittal that complies with the Contract Documents.
 - e. Returned for Resubmittal: When the Architect marks a submittal "Submit Specified Item" do not proceed with work covered by the submittal, including purchasing, fabrication, delivery, or other activity. The product submitted was not specified or previously approved. Shop drawing or product data submittal is not an acceptable method to obtain approval of substitutions. Resubmit specified or previously approved product.
 - f. Returned for Resubmittal: When the Architect marks a submittal "Submit Additional Information", do not proceed with work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Not enough information has been included to make an evaluation, or the data submitted illustrates more than one product or optional features, without identifying what is actually proposed. Revise or prepare a new submittal with all required information complete and clearly indicated.
 - C. Informational Submittals: Architect will review each submittal and will not return it, or will reject and return it if it does not comply with requirements.
 - D. Submittals not required by the Contract Documents will not be reviewed and may be discarded or returned without action.

END OF SECTION 013300



Submittal No. _____

Submittal Transmittal

PROJECT: HVAC Improvements, Emergency Services WENDEL PROJECT #: 307659

OWNER: Cattaraugus County A/E: Wendel

CONTRACT # & NAME _____

CONTRACTOR: _____
(NAME, ADDRESS, TELEPHONE & FAX NUMBERS)

☐ NEW SUBMITTAL ☐ RESUBMITTAL

Date: _____

This submittal is: ☐ AS SPECIFIED REMARKS: _____

NUMBER OF COPIES SUBMITTED: (8 maximum) _____

TYPE OF SUBMITTAL: (**CHECK ALL THAT APPLY**)

☐ PRODUCT DATA/CATALOG CUT

☐ RECORD DOCUMENT

☐ SHOP DRAWINGS

☐ SCHEDULE

☐ PERFORMANCE DATA

☐ SAMPLE

☐ WARRANTY

☐ OPERATIONS & MAINTENANCE DATA

☐ COLOR SELECTION

☐ TEST REPORT

☐ OTHER _____

SPEC. SECTION: _____

PARAGRAPH(S): _____

DWG. REF. NO.: _____

CONTRACTOR CERTIFICATION

CONTRACTOR CERTIFIES THAT THE INFORMATION
SUBMITTED COMPLIES WITH THE CONTRACT
DOCUMENT REQUIREMENTS.

By: _____

Date: _____

**NOTE: Contractor shall apply an approval stamp to
each copy of each submittal.**

DESCRIPTION OF SUBMITTAL: _____

PRODUCT NAME: _____

MANUFACTURER: _____

ADDRESS: _____

TEL. NO.: _____

CONTRACTOR or SUBCONTRACTOR: _____

TEL. NO.: _____

SUPPLIER: _____

TEL. NO.: _____

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Sections include the following:
 - 1. Division 1 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
 - 2. Division 1 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.

1.3 DEFINITIONS

- A. Quality-Assurance Services: 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.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction complies with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

1.4 DELEGATED DESIGN

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

1.5 SUBMITTALS

- A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.
- C. Reports: Prepare and submit certified written reports that include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.
 - 8. Complete test or inspection data.
 - 9. Test and inspection results and an interpretation of test results.
 - 10. Ambient conditions at time of sample taking and testing and inspecting.
 - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 - 12. Name and signature of laboratory inspector.
 - 13. Recommendations on retesting and reinspecting.
- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- B. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- C. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- D. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.
- F. Testing Agency Qualifications: An agency with the experience and capability to conduct testing and inspecting indicated, as documented by ASTM E 548, and that specializes in types of tests and inspections to be performed.
- G. Preconstruction Testing: Testing agency shall perform preconstruction testing for compliance with specified requirements for performance and test methods.
 - 1. Contractor responsibilities include the following:
 - a. Provide test specimens and assemblies representative of proposed materials and construction. Provide sizes and configurations of assemblies to adequately demonstrate capability of product to comply with performance requirements.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Fabricate and install test assemblies using installers who will perform the same tasks for Project.
 - d. When testing is complete, remove assemblies; do not reuse materials on Project.
 - 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Owner and Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- H. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.

2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Demolish and remove mockups when directed, unless intent for mockups to become part of completed construction is indicated.

1.7 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 1. 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.
 2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Unless otherwise indicated, provide quality-control services specified and required by authorities having jurisdiction.
 1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ the same entity engaged by Owner, unless agreed to in writing by Owner.
 2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Special Tests and Inspections: Owner will engage a testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner.
 1. Testing agency will notify Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 2. Testing agency will submit a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Owner and Contractor and to authorities having jurisdiction.
 3. Testing agency will submit a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.

4. Testing agency will interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 5. Testing agency will retest and reinspect corrected work.
- D. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing.
- E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that revised or replaced Work that failed to comply with requirements established by the Contract Documents.
- F. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 3. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 4. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.
 5. Do not perform any duties of Contractor.
- G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field-curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Sections of these Specifications. Restore patched areas and extend restoration into adjoining areas in a manner that eliminates evidence of patching.
 - 2. Comply with the Contract Document requirements for Division 1 Section "Cutting and Patching."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect or Owner. Other terms including "requested," "authorized," "selected," "approved," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Installer": 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. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.

- J. "Experienced": When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- K. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents, unless otherwise indicated.
- C. Conflicting Requirements: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.
 - 1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.
- D. Copies of Standards: Each entity engaged in construction on Project must be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source and make them available on request.
- E. Abbreviations and Acronyms for Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list and other names as officially recognized. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADAAG	Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities Available from Access Board www.access-board.gov	(800) 872-2253 (202) 272-5434

CFR	Code of Federal Regulations Available from Government Printing Office www.access.gpo.gov/nara/cfr	(888) 293-6498 (202) 512-1530
CRD	Handbook for Concrete and Cement Available from Army Corps of Engineers Waterways Experiment Station www.wes.army.mil	(601) 634-2355
DOD	Department of Defense Specifications and Standards Available from Defense Automated Printing Service www.astimage.daps.dla.mil/online	(215) 697-6257
FED-STD	Federal Standard (See FS)	
FS	Federal Specification Available from Defense Automated Printing Service www.astimage.daps.dla.mil/online	(215) 697-6257
	Available from General Services Administration www.fss.gsa.gov/pub/fed-specs.cfm	(202) 619-8925
	Available from National Institute of Building Sciences www.nibs.org	(202) 289-7800
FTMS	Federal Test Method Standard (See FS)	
MILSPEC	Military Specification and Standards Available from Defense Automated Printing Service www.astimage.daps.dla.mil/online	(215) 697-6257
UFAS	Uniform Federal Accessibility Standards Available from Access Board www.access-board.gov	(800) 872-2253 (202) 272-5434

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale Research's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."
- B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names,

telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CABO	Council of American Building Officials (See ICC)	
IAPMO	International Association of Plumbing and Mechanical Officials (The) www.iapmo.org	(909) 595-8449
ICBO	International Conference of Building Officials www.icbo.org	(800) 284-4406 (562) 699-0541
ICC	International Code Council, Inc. (Formerly: CABO - Council of American Building Officials) www.intlcode.org	(703) 931-4533

- C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list and other names as officially recognized. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CPSC	Consumer Product Safety Commission www.cpsc.gov	(800) 638-2772 (301) 504-0990
DOC	Department of Commerce www.doc.gov	(202) 482-2000
EPA	Environmental Protection Agency www.epa.gov	(202) 260-2090
FDA	Food and Drug Administration www.fda.gov	(888) 463-6332
NCHRP	National Cooperative Highway Research Program (See TRB)	
NIST	National Institute of Standards and Technology www.nist.gov	(301) 975-6478
OSHA	Occupational Safety & Health Administration www.osha.gov	(800) 321-6742 (202) 693-1999
TRB	Transportation Research Board www.nas.edu/trb	(202) 334-2934

Cattaraugus County
HVAC Improvements
Emergency Services
Wendel Project No. 307659

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Sections include the following:
 - 1. Division 1 Section "Summary" for limitations on utility interruptions and other work restrictions and infection control guidelines.
 - 2. Division 1 Section "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
 - 3. Division 1 Section "Execution Requirements" for progress cleaning requirements.

1.3 USE CHARGES

- A. Water Service: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- B. Electric Power Service: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.4 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.5 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Lumber and Plywood: Exterior quality, pressure treated.
- B. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails. Provide [concrete] [galvanized-steel] bases for supporting posts.
- C. Fencing Windscreen Privacy Screen: Polyester fabric scrim with grommets for attachment to chain link fence, sized to height of fence, in color selected by Architect from manufacturer's standard colors
- D. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil (0.25-mm) minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.

2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations. Coordinate with the Owner to use space in the existing site lot.
 - 1. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

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

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with Owner for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Water Service: Use of Owner's existing water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
 - 1. Use of existing toilet room facilities to be at the discretion of the Owner. If acceptable to the Owner, contractor is to clean and maintain facilities in a manner acceptable to the Owner. At Substantial Completion, restore facilities to original condition acceptable to the Owner.
- D. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
- E. Electric Power Service: Use of Owner's existing electric power service will be permitted, as long as equipment is maintained in a condition acceptable to Owner.
 - 1. Install electric power service overhead, unless otherwise indicated.
 - 2. Connect temporary service to Owner's existing power source, as directed by Owner.
- F. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

- G. Telephone Service: Provide project superintendent with cell phone for use whenever on job site.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:

- 1. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

- B. Parking: Coordinate with the Owner a designated area of existing parking areas for construction personnel.

- C. Temporary Signs:

- 1. Provide temporary, directional signs for construction personnel and visitors.
 - 2. Maintain and touchup signs so they are legible at all times.

- D. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 1 Section "Execution Requirements" for progress cleaning requirements.

- E. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

- 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

- F. Existing Elevator Use: Use of Owner's existing elevators will not be permitted.

- G. Use of Existing Stairs: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

- 1. Comply with work restrictions specified in Division 1 Section "Summary."

- C. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
- D. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- E. Tree and Plant Protection: Comply with requirements specified in Section 015639 "Temporary Tree and Plant Protection."
- F. Covered Walkway: Erect protective, covered walkway for passage of individuals at all building entrances. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction.
 - 1. Provide overhead decking, protective enclosure walls, handrails, barricades, warning signs, exit signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
- G. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
- H. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
 - 1. Prohibit smoking in construction areas. Comply with Owner's rules for designated smoking areas. Smoking is prohibited inside of building.
 - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
 - 4. Provide fire extinguishers for fire protection.

3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are property of Contractor.
 2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 1 Section "Closeout Procedures."

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following administrative and procedural requirements: selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.
- B. Related Sections include the following:
 - 1. Division 1 Section "Alternates" for products selected under an alternate.
 - 2. Division 1 Section "References" for applicable industry standards for products specified.
 - 3. Division 1 Section "Closeout Procedures" for submitting warranties for contract closeout.

1.3 DEFINITIONS

- A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation, shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Substitutions: Changes in manufacturers, products, materials, equipment, and methods of construction from those required by the Contract Documents, proposed by Contractor.
- C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service

performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

- D. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
- E. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

1.4 SUBMITTALS

- A. Product List: Submit a list, in tabular form, showing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.
 - 1. Coordinate product list with Contractor's Construction Schedule and the Submittals Schedule.
 - 2. Form: Tabulate information for each product under the following column headings:
 - a. Specification Section number and title.
 - b. Generic name used in the Contract Documents.
 - c. Proprietary name, model number, and similar designations.
 - d. Manufacturer's name and address.
 - e. Supplier's name and address.
 - f. Installer's name and address.
 - g. Projected delivery date or time span of delivery period.
 - h. Identification of items that require early submittal approval for scheduled delivery date.
 - 3. Completed List: Within 30 days after date of commencement of the Work, submit 3 copies of completed product list. Include a written explanation for omissions of data and for variations from Contract requirements.
 - 4. Architect's Action: Architect will respond in writing to Contractor within 15 days of receipt of completed product list. Architect's response will include a list of unacceptable product selections and a brief explanation of reasons for this action. Architect's response, or lack of response, does not constitute a waiver of requirement that products comply with the Contract Documents.
- B. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use form provided at end of Section.
 - 2. Documentation: With each substitution request, show compliance with requirements for substitutions and include the following, as applicable:
 - a. Statement indicating why specified material or product cannot be provided.

- b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, code compliance and specific features and requirements indicated.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - h. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
 - i. Cost information, including a proposal of change, if any, in the Contract Sum.
 - j. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
 - k. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If accepted, Architect will issue a written Addendum prior to bid opening indicating acceptance of the proposed substitution.
- a. Use product specified if Architect cannot make a decision on use of a proposed substitution prior to bid opening.
 - b. If rejected, Architect will notify Contractor through Construction Manager prior to bid opening.

1.5 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.
- 1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 - 2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturers written instructions.
 - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - 4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
 - 5. Store products to allow for inspection and measurement of quantity or counting of units.
 - 6. Store materials in a manner that will not endanger Project structure.
 - 7. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
 - 8. Comply with product manufacturers written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 - 9. Protect stored products from damage.

1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.
 - 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 - 2. Specified Form: Forms are included with the Specifications. Prepare a written document using appropriate form properly executed.
 - 3. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT OPTIONS

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged, and unless otherwise indicated, that are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Architect will make selection.
 5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
 6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
- B. Product Selection Procedures: Procedures for product selection include the following:
1. Product(s): Where Specification paragraphs or subparagraphs titled "Product" or "Products" name one or two products and manufacturers, provide one of the products named.
 - a. Substitutions may be considered, unless otherwise indicated.
 2. Products: Where Specification paragraphs or subparagraphs titled "Products" introduce a list of three (3) or more names of both products and manufacturers, provide one of the products listed that complies with requirements.
 3. Manufacturer/Source: Where Specification paragraphs or subparagraphs titled "Manufacturer" or "Source" name single manufacturers or sources, provide a product by the manufacturers or from the sources named that complies with requirements.
 - a. Substitutions may be considered, unless otherwise indicated.
 4. Manufacturers: Where Specification paragraphs or subparagraphs titled "Manufacturers" introduce a list of three (3) or more manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
 5. Product Options: Where Specification paragraphs titled "Product Options" indicate that size, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide either the specific product or system indicated or a comparable product or system by another manufacturer, if substitutions are allowed. Comply with provisions in "Product Substitutions" Article.
 6. Basis-of-Design Products: Where Specification paragraphs or subparagraphs titled "Basis-of-Design Product[s]" are included and also introduce or refer to a list of three (3) or more manufacturers' names, provide either the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.

- a. Substitutions may be considered, unless otherwise indicated.
7. Or Equal: Where products and/or manufacturers are specified by name and accompanied by the term "or equal" or "or approved equal" or "or as approved", comply with the provisions in "Product Substitutions" Article.
8. Visual Matching Specification: Where Specifications require matching an established Sample, select a product (and manufacturer) that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches satisfactorily.
 - a. If no product available within specified category matches satisfactorily and complies with other specified requirements, comply with provisions of the Contract Documents on "substitutions" for selection of a matching product.
9. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product (and manufacturer) that complies with other specified requirements.
 - a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that does not include premium items.
 - b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that includes both standard and premium items.

2.2 PRODUCT SUBSTITUTIONS

- A. Timing: Architect will consider requests for substitution if received no later than ten (10) days prior to the date established for opening of bids. Architect will also consider requests for substitution submitted with the bid proposal, as described below. Requests received after that time will be rejected.
 1. Substitutions Submitted With Bid Package: Contractor may submit fully documented substitution requests with his bid proposal, but does so at his own risk, as such proposed substitution are subject to the approval of the Architect.
- B. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 2. Requested substitution does not require extensive revisions to the Contract Documents.
 3. Requested substitution is consistent with the Contract Documents and will produce indicated results.

4. Substitution request is fully documented and properly submitted, as per provisions in "Submittals" Article.
5. Requested substitution will not adversely affect Contractor's Construction Schedule.
6. Requested substitution has received necessary approvals of authorities having jurisdiction.
7. Requested substitution is compatible with other portions of the Work.
8. Requested substitution has been coordinated with other portions of the Work.
9. Requested substitution provides specified warranty.
10. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

2.3 COMPARABLE PRODUCTS

- A. Where products or manufacturers are specified by name, submit the following, in addition to other required submittals, to obtain approval of an unnamed product:
 1. Evidence that the proposed product does not require extensive revisions to the Contract Documents that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 3. Evidence that proposed product provides specified warranty.
 4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. General installation of products.
 - 3. Coordination of Owner-installed products.
 - 4. Progress cleaning.
 - 5. Starting and adjusting.
 - 6. Protection of installed construction.
 - 7. Correction of the Work.
- B. Related Sections include the following:
 - 1. Division 1 Section "Temporary Facilities and Controls" for procedures for coordinating temporary utilities, temporary partitions and other temporary facilities with other construction facilities.
 - 2. Division 1 Section "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.
 - 3. Division 1 Section "Closeout Procedures" for final cleaning.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

- B. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - a. Description of the Work.
 - b. List of detrimental conditions, including substrates.
 - c. List of unacceptable installation tolerances.
 - d. Recommended corrections.
 - 2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect on the form at the end of this Section. Include a detailed description of problem encountered, together with recommendations (if any) for changing the Contract Documents.

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. Building Lines and Levels: Locate and lay out control lines and levels for installation of the work, including those required for mechanical and electrical work.
- C. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Make the log available for reference by Architect.

3.4 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
- G. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- H. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.5 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80°F (27°C).
 - 3. Provide dumpsters on site for depositing of waste materials. Locate on site where approved by the Owner. Empty dumpsters legally off site when full. Do not allow dumpsters to overflow.
 - 4. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Cutting and Patching: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.
1. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.
- H. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- I. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- J. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- K. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.
- 3.6 PROTECTION OF INSTALLED CONSTRUCTION
- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
 - B. Comply with manufacturer's written instructions for temperature and relative humidity.
- 3.7 CORRECTION OF THE WORK
- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 1 Section "Cutting and Patching."

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

SECTION 017329 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.

1.3 DEFINITIONS

- A. Cutting: Removal of existing construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 SUBMITTALS

- A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
 - 1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
 - 2. Changes to Existing Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
 - 3. Products: List products to be used and firms or entities that will perform the Work.
 - 4. Dates: Indicate when cutting and patching will be performed.
 - 5. Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.
 - 6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
 - 7. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.5 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch the following operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
 - 1. Primary operational systems and equipment.
 - 2. Fire-protection systems.
 - 3. Control systems.
 - 4. Communication systems.
 - 5. Electrical wiring systems.
- C. Miscellaneous Elements: Do not cut and patch the following elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
 - 1. Water, moisture, or vapor barriers.
 - 2. Membranes and flashings.
 - 3. Exterior wall construction.
 - 4. Equipment supports.
 - 5. Piping, ductwork, vessels, and equipment.
 - 6. Noise- and vibration-control elements and systems.
- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.6 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections of these Specifications.
- B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or

adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 3. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

END OF SECTION 017329

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Inspection procedures.
 - 2. Project Record Documents.
 - 3. Warranties.
 - 4. Instruction of Owner's personnel.
 - 5. Final cleaning.
- B. Related Sections include the following:
 - 1. Division 1 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
 - 2. Division 1 Section "Construction Progress Documentation" for submitting Final Completion construction photographs and negatives.
 - 3. Division 1 Section "Execution Requirements" for progress cleaning of Project site.
 - 4. Division 1 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
 - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 - 2. Advise Owner of pending insurance changeover requirements.
 - 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.

5. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
7. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
8. Complete final cleaning requirements, including touchup painting.
9. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
 - 1. Organize list of spaces in sequential order, starting with exterior areas first.
 - 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 - 3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Page number.
 - 4. Indicate the reason why each item of the Work is not complete.

1.6 PROJECT RECORD DOCUMENTS

- A. General: Do not use Project Record Documents for construction purposes. Protect Project Record Documents from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.
- B. Record Drawings: Maintain and submit one set of black-line white prints of Contract Drawings and Shop Drawings.
 - 1. Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
 - a. Give particular attention to information on concealed elements that cannot be readily identified and recorded later.
 - b. Accurately record information in an understandable drawing technique.
 - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 - d. Mark Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. Where Shop Drawings are marked, show cross-reference on Contract Drawings.
 - 2. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.
 - 3. Mark important additional information that was either shown schematically or omitted from original Drawings.
 - 4. Note Construction Change Directive numbers, Change Order numbers, alternate numbers, and similar identification where applicable.
 - 5. Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location. Organize into manageable sets; bind each set with durable paper cover sheets. Include identification on cover sheets.

- C. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications. Mark copy to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 - 3. Note related Change Orders where applicable.
- D. Miscellaneous Record Submittals: Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

1.7 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 - 1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (115-by-280-mm) paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 DEMONSTRATION AND TRAINING

- A. Instruction: Instruct Owner's personnel to maintain systems.
 - 1. Provide instructors experienced in operation and maintenance procedures.
 - 2. Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at the start of each season.
 - 3. Schedule training with Owner with at least seven days' advance notice.
 - 4. Coordinate instructors, including providing notification of dates, times, length of instruction, and course content.
- B. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections. For each training module, develop a learning objective and teaching outline. Include instruction for the following:
 - 1. Review of documentation.
 - 2. Troubleshooting.
 - 3. Maintenance.
 - 4. Repair.

3.2 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - c. Remove labels that are not permanent.
 - d. Remove temporary protections that are not to remain.
 - e. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - f. Wipe surfaces of mechanical and electrical equipment, and similar equipment.
 - g. Leave Project clean.
- C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous

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materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance manuals for systems, subsystems, and equipment.
 - 2. Maintenance manuals for the care and maintenance of products, materials, and finishes.
- B. Related Sections include the following:
 - 1. Division 1 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
 - 2. Division 1 Section "Closeout Procedures" for submitting operation and maintenance manuals.

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 SUBMITTALS

- A. Final Submittal: Submit 2 copies of each manual in final form at least 15 days before final inspection. Architect will return copy with comments within 15 days after final inspection.
 - 1. Correct or modify each manual to comply with Architect's comments. Submit 3 copies of each corrected manual within 15 days of receipt of Architect's comments.

1.5 COORDINATION

- A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 MANUALS, GENERAL

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 - 1. Title page.
 - 2. Table of contents.
 - 3. Manual contents.
- B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:
 - 1. Subject matter included in manual.
 - 2. Name and address of Project.
 - 3. Name and address of Owner.
 - 4. Date of submittal.
 - 5. Name, address, and telephone number of Contractor.
 - 6. Name and address of Architect.
 - 7. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
 - 1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
 - 1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (115-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
 - 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of

equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch (115-by-280-mm), 20-lb/sq. ft. (75-g/sq. m) white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.2 OPERATION AND MAINTENANCE MANUALS

- A. Content: In addition to requirements in this Section, include operation and maintenance data required in individual Specification Sections and the following information:
 1. System, subsystem, and equipment descriptions.
 2. Performance and design criteria if Contractor is delegated design responsibility.
 3. Operating standards.
 4. Operating procedures.
 5. Wiring diagrams.
 6. Control diagrams.
 7. Piped system diagrams.
 8. Precautions against improper use.
 9. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
 1. Product name and model number.
 2. Manufacturer's name.
 3. Equipment identification with serial number of each component.
 4. Equipment function.
 5. Operating characteristics.
 6. Limiting conditions.
 7. Performance curves.
 8. Engineering data and tests.
 9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
 1. Startup procedures.
 2. Equipment or system break-in procedures.
 3. Routine and normal operating instructions.
 4. Regulation and control procedures.
 5. Instructions on stopping.

6. Normal shutdown instructions.
 7. Seasonal and weekend operating instructions.
 8. Required sequences for electric or electronic systems.
 9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.
- F. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
1. Standard printed maintenance instructions and bulletins.
 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
- G. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
 2. Troubleshooting guide.
 3. Precautions against improper maintenance.
 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 5. Aligning, adjusting, and checking instructions.
 6. Demonstration and training videotape, if available.
- H. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- I. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- J. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- K. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

- L. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include instructions and procedures for each type of emergency, and responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
 - 1. Include the following, as applicable:
 - a. Instructions on stopping.
 - b. Shutdown instructions for each type of emergency.
 - c. Operating instructions for conditions outside normal operating limits.
 - d. Required sequences for electric or electronic systems.
 - e. Special operating instructions and procedures.

2.3 PRODUCT MAINTENANCE MANUAL

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Product Information: Include the following, as applicable:
 - 1. Product name and model number.
 - 2. Manufacturer's name.
 - 3. Color, pattern, and texture.
 - 4. Material and chemical composition.
 - 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
 - 1. Inspection procedures.
 - 2. Types of cleaning agents to be used and methods of cleaning.
 - 3. List of cleaning agents and methods of cleaning detrimental to product.
 - 4. Schedule for routine cleaning and maintenance.
 - 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
 - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- C. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- D. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
 - 1. Do not use original Project Record Documents as part of operation and maintenance manuals.
- E. Comply with Division 1 Section "Closeout Procedures" for the schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 230010 – GENERAL MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. The General Conditions, Supplementary General Conditions, Instructions to Bidders, General Requirements, and Division 1 of these Specifications are part of the work of this Section.
- B. Section 230010 General Mechanical Requirements applies to the work of all Mechanical Trades, including HVAC, Temperature Controls, as well as each Mechanical Specification Section.

1.2 EQUIPMENT AND MATERIALS SPECIFIED

- A. Where products are named on the Drawings or in the Specifications, a **Basis of Design** product may be named. Other product manufacturers named in the specifications are acceptable; however, the Contractor must first confirm that these products meet the requirements of the contract documents by demonstrating at minimum that they fit into the available space, and meet all performance requirements indicated on the Contract Documents, prior to submitting them for approval. Where the Engineer has determined the products do not meet the requirements of the contract documents, the product is not acceptable.
- B. Where the Contractor submits for approval equipment or materials other than those that are the Engineer's basis for design, the Contractor shall first demonstrate in writing that the equipment or materials will fit into available space, and will meet or exceed all performance requirements indicated on the drawings. Where, in the opinion of the Engineer, any characteristic of the product or material requires modification, such as larger motors, electrical feeders, circuit breakers, additional control devices, valves, fittings, larger support and other miscellaneous equipment, the cost of all such modifications to this and other Contracts shall be borne by the Contractor offering the substitution.
- C. Contractor shall retain the ultimate responsibility for function of equipment and materials which are not the basis of design for the Contract Documents. Responsibility includes coordinate with other trades for proper location of roughing, and connections to be made by other trades, as well as removal and replacement of any doors, frames, walls, ceilings, and floors without additional cost to be borne by the project.
- D. If revised arrangement submittal is rejected, revise and resubmit specified "design equipment" item which conforms to the Contract Documents.

1.3 ABSENCE OF SPECIFICATION

- A. Where the drawings or the specifications do not name a particular brand or manufacturer of any item, the item is still part of the Work, and the Contractor shall provide such item(s) that may be

fairly and reasonably judged throughout the construction industry to be the most appropriate and best quality item for the intended application. Provide submittals for proposed items to the Engineer for review and approval.

1.4 ELECTRICAL CHARACTERISTICS FOR MECHANICAL EQUIPMENT

- A. Equipment of differing electrical characteristics may be furnished provided the Engineer is first notified in writing of the discrepancy, and that such proposed equipment is approved in writing by the Engineer, and that all connecting electrical services, feeders, branch circuits, disconnecting devices, over current devices, motor starting equipment, wiring, controls, boxes, and conduit sizes are appropriately modified, and the cost of all such modifications are borne by the Contractor. If minimum energy ratings or efficiencies are specified, all equipment shall comply with requirements.

1.5 SUBSTITUTIONS

- A. The materials, products and equipment described in the Bidding Documents establish a standard of required quality, functions, dimensions and appearance that must be met by any proposed substitution.
- B. Proposed substitutions must be submitted in writing to the Architect and Engineer a maximum of 48 hours after the contractor receives a notice to proceed. Each request shall include the name of the proposed material, product or equipment being substituted, cut sheets, installation drawings, performance and test data, warranties and location of three (3) similar installations with reference names of owner or facility personnel responsible for maintaining equipment. At that time, the equipment or will be evaluated and if determined to be acceptable and is acceptable the contractor may proceed to Submittal. Failure to follow the guidelines described above will result in equipment being rejected at submittal based solely on failure to follow the above guidelines.
- C. Approval by the Architect and/or Engineer to proceed with a substitution does not relieve the contractor from meeting all of the requirements set forth in section 1.2 of this specification.
- D. Requests for substitution shall be made only by a Bidder. Requests for substitution from sales representatives, vendors or suppliers are unacceptable and will not be considered.

1.6 SCOPE OF WORK

- A. Include in bid all labor, materials, tools, plant, transportation, excavation, equipment, insurance, temporary protection, permits, taxes, services and all necessary and related items required to provide complete and operational systems shown and described.
- B. References to codes and standards called for in the Contract Documents means the latest edition, amendment and revisions to the codes and standards in effect on the date of these contract documents.
- C. Contract shall include, but not be limited to:

1. HVAC
2. General Contracting work as related to the HVAC Contract
3. Temperature Controls
4. Testing, Adjusting, and Balancing of Mechanical Systems.

1.7 DRAWINGS AND SPECIFICATIONS

- A. The drawings are diagrammatic, and have been developed by the Engineer for the purpose of indicating the sizes, capacities, and the general arrangement of the systems to be installed under this Contract. Install all equipment in complete compliance with manufacturer's instructions, applicable codes and ordinances, and in a neat and workmanlike manner. Field inspect all existing conditions, and identify any obstacles or interferences which may affect the execution of the work. Carefully lay out the routing and location of all equipment and materials so as to accommodate obstacles and interferences, and to provide proper maintenance and access clearances.
- B. Notify the Engineer of any conflicts that will affect the quality, performance, or appearance of the systems installed under this Contract, prior to installing them. In the event of conflict between the drawings and specifications, or between different sheets within the drawing set, this shall be brought to the attention of the Engineer for resolution prior to submission of bids. In the event the contractor fails to note these discrepancies prior to the submission of bids or in writing within their bid submission, the Engineer shall resolve the discrepancy such that the design intent is provided. The contractor shall provide as part of the bid, all labor, materials, and equipment to provide the most costly installation.

1.8 CODES AND STANDARDS

- A. All Work shall conform to rules and regulations of federal, state, and local governmental agencies having jurisdictional authority. All installations shall be installed and tested in accordance with these rules and regulations.
- B. In the event of a conflict between these contract documents and governing rules, regulations, and codes the more stringent practice shall apply.
- C. Install all work in complete compliance with the applicable provisions of the following:
 1. 2015 International Building Code
 2. 2015 International Existing Building Code
 3. 2015 International Fire Code
 4. 2015 International Plumbing Code
 5. 2015 International Mechanical Code
 6. 2015 International Fuel Gas Code
 7. 2015 International Energy Conservation Code
 8. 2016 Supplement to the New York State Energy Conservation Code
 9. 2016 Uniform Code Supplement
 10. Local Codes and Ordinances for Village/Town/City/County, State
 11. USP 797 and 800 – Latest Editions

12. Facilities Guideline Institute (FGI) – Guideline for the Design and Construction of Health Care Facilities
13. New York State Department of Health Regulations (DOH)
14. New York State Department of Labor Rules and Regulations (DOL)
15. American Gas Association (AGA)
16. Underwriter's Laboratories (UL)
17. National Fire Protection Association (NFPA)
18. American Society of Mechanical Engineers (ASME)
19. American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)
20. Utility Company Standards and Requirements
21. Occupational, Safety and Health Act (OSHA)
22. International Standards Organization (ISO)
23. Other requirements required by the Authorities having Jurisdiction.

1.9 LICENSING AND PERMITS

- A. Contractor shall maintain all required licenses to perform the work of his respective trade in the locality where the project is constructed.
- B. All electrical work shall be performed under the supervision of a licensed electrician.
- C. All plumbing work shall be performed under the supervision of a licensed master plumber.
- D. Apply for all required permits associated with the work of this Contract and pay the cost of all associated permitting fees.

1.10 SUBMITTALS, SHOP DRAWINGS, WIRING DIAGRAMS

- A. Unless otherwise waived, provide submittals for all equipment and materials that are part of this Contract.
- B. Submittals shall include dimensions, weights, capacities, and a list of all specific features and accessories that are to be provided for this project in sufficient detail to permit the Engineer to determine compliance with specified requirements.
- C. Provide wiring diagrams for approval by the Engineer for all electrically powered and/or electrically controlled equipment that is part of this Contract.
- D. Provide complete temperature control wiring diagrams for approval by the Engineer for all temperature control systems and equipment.
- E. Refer to Division 1 for additional requirements for submittals and shop drawings. Where such requirements conflict with this section, the more stringent shall apply.
- F. Approval of shop drawings and/or submittals does not relieve this contractor from responsibility for deviations from the contract documents. It is the responsibility of the Contractor to meet the requirements of these documents. All errors and omissions in the product data are to be corrected by this Contractor irrespective of any approvals by the Architect or Engineer.

1.11 LAYOUT, COORDINATION AND SEQUENCING

- A. Coordinate the work with the work of other Contractors working on this project.
- B. It is the responsibility of this Contractor to lay out and adjust the location of the work of this Contract. Contractor's layout shall accommodate all obstacles and interferences anticipated or encountered. Contractor shall relocate obstacles and interferences where required, and as may additionally be directed by the Engineer.
- C. Store materials on a dry base, a least 6" above grade. Store materials so not to interfere with other work or obstruct access to the building. Provide covering, if stored outdoors, provide sight-proof covering. Protect against both theft and damage. Replace stolen or damaged items at no additional cost to the project.
- D. Install the work sequentially with respect to the work of other trades in a timely manner, and so as not to delay the work of other trades or of the Project schedule.
- E. Adhere to the established Construction Schedule for the Project.
- F. Order all equipment and materials in a timely manner so as not to delay the Project. Notify the Engineer of any delays in the timely procurement of equipment and materials.

1.12 ELECTRONIC CAD FILES

- A. The Engineer may provide the Contractor with CAD files for this project, at the request of the contractor. Contractor shall be required to supply the Engineer a completed CAD release form, to be supplied by the Engineer. These CAD files shall be used for reference purposes only, and not as shop drawings or as-built documents. It is the Contractors' responsibility to provide detailed, coordinated shop drawings and documentation prior to installation. The purpose of the Contractors' coordination shop drawings is to account for all trades and field conditions and identify any conflicts that shall be resolved prior to installation.
- B. Any additional cost for changes due to conflicts as a result of the Contractors' failure to provide properly coordinated documents will be the responsibility of the Contractors and not of the Engineer or the Owner.
- C. If the Contractor requests electronic CAD files from the Engineer and this request is granted, such convenience may be deducted from monies owed to the contractor at the completion of the project at a value determined mutually by the Engineer and Contractor.

1.13 EXISTING CONDITIONS

- A. Inspect the existing premises where the work is performed prior to submitting a proposal to perform the work. Note all instances where interferences and/or obstacles will affect the layout of the work.
- B. Submit a complete list and photographs of existing damage, to the Owner prior to beginning work. If existing damage is not documented and submitted, the Contractor shall repair all

damage found at the completion of the project that is determined to have been caused by the work of this contract. Repairs shall restore the area to like new condition.

- C. The Owner's Representative shall determine if the Contractor has damaged existing systems or construction and shall approve the repairs.

1.14 REMOVALS AND DEMOLITION

- A. Where drawings indicate items to be removed, Contractor shall remove all equipment, supports, foundations, concrete pads, frames, piping, controls, insulation, fasteners, conduit, wiring, boxes, ductwork, concrete bases, metal bases, and all other related accessories. Remove these items from the site, and dispose of at an approved disposal facility. Pay all fees associated with disposal of removed items.
- B. Contractor shall refer to specification 230593 – Testing, Adjusting, and Balancing and perform any pre-testing required as part of that specification, prior to removal of any mechanical and/or temperature system or component.
- C. Demolition of mechanical systems includes removal and deprogramming of multiple control system devices and sensors. Coordinate with the Owner if any quantity to desired to be turned over surplus stock. Owner shall determine which items shall be turned over.
- D. Contractor to exercise extreme care to preserve materials, finishes, and equipment to remain.
- E. Where the Contract Documents require that equipment be turned over to the Owner, Contractor to exercise extreme care in removing and handling the equipment, and shall turn same over to owner in same condition as presently exists, and at location as directed by the Owner.
- F. Unless specifically called out on the Contract Documents, the Contractor is not to leave any piping, piping specialties, ductwork, ductwork accessories, conduit, wiring, panels, pneumatic tubing, equipment, fasteners, hangers, or supports, abandoned in place. Where a systems is called on the contract documents to be removed, all the above listed installations shall be included with the removal. Seal all openings after removal as called for on the contract documents in a manner consistent with the adjacent construction. Structural integrity of the building shall be maintained.

1.15 ASBESTOS RECOGNITION AND PRECAUTION

- A. The Contractor shall be responsible for coordination of all required removal work, coring, cutting and patching with the Owner's asbestos management plan. Prior to performing such work, identify areas containing asbestos. Notify the Owner so that arrangements may be made for abatement and/or containment prior to work proceeding. The Contractor shall be responsible for cleaning all areas where asbestos is released due to the failure to coordinate with the asbestos management plan. Refer to Division 1 Sections for further requirements.
- B. The disturbance or dislocation of asbestos-containing materials causes asbestos fibers to be released into the building's atmosphere, thereby creating a health hazard to workmen and building occupants. Consistent with Industrial Code Rule 56 and the content of recognized

asbestos-control work, the Contractor shall apprise all of his workers, supervisory personnel, subcontractors, Owner and Consultants who will be at the job site of the seriousness of the hazard and of proper safeguards and work procedures which must be followed, as described in New York State Department of Labor Industrial Code Rule 56.

1.16 ROUGHING IN

- A. Due to small scale of Drawings, it is not possible to indicate all offsets, fittings, changes in elevation, etc. Verify final locations for rough-ins with field measurements and with the equipment being connected. Verify exact location and elevations at work site prior to any rough in work. DO NOT SCALE PLANS. If field conditions, details, changes in equipment or shop drawing information require a significant change to the original documents, contact the Owner's Representative for approval before proceeding.
- B. All equipment locations shall be coordinated with other trades to eliminate interference with required clearances for equipment maintenance and inspections.
- C. Coordinate work with other trades and determine exact routing of all duct, pipe, conduit, etc., before fabrication and installation. Coordinate with Architectural Drawings and all existing architecture. Verify with Owner's Representative exact location and mounting height of all equipment in finished areas, such as thermostats, fixtures, communication and electrical devices, including panels. Mechanical and electrical drawings show design arrangement only for Diffusers, grilles, registers, air terminals, lighting fixtures, sprinklers, speakers and other items. Do not rough-in contract work without reflected ceiling location plans. Report to the Engineer immediately for instances where to the mechanical/electrical/architectural plans show more than one device occupying the same ceiling location.
- D. Before roughing for equipment furnished by Owner or in other contracts, obtain approved roughing drawings giving exact location for each piece of equipment. Do not "rough in" services without final layout drawings approved for construction. Cooperate with other trades to ensure proper location and size of connections. Ensure proper functioning of all systems and equipment. Obtain written authorization from the Owner's Representative or other contractor for any "rough ins" that are required before approved coordination drawings are available. Any work installed without written authorization or approved coordination drawings, causing a conflict will be relocated by the Contractor at no additional cost to the project.
- E. For equipment and connections provided in this contract, prepare roughing drawings as follows:
 - 1. Existing equipment being relocated: Measure the existing equipment and prepare drawings for installation in new location.
 - 2. New equipment: Obtain equipment roughing drawings and dimensions, then prepare rough-in drawings.
- F. Where more than one trade is involved in an area, space or chase, all shall cooperate and install their own work to utilize the space equally between them in proportion to their individual requirements. In general, ductwork shall be given preference except where grading of piping becomes a problem, followed by piping then electrical wiring. If it is determined that ample maintenance and passage space has not been provided, rearrange work and/or furnish other equipment as required for ample maintenance space. Any changes in the size or location of the

material or equipment supplied, which may be necessary in order to meet field conditions or in order to avoid conflicts between trades, shall be brought to the immediate attention of the Owner's Representative and approval received before such alterations are made.

- G. Contractor shall relocate existing work in the way of new construction. VISIT SITE BEFORE BIDDING TO DETERMINE SCOPE OF WORK. Provide new materials, including new piping and insulation for relocated work.
- H. All equipment requiring service and / or access shall be provided adequate clearances for this purpose. Any clearances described in manufacturer's information, code requirements, etc., shall be taken into account in determining final rough-in positions. Reasonable access for maintenance and service shall be maintained. The most stringent standard, as determined by the Engineer, shall apply.

1.17 CUTTING AND PATCHING

- A. Provide cutting and patching for all work under this Contract:
 - 1. Provide steel lintels for all duct floor and wall penetrations and similar large openings.
 - 2. Provide steel sleeves for all floor and wall pipe penetrations.
- B. Refer to Division 1, Section "Cutting and Patching" for additional requirements.

1.18 CONCEALMENT

- A. Conceal all work above ceilings and within walls, below slabs, and elsewhere through the building, except in unfinished spaces. Where a conflict exists that renders concealment impossible, notify the Engineer before starting the work and install as directed.

1.19 FIRE-STOPPING

- A. Refer to Division 7 Section "Through-Penetration Firestop Systems". Where the provisions contained in Division 7 Section "Through-Penetration Firestop Systems" conflict with the requirements contained herein, the more stringent shall apply. Where Division 7 Section "Through-Penetration Firestop Systems" is not included, the provisions contained herein shall apply.
- B. Provide materials and products listed by an independent testing laboratory for Through-Penetration Fire Stop Systems, to meet requirements of Fire Tests of Through Penetration Fire-Stops, ASTM E814.
- C. Provide fire stop system at all locations where piping, tubing, conduit, cables, ductwork, and similar items pass through or penetrate any fire rated wall or floor assembly. Where fire ratings of wall and floor assemblies are not indicated on the drawings, Contractor is to assume that all floor and wall assemblies are two (2) hour fire rated assemblies.

- D. Maintain minimum required fire-resistance rating of the wall, floor, or ceiling assembly which is penetrated.
- E. Apply fire-stopping systems within the temperature and humidity limits permitted by the manufacturer.
- F. Provide rigid sleeves where non-armored cables pass through fire rated walls and barriers.
- G. Acceptable Manufacturers:
 - 1. Hilti Firestop Systems
 - 2. Dow Corning Fire-Stop System Foams and Sealants
 - 3. Nelson Electric Fire-Stop System Putty, CLK and WRP
 - 4. Thomas & Betts – S-100 FS500/600
 - 5. Carborum Fyre Putty

1.20 EQUIPMENT INSTALLATION

- A. Minimum Requirements:
 - 1. Materials shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less, in accordance with NFPA 255.
 - 2. All equipment and material for which there is a listing service shall bear a UL label.
 - 3. Electrical equipment and systems shall meet UL Standards and requirements of the N.E.C. This listing requirement applies to the entire assembly. Any modifications to equipment to suit the intent of the specifications shall be performed in accordance with UL Standards and the requirements of the N.E.C.
 - 4. Communications equipment shall meet all FCC Regulations.
 - 5. All materials, unless otherwise specified, shall be new and be the standard products of the manufacturer. Used equipment or damaged material will be rejected.
- B. Install all equipment in compliance with manufacturer's instructions and the Contract Documents. Notify the Engineer where manufacturer's instructions differ from the Contract Documents for resolution.
- C. Coordinate ordering all equipment with long lead times or equipment having major impact on work by other trades.
- D. Provide all scaffolding, rigging, hoisting, and services necessary for erection and delivery of equipment and apparatus furnished. Remove these apparatus' when they are no longer required.
- E. Where mounting heights are not indicated, install systems in a manner to maximize head room possible.
- F. Lay out equipment to provide access to all components requiring maintenance. Provide clearances as required by applicable codes and standards, as well as manufacturer's recommendations, and good practice.

- G. Lay out equipment so as to provide adequate removal clearance for coils, tubes, fan assemblies, and similar components.
- H. Equipment shall be plumb and level, and secured to supporting structures as specified, recommended by manufacturer, and as dictated by good practice.
- I. Take all necessary precautions with equipment, systems, and building to prevent any damage due to freezing and/or water. Repair or replace, any no additional cost to the project, any such damage which is a result of failure to take proper precautions against freezing and water damage.

1.21 EQUIPMENT SUPPORTS, ROOF CURBS AND CONCRETE BASES

- A. Provide supporting structures for all mechanical equipment.
- B. Concrete Bases:
 - 1. Provide concrete bases for all floor mounted equipment including, but not limited to, Chillers, Boilers, air-handling units, heat recovery units, furnaces, fans, pumps, generators, water heaters, storage tanks, expansion and compression tanks, heat exchangers, condensate pumps, vacuum pumps and all other similar equipment required for this project, as called for on the Contract Documents.
 - 2. Floor mounted mechanical equipment shall be mounted on 4" high concrete bases. The plan dimensions of each base shall extend 6" beyond the outer extents of the equipment served.
 - 3. Concrete bases shall be doweled into floor with steel dowels, minimum 4 dowels per pad, and shall consist of minimum 28 day minimum strength - 4,000-psi strength concrete. Concrete bases shall be steel reinforced, with minimum one ½" rebar for every 2 sqft of base area, and shall be smooth and level.
 - 4. Corners of concrete bases shall be chamfered.
 - 5. Paint edge of bases two coats bright yellow.
- C. Equipment support frames:
 - 1. Provide steel support frames for all equipment under this Contract that is installed above the floor or suspended from the structure above including, but not limited to, boilers, pumps, heat exchangers, air-handling units, terminal boxes, coils, expansion tanks, compression tanks, furnaces, heat recovery units, valves, control panels, as called for on the Contract Documents.
 - 2. Unless otherwise noted, use galvanized steel support frames.
 - 3. Use structural steel channels and steel angles, bolted construction.
 - 4. Provide 1/2" steel plate at each vertical support, anchor bolted to floor; anchor top of each vertical support to structure above.
 - 5. Provide diagonal bracing to restrain deflection in the three perpendicular axes.
 - 6. Attach equipment to frame using approved fasteners and vibration isolating mounting hardware.
 - 7. Use horizontal frames suspended from above from four points with threaded rods, forged steel turnbuckles and associated hardware for suspended items such as fans, terminal boxes, and similar equipment as approved by the Engineer. Provide lateral sway bracing

anchored to structure for each orthogonal axis. Use steel angles or channels for this purpose.

- a. Threaded rod schedule, total weight suspended based on minimum four (4) rods:

Weight (lbs)	Rod Diameter (4 rods required to support Weight)
0-300	3/8"
301-585	1/2"
586-900	5/8"
901-1350	3/4"
1351-2500	1"
1/4" diameter rod is not permitted.	

8. Metal bars, plates, tubing, etc. shall conform to ASTM standards:

- a. Steel plates, shapes, bars, and grating: ASTM A36
- b. Cold-formed Steel Tubing: ASTM A500
- c. Hot-rolled Steel Tubing: ASTM A501
- d. Steel Pipe: ASTM A53, Schedule 40, welded
- e. Fasteners shall be zinc-coated, type, grade, and class as required.

D. Curbs, rails and dunnage

- 1. Provide factory manufactured, insulated roof mounting curbs for all roof mounted equipment including, but not limited to fans, rooftop HVAC units, and similar equipment.
- 2. Unless specifically noted otherwise, provide structural steel roof mounting rails for chillers, condensing units, condensers, and similar equipment.
- 3. Coordinate installation of all curbs, rails, and dunnage with the Contractor performing the roof work.

E. Refer to respective Specification sections for support of ductwork and piping.

F. Provide shop drawings for all concrete bases, equipment support frames, and mounting curbs, mounting rails, for review and approval by the Engineer.

1.22 START-UP AND TESTING

- A. Engage the services of a qualified factory representative for all manufactured equipment to assist in the start-up of all systems and equipment installed under this Contract.
- B. Test all systems, equipment, components, and controls installed under this Contract.
- C. Test all piping and related accessories installed under this Contract.
- D. Testing requirements are contained in specifications for each specific equipment, component, and material type.

- E. Correct all deficient items detected and re-test until results are satisfactory.
- F. Upon completion of testing, submit a comprehensive written test report to the Engineer for review and approval.

1.23 CONTINUITY OF SERVICES

- A. All or part of the building will be in use during construction operations. Maintain existing systems in operation within all rooms of building as directed by the Owner. Refer to "General Conditions of the Contract for Construction" for temporary facilities for additional contract requirements. Schedules for various phases of contract work shall be coordinated with all other trades and with Owner's Representative. Provide, as part of contract, temporary mechanical connections and relocation as required to accomplish the above. Obtain approval in writing as to date, time, and location for shut-down of existing mechanical facilities or services.

1.24 ADJUSTMENTS AND BALANCING

- A. Balance all air and fluid flows associated with the systems installed under this contract per the Engineer's requirements. Where flow rates, speeds, and capacities are not stated on the drawings, the Engineer will, upon request, provide the Contractor with required quantities. Refer to Section "Testing, Adjusting, and Balancing" for additional requirements.

1.25 IDENTIFICATION

- A. Identify all equipment, piping, ductwork, valves, and controls with permanent, marking system as specified. Refer to Section "Mechanical Identification" for requirements.

1.26 CLEANING

- A. Keep the job site and premises clean at all times. Refer to Division 1 for requirements.
- B. Contractor shall maintain all installed work clean throughout the duration of the project.
 - 1. Remove debris, dirt, grease, paint, plaster, etc. from all equipment and materials installed.
 - 2. Restore original finish of any equipment and materials damaged during construction.
- C. Clean piping and ductwork prior to testing. Refer to specific specification sections covering piping and ductwork for specific cleaning requirements.

1.27 RECORD DRAWINGS

- A. The Contractor shall prepare record drawings of the completed work of this Contract.
 - 1. Take dimensions from a given fixed bench mark, such as the corner of a building, and neatly and clearly indicate same on reproducible prints.

2. Provide Record Drawings for all Contract Work. Document the location of control devices, isolation valves, safety devices, and equipment.
3. Incorporate all field changes, change orders and other modifications into the final Record Drawings.
4. Record drawings shall contain all corrections from construction documents to as-built conditions and shall be submitted for review and approval. Documents shall be provided in PDF format or, where fully developed in CAD, in AutoCAD compatible file format. Submittal media shall be as acceptable to the Owner and Engineer.

1.28 OPERATING AND MAINTENANCE INSTRUCTIONS

- A. Operation instruction: After all systems have been completely installed and satisfactorily tested, instruct the Owner's representative on the operation of all systems and equipment that are part of this Contract. Instruction shall be a "hands on" session, whereby the Contractor physically demonstrates the proper operation of all items of equipment. Provide written instructions for the Owner's use prior to the time of instruction, and amend same where required. Include sufficient time to permit the Owner to master the operation of all systems.
- B. Provide one (1) electronic version and one (1) bound set of maintenance manuals covering all systems installed under this contract. Manuals shall adhere to the following requirements:
 1. Bound in three-ring binders.
 2. Cover sheet to include Project title, Contractors name, contact person, contact information, name and contact information of all factory equipment representatives.
 3. Table of contents; tabulated section for each major system.
 4. Operations instructions for each major system.
 5. Include the following for each item of equipment furnished under this contract:
 - a. Maintenance instructions
 - b. Manufacturer's data sheets
 - c. Recommended spare parts inventory
 - d. Wiring diagrams
 6. Preventative maintenance schedule
 7. Record drawings
 8. Temperature controls drawings
 9. Provide approved submittal as part of O&M clearly identifying manufacturer and provided model number.
 10. Include vendor contact information for service and warranty
 11. Include all start-up and testing reports

PART 2 - PRODUCTS – not used

PART 3 - EXECUTION – not used

END OF SECTION 230010

SECTION 230513 - COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.3 COORDINATION

- A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
 - 1. Motor controllers.
 - 2. Torque, speed, and horsepower requirements of the load.
 - 3. Ratings and characteristics of supply circuit and required control sequence.
 - 4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS

- A. Manufacturers: Subject to compliance with the requirements, provide products by one of the following:
 - 1. Baldor (Basis of design)
- B. Comply with NEMA MG 1 unless otherwise indicated.
- C. Comply with IEEE 841 for severe-duty motors.
- D. Motors to have three (3) year warranty.
- E. Efficiency rating shall appear on nameplate and shall be not less than as follows:

MINIMUM NOMINAL FULL LOAD EFFICIENCY FOR 60 HZ NEMA GENERAL PURPOSE ELECTRIC MOTORS (SUBTYPE I) RATED 600 VOLTS OR LESS (RANDOM WOUND)						
HP	OPEN DRIP-PROOF MOTORS			TOTALLY ENCLOSED FAN-COOLED MOTORS		
	2 POLES 3600 RPM	4 POLES 1800 RPM	6 POLES 1200 RPM	2 POLES 3600 RPM	4 POLES 1800 RPM	6 POLES 1200 RPM
1	77.0	85.5	82.5	77.0	85.5	82.5
1.5	84.0	86.5	86.5	84.0	86.5	87.5
2	85.5	86.5	87.5	85.5	86.5	88.5
3	85.5	89.5	88.5	86.5	89.5	89.5
5	86.5	89.5	88.5	88.5	89.5	89.5
7.5	88.5	91.0	90.2	89.5	91.7	91.0
10	89.5	91.7	91.7	90.2	91.7	91.0
15	90.2	93.0	91.7	91.0	92.4	91.7
20	91.0	93.0	92.4	91.0	93.0	91.7
25	91.7	93.6	93.0	91.7	93.6	93.0
30	91.7	94.1	93.6	91.7	93.6	93.0
40	92.4	94.1	94.1	92.4	94.1	94.1
50	93.0	94.5	94.1	93.0	94.5	94.1
60	93.6	95.0	94.5	93.6	95.0	94.5
75	93.6	95.0	94.5	93.6	95.4	94.5
100	93.6	95.4	95.0	94.1	95.4	95.0
125	94.1	95.4	95.0	95.0	95.4	95.0
150	94.1	95.8	95.4	95.0	95.8	95.8
200	95.0	95.8	95.4	95.4	96.2	95.8
250	95.0	95.8	95.4	95.8	96.2	95.8
300	95.4	95.8	95.4	95.8	96.2	95.8
350	95.4	95.8	95.4	95.8	96.2	95.8
400	95.8	95.5	95.8	95.8	96.2	95.8
450	95.8	96.2	96.2	95.8	96.2	95.8
500	98.5	96.2	96.2	95.8	96.2	95.8

MINIMUM NOMINAL FULL-LOAD EFFICIENCIES GENERAL PURPOSES ELECTRIC MOTORS (SUBTYPE II) AND ALL DESIGN B MOTORS GREATER THAN 200 HP								
HP	OPEN DRIP-PROOF MOTORS				TOTALLY ENCLOSED FAN-COOLED MOTORS			
	2 POLE 3600 RPM	4 POLE 1800 RPM	6 POLE 1200 RPM	8 POLE 900 RPM	2 POLE 3600 RPM	4 POLE 1800 RPM	6 POLE 1200 RPM	8 POLE 900 RPM
1	NR	82.5	80.0	74.0	75.5	82.5	80.0	74.0
1.5	82.5	84.0	84.0	75.5	85.5	84.4	85.5	77.0

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2	84.0	84.0	85.8	85.5	84.0	84.0	86.5	82.5
3	84.0	86.5	86.5	86.5	85.5	87.5	87.5	84.0
5	85.5	87.5	87.5	87.5	87.5	87.5	87.5	84.0
7.5	87.5	88.5	88.5	88.5	88.5	89.5	89.5	85.5
10	88.5	89.5	90.2	89.5	89.5	89.5	89.5	88.5
15	89.5	91.0	90.2	89.5	90.2	91.0	90.2	88.5
20	90.2	91.0	91.0	90.2	90.2	91.0	90.2	89.5
25	91.0	91.7	91.7	92.0	91.0	92.4	91.7	89.5
30	91.0	92.4	92.4	91.0	91.0	92.4	91.7	91.0
40	91.7	93.0	93.0	91.0	91.7	93.0	93.0	91.0
50	92.4	93.0	93.0	91.7	92.4	93.0	93.0	91.7
60	93.0	93.6	93.6	92.4	93.0	93.6	93.6	91.7
75	93.0	94.1	93.6	93.6	93.0	94.1	93.6	93.0
100	93.0	94.1	94.1	93.6	93.6	94.5	94.1	93.0
125	93.6	94.5	94.1	93.6	94.5	94.5	94.1	93.6
150	93.6	95.0	94.5	93.6	94.5	95.0	95.0	93.6
200	94.5	95.0	94.5	93.6	95.0	95.0	95.0	94.1
250	94.5	95.4	95.4	94.5	95.4	95.0	95.0	94.5
300	95.0	95.4	95.4	NR	95.4	95.4	95.0	NR
350	95.0	95.4	95.4	NR	95.4	95.4	95.0	NR
400	95.4	95.4	NR	NR	95.4	95.4	NR	NR
450	95.8	95.8	NR	NR	95.4	95.4	NR	NR
500	95.8	95.8	NR	NR	95.4	95.8	NR	NR

MINIMUM AVERAGE FULL LOAD EFFICIENCY POLYPHASE SMALL ELECTRIC MOTORS			
HP	OPEN MOTORS		
	2 POLES 3600 RPM	4 POLES 1800 RPM	6 POLES 1200 RPM
0.25	65.6	69.5	67.5
0.33	69.5	73.4	71.4
0.50	73.4	78.2	75.3
0.75	76.8	81.1	81.7
1	77.0	83.5	82.5
1.5	84.0	86.5	83.8
2	85.5	86.5	N/A
3	85.5	86.9	N/A
MINIMUM AVERAGE FULL LOAD EFFICIENCY FOR CAPACITOR-START CAPACITOR-RUN AND			

CAPACITOR-START INDUCTION-RUN SMALL ELECTRIC MOTORS			
HP	OPEN MOTORS		
	2 POLES 3600 RPM	4 POLES 1800 RPM	6 POLES 1200 RPM
0.25	66.6	68.5	62.2
0.33	70.5	72.4	66.6
0.50	72.4	76.2	76.2
0.75	76.2	81.8	80.2
1	80.4	82.6	81.1
1.5	81.5	83.8	N/A
2	82.9	84.5	N/A
3	84.1	N/A	N/A

2.2 MOTOR CHARACTERISTICS

- A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.
- B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.
- C. Motor Application: Provide the following enclosure types unless noted:

Environment/Location	Motor Enclosure Type
General Purpose	Open drip-proof with cast iron frame, TEFC with cast iron frame, or encapsulated
Outdoors, below grade or high humidity	TEFC with cast iron frame
Hazardous	Explosion-proof
Packaged Refrigeration Compressors	Hermetic or semi-hermetic

2.3 POLYPHASE MOTORS

- A. Description: NEMA MG 1, Design B, medium induction motor.
- B. Efficiency: Energy efficient, as defined in NEMA MG 1.
- C. Service Factor: 1.15.

- D. Multispeed Motors: Variable torque.
 - 1. For motors with 2:1 speed ratio, consequent pole, single winding.
 - 2. For motors with other than 2:1 speed ratio, separate winding for each speed.
- E. Multispeed Motors: Separate winding for each speed.
- F. Rotor: Random-wound, squirrel cage.
- G. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.
- H. Temperature Rise: Match insulation rating.
- I. Insulation: Class F.
- J. Code Letter Designation:
 - 1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
 - 2. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.

2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

- A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.
- B. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
 - 1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
 - 2. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
 - 3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
 - 4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.
- C. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.

2.5 SINGLE-PHASE MOTORS

- A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
 - 1. Permanent-split capacitor.
 - 2. Split phase.
 - 3. Capacitor start, inductor run.

4. Capacitor start, capacitor run.
- B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.
- C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.
- D. Motors 1/20 HP and Smaller: Shaded-pole type.
- E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

2.6 SHAFT GROUNDING RINGS

- A. Motors for use with Variable Speed Drives:
 1. Shaft Grounding ring on NEMA Premium and inverter duty motors consisting of conductive microfibers and grounding path.

PART 3 - EXECUTION

3.1 MOTORS

- A. Furnished by the equipment manufacturer and selected and installed for the intended use. Motors to be accessible for maintenance and, where applicable, belt adjustment.

3.2 SHAFT GROUNDING RINGS

- A. Wire Shaft Grounding Kit on motors for use with variable frequency drives:
 1. Ensure shaft grounding kit is installed on motor in accordance with manufacturer's recommendations.
 2. Shaft grounding ring (SGR) is bolted directly to the motor end bracket for installed with conductive epoxy to ensure ground connection from the SGR to the motor frame.

END OF SECTION 230513

SECTION 230519 - METERS AND GAUGES FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Liquid-in-glass thermometers.
 - 2. Thermowells.
 - 3. Dial-type pressure gauges.
 - 4. Gauge attachments.
 - 5. Test plugs.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For meters and gauges to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 LIQUID-IN-GLASS THERMOMETERS

- A. Metal-Case, Industrial-Style, Liquid-in-Glass Thermometers:
 - 1. Performance: Subject to compliance with requirements and related documents, provide products meeting a minimum performance of the following:
 - 2. Standard: ASME B40.200.
 - 3. Case: Cast aluminum; 9-inch nominal size unless otherwise indicated.
 - 4. Case Form: Adjustable angle unless otherwise indicated.
 - 5. Tube: Glass with magnifying lens and blue organic liquid.
 - 6. Tube Background: Non-reflective aluminum with permanently etched scale markings graduated in deg F.

7. Window: Glass.
8. Stem: Aluminum and of length to suit installation.
 - a. Design for Thermowell Installation: Bare stem.
9. Connector: 1-1/4 inches, with ASME B1.1 screw threads.
10. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

2.2 THERMOWELLS

A. Thermowells:

1. Standard: ASME B40.200.
2. Description: Pressure-tight, socket-type fitting made for insertion into piping tee fitting.
3. Material for Use with Copper Tubing: CNR or CUNI.
4. Material for Use with Steel Piping: CRES or CSA
5. Type: Stepped shank unless straight or tapered shank is indicated.
6. External Threads: NPS 1/2, NPS 3/4, or NPS 1, ASME B1.20.1 pipe threads.
7. Internal Threads: 1/2, 3/4, and 1 inch, with ASME B1.1 screw threads.
8. Bore: Diameter required to match thermometer bulb or stem.
9. Insertion Length: Length required to match thermometer bulb or stem.
10. Lagging Extension: Include on thermowells for insulated piping and tubing.
11. Bushings: For converting size of thermowell's internal screw thread to size of thermometer connection.

B. Heat-Transfer Medium: Mixture of graphite and glycerin.

2.3 PRESSURE GAUGES

A. Direct-Mounted, Metal-Case, Dial-Type Pressure Gauges:

1. Performance: Subject to compliance with requirements and related documents, provide products meeting a minimum performance of the following:
2. Standard: ASME B40.100.
3. Case: Sealed type; cast aluminum; 6-inch nominal diameter.
4. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
5. Pressure Connection: Brass, with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
6. Movement: Mechanical, with link to pressure element and connection to pointer.
7. Dial: Non-reflective aluminum with permanently etched scale markings graduated in psi.
8. Pointer: Dark-colored metal.
9. Window: Glass.
10. Ring: Brass.
11. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range.

2.4 GAUGE ATTACHMENTS

- A. Snubbers: ASME B40.100, brass; with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and piston-type surge-dampening device. Include extension for use on insulated piping.
- B. Siphons: Loop-shaped section of brass pipe with NPS 1/4 or NPS 1/2 pipe threads.
- C. Valves: Brass ball, with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads.

2.5 TEST PLUGS

- A. Performance: Subject to compliance with requirements and related documents, provide products meeting a minimum performance of the following:
 - 1. Description: Test-station fitting made for insertion into piping tee fitting.
 - 2. Body: Brass or stainless steel with core inserts and gasketed and threaded cap. Include extended stem on units to be installed in insulated piping.
 - 3. Thread Size: NPS 1/4 or NPS 1/2 ASME B1.20.1 pipe thread.
 - 4. Minimum Pressure and Temperature Rating: 500 psig at 200 deg F
 - 5. Core Inserts: EPDM self-sealing rubber.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install thermowells with socket extending to center of pipe and in vertical position in piping tees.
- B. Provide thermowells associated with each thermometer. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.
- C. Install thermowells with extension on insulated piping.
- D. Fill thermowells with heat-transfer medium.
- E. Install direct-mounted thermometers in thermowells and adjust vertical and tilted positions.
- F. Install direct-mounted pressure gauges in piping tees with pressure gauge located on pipe at the most readable position.
- G. Install valve and snubber in piping for each pressure gauge for fluids.
- H. Install test plugs in piping tees.
- I. Install permanent indicators on walls or brackets in accessible and readable positions.
- J. Install connection fittings in accessible locations for attachment to portable indicators.

K. Install siphons where required to protect from high temperature damage of gauges

L. Install thermometers in the following locations:

1. Inlet and outlet of each hydronic coil.
2. As shown on drawings

M. Install pressure gauges in the following locations:

1. Inlet and outlet of each hydronic coil
2. As shown on drawings

3.2 CONNECTIONS

A. Install meters and gauges adjacent to machines and equipment to allow service and maintenance of meters, gauges, machines, and equipment.

3.3 ADJUSTING

A. After installation, calibrate meters according to manufacturer's written instructions.

B. Adjust faces of meters and gauges to proper angle for best visibility.

3.4 THERMOMETER SCHEDULE

A. Thermometers as listed above and as shown on drawings shall be the following:

1. Industrial-style, liquid-in-glass type.
2. Test plug with EPDM self-sealing rubber inserts.
3. Install thermometers in thermowells.

B. Thermometer stems shall be of length to match thermowell insertion length.

3.5 THERMOMETER SCALE-RANGE SCHEDULE

A. Scale Range for Heating, Hot-Water Piping: 0 to 250 deg F.

3.6 PRESSURE-GAUGE SCHEDULE

A. Pressure gauges listed above and as shown on drawings shall be the following:

1. Sealed, direct-mounted, metal case.
2. Test plug with EPDM self-sealing rubber inserts.
3. Install pressure gauge in snubber

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3.7 PRESSURE-GAUGE SCALE-RANGE SCHEDULE

- A. Scale Range for Heating, Hot-Water Piping: 0 to 100 psi

END OF SECTION 230519

SECTION 230523 - GENERAL-DUTY VALVES FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Bronze ball valves.
 - 2. Bronze swing check valves

- B. Related Sections:

- 1. Division 23 Section "Identification for HVAC Piping and Equipment" for valve tags and schedules.
 - 2. Division 23 Section "HVAC hydronic piping."
 - 3. Division 23 Section "HVAC hydronic piping specialties."

1.3 DEFINITIONS

- A. CWP: Cold working pressure.
- B. EPDM: Ethylene propylene copolymer rubber.
- C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
- D. NRS: Nonrising stem.
- E. OS&Y: Outside screw and yoke.
- F. RS: Rising stem.
- G. SWP: Steam working pressure.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of valve indicated.

- B. Provide valve schedule indicating intended type of valve to be installed and installation location. Refer to valve schedule below.

1.5 QUALITY ASSURANCE

- A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.
- B. ASME Compliance:
 - 1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
 - 2. ASME B31.1 for power piping valves.
 - 3. ASME B31.9 for building services piping valves.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
 - 1. Protect internal parts against rust and corrosion.
 - 2. Protect threads, flange faces, grooves, and weld ends.
 - 3. Set ball valves open to minimize exposure of functional surfaces.
- B. Use the following precautions during storage:
 - 1. Maintain valve end protection.
 - 2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.
- C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

- A. Refer to HVAC valve schedule articles for applications of valves.
- B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- C. Valve Sizes: Same as upstream piping unless otherwise indicated.
- D. Valve Actuator Types:
 - 1. Handwheel: For valves other than quarter-turn types.
 - 2. Handlever: For quarter-turn valves NPS 6 and smaller.

- E. Valves in Insulated Piping: With 2-inch stem extensions and the following features:
 - 1. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
- F. Valve-End Connections:
 - 1. Flanged: With flanges according to ASME B16.1 for iron valves.
 - 2. Solder Joint: With sockets according to ASME B16.18.
 - 3. Threaded: With threads according to ASME B1.20.1.
 - 4. Grooved: With grooves according to AWWA C606.

2.2 BRONZE BALL VALVES

- A. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Conbraco Industries, Inc.; Apollo Valves.
 - b. Milwaukee Valve Company.
 - c. NIBCO INC.
 - d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 - 2. Description:
 - a. Standard: MSS SP-110.
 - b. SWP Rating: 150 psig.
 - c. CWP Rating: 600 psig.
 - d. Body Design: Two piece.
 - e. Body Material: Bronze.
 - f. Ends: Threaded.
 - g. Seats: PTFE.
 - h. Stem: 316 Stainless Steel.
 - i. Ball: 316 Stainless Steel.
 - j. Port: Full.

2.3 BRONZE SWING CHECK VALVES

- A. Class 150, Bronze Swing Check Valves with Bronze Disc:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Valve, Inc.
 - b. Milwaukee Valve Company.

- c. NIBCO INC.
- 2. Description:
 - a. Standard: MSS SP-80, Type 3.
 - b. CWP Rating: 300 psig
 - c. Body Design: Horizontal flow.
 - d. Body Material: ASTM B 62, bronze.
 - e. Ends: Threaded.
 - f. Disc: Bronze

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- C. Examine threads on valve and mating pipe for form and cleanliness.
- D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

- A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access from floor level and provide separate support where necessary. Provide piping and fittings as required to locate valves in an easily accessible area. Contractor shall coordinate valve location to maintain proper access and maintenance with all other building systems. (i.e. ductwork, equipment, structure, walls, etc.).
- C. Install valves in horizontal piping with stem at or above center of pipe.
- D. Install valves in position to allow full stem movement.
- E. Install chain operated valve for any valve required to be installed 6 feet above finished floor or higher if it is below the ceiling or structure above.

F. Install check valves for proper direction of flow and as follows:

1. Swing Check Valves: In horizontal position with hinge pin level

3.3 ADJUSTING

- A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

- A. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball, or high performance butterfly valves.

- B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.

3.5 HOT WATER VALVE SCHEDULE

- A. Pipe NPS 2-1/2 and Smaller:

1. Bronze Ball Valves: Solder-joint, Two piece, full port, bronze with stainless steel ball and stem.
2. Bronze Swing Check Valves: Solder-joint, bronze disc

END OF SECTION 230523

SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Thermal-hanger shield inserts.
4. Fastener systems.
5. Equipment supports.

- B. Related Sections:

1. Division 23 Section "Metal Ducts" for duct hangers and supports.

1.3 DEFINITIONS

- A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis signed and sealed by a qualified professional engineer, licensed in the project location state, responsible for their preparation. Design to include hangers associated with supports from walls, columns, or the structure above using performance requirements and design criteria indicated. All building attachments to be coordinated with building design.
 1. Detail fabrication and assembly of hangers.
 2. Design Calculations: Calculate requirements for designing hangers
- B. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details and include calculations for the following; include Product Data for components:
 1. Trapeze pipe hangers.
 2. Metal framing systems.
 3. Equipment supports.

1.6 INFORMATIONAL SUBMITTALS

- A. Delegated-Design Submittal: Refer to above
- B. Welding certificates.

1.7 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

2.1 METAL PIPE HANGERS AND SUPPORTS

- A. Carbon-Steel Pipe Hangers and Supports:
 1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
 2. Galvanized Metallic Coatings: Pre-galvanized 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 stainless steel.
- B. Stainless-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel

C. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

2.2 TRAPEZE PIPE HANGERS

- A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 THERMAL-HANGER SHIELD INSERTS

- A. Performance: Subject to compliance with requirements and related documents, provide products meeting a minimum performance of the following:
- B. 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.
- C. Insulation-Insert Material for Hot 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.
- D. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- E. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- F. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.4 FASTENER SYSTEMS

- A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- B. Mechanical-Expansion Anchors: Insert-wedge-type, 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.

- C. Coordinate building attachments with building construction.

2.5 EQUIPMENT SUPPORTS

- A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.
- B. Coordinate building attachments with building construction.

2.6 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, non-shrink and nonmetallic grout; suitable for interior and exterior applications.
 - 1. Properties: Non-staining, noncorrosive, and nongaseous.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 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. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
 - 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
 - 2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
- C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.
- D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- E. Fastener System Installation:

1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
 2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- F. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- G. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- H. Install lateral bracing with pipe hangers and supports to prevent swaying.
- I. 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.
- J. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- 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.
 - b. NPS 4: 12 inches long and 0.06 inch thick.

- c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
 - d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
- 5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
 - 6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make bearing surface smooth.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 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

3.5 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 carbon-steel pipe hangers and supports or metal trapeze pipe hangers and attachments for general service applications.
- F. Use copper-plated pipe hangers and copper 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 non-insulated or insulated, stationary pipes NPS 1/2 to NPS 30.
 - 2. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 8, requiring clamp flexibility and up to 4 inches of insulation.
 - 3. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 8 if little or no insulation is required.
 - 4. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
 - 5. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of non-insulated, stationary pipes NPS 3/4 to NPS 8.
 - 6. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of non-insulated, stationary pipes NPS 1/2 to NPS 8.
 - 7. Adjustable Band Hangers (MSS Type 9): For suspension of non-insulated, stationary pipes NPS 1/2 to NPS 8.
 - 8. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of non-insulated, stationary pipes NPS 1/2 to NPS 8.
 - 9. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of non-insulated, stationary pipes NPS 3/8 to NPS 8.
 - 10. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of non-insulated, stationary pipes NPS 3/8 to NPS 3.
 - 11. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 8.
 - 12. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
 - 13. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 8, from two rods if longitudinal movement caused by expansion and contraction might occur.
- J. 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.
- K. 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. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
 3. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
 4. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
 5. C-Clamps (MSS Type 23): For structural shapes.
 6. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
 7. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
 8. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
 9. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
 10. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
 11. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
 - a. Light (MSS Type 31): 750 lb.
 - b. Medium (MSS Type 32): 1500 lb.
 - c. Heavy (MSS Type 33): 3000 lb.
 12. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
 13. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
 14. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.
- L. 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.

- M. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
 2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
 3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
 4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
 5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
 6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
 7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.
 8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:
 - a. Horizontal (MSS Type 54): Mounted horizontally.
 - b. Vertical (MSS Type 55): Mounted vertically.
 - c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.
- N. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.
- O. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.
- P. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 230529

SECTION 230553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Equipment labels.
- 2. Pipe labels.
- 3. Valve tags.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.
- C. Valve numbering scheme.
- D. Valve Schedules: For each piping system to include in maintenance manuals.

1.4 COORDINATION

- 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.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

- A. Metal Labels for Equipment:

1. Material and Thickness: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
3. 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-fourths the size of principal lettering.
4. Fasteners: Stainless-steel rivets.

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-fourths the size of principal lettering.
7. Fasteners: Stainless-steel rivets or self-tapping screws.

C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus 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), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
- B. Pre-tensioned Pipe Labels: Pre-coiled, semi-rigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
- C. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, 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 1-1/2 inches high.

2.3 STENCILS

- A. Stencils: Prepared with letter sizes according to ASME A13.1 for piping; minimum letter height of 3/4 inch for access panel and door labels, equipment labels, and similar operational instructions.
 - 1. Stencil Material: Aluminum.
 - 2. Stencil Paint: Exterior, gloss, acrylic enamel black unless otherwise indicated. Paint may be in pressurized spray-can form.
 - 3. Identification Paint: Exterior, acrylic enamel in colors according to ASME A13.1 unless otherwise indicated

2.4 VALVE TAGS

- A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.
 - 1. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
 - 2. Fasteners: Brass wire-link chain or S-hook.
- B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper, typed. 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. Valve-tag schedule shall be framed and mounted in the mechanical schedule.

2.5 ABOVE CEILING EQUIPMENT LOCATOR STICKERS

- A. Provide 3/4" diameter colored stickers on ceiling at equipment above ceilings as follows:
 - 1. Fire, Smoke, and Fire/Smoke Dampers – RED
 - 2. Air Terminal Devices – GREEN
 - 3. Valves - ORANGE
- B. For lay in ceilings locate stickers at nearest ceiling grid bar. Do not place sticker(s) on ceiling tile.
- C. Provide typewritten chart of Above Ceiling Equipment location with 8-1/2x11 schematic of project area indicating location. Frame and place under clear glass. Hang in mechanical space or other location as designated by the Owner's Representative and provide a hard copy to the Owner' Representative.

2.6 WARNING TAGS

- A. Warning Tags: 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: Yellow background with black lettering.

PART 3 - EXECUTION

3.1 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.

3.2 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment. Major mechanical equipment shall include:
 - 1. Duct coils
- B. Locate equipment labels where accessible and visible.
- C. Coordinate naming convention of all equipment with the Owner and naming convention within the temperature control system. Tags on the contract documents may not accurately tag the equipment.

3.3 PIPE LABEL INSTALLATION

- A. Piping Color-Coding: Painting of piping is specified in Division 09 Section "Interior Painting".
- B. 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 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. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.
8. At each identification location, provide a flow direction arrow

C. Lettering:

<u>Pipe Function</u>	<u>Identification</u>
Heating Water Supply	HWS
Heating Water Return	HWR

3.4 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 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: Tags shall be 1-1/2 inches round, natural brass, black lettering.

3.5 WARNING-TAG INSTALLATION

- A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 230553

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Balancing Air Systems:
 - a. Constant-volume air systems.
 - b. Variable-air-volume systems.
 - 2. Balancing Hydronic Piping Systems:
 - a. Constant-flow hydronic systems.
 - b. Variable-flow hydronic systems.
 - c. Primary-secondary hydronic systems.

1.3 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. NEBB: National Environmental Balancing Bureau.
- C. TAB: Testing, adjusting, and balancing.
- D. TAB Specialist: An entity engaged to perform TAB Work.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: Within 45 days of Contractor's Notice to Proceed, submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
- B. Contract Documents Examination Report: Within 45 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.

- C. Strategies and Procedures Plan: Within 60 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.
- D. Certified TAB reports.
- E. Sample report forms.
- F. Instrument calibration reports, to include the following:
 - 1. Instrument type and make.
 - 2. Serial number.
 - 3. Application.
 - 4. Dates of use.
 - 5. Dates of calibration.

1.5 QUALITY ASSURANCE

- A. TAB Contractor Qualifications: Engage a TAB entity currently and for the duration of the project, certified by NEBB or AABC.
 - 1. TAB Field Supervisor: Employee of the TAB contractor and currently certified by NEBB or AABC.
 - 2. TAB Technician: Employee of the TAB contractor and individual who is currently certified by NEBB or AABC as a TAB technician.
 - 3. TAB contractor shall maintain NEBB or AABC certification for the duration of the project.
- B. Certify TAB field data reports and perform the following:
 - 1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
 - 2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.
- C. TAB Report Forms: Use standard TAB contractor's forms approved by Engineer.
- D. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."
- E. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
- F. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

1.6 PROJECT 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.

1.7 COORDINATION

- A. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.
- B. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 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 systems for installed 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 accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine equipment performance data including fan 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 filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- I. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.
- J. Examine strainers. Verify that startup screens are replaced by permanent screens with indicated perforations.
- K. Examine automatic balancing valves. Remove balancing valve cartridge and flush clean prior to system balance and verification.
- L. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- 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.

3.2 PREPARATION

- A. Prepare a TAB plan that includes strategies and step-by-step procedures.
- B. Complete system-readiness checks and prepare reports. Verify the following:
 - 1. Permanent electrical-power wiring is complete.
 - 2. Hydronic systems are filled, clean, and free of air.
 - 3. Automatic temperature-control systems are operational.
 - 4. Equipment and duct access doors are securely closed.
 - 5. Balance, smoke, and fire dampers are open.
 - 6. Isolating and balancing valves are open and control valves are operational.
 - 7. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
 - 8. Windows and doors can be closed so indicated conditions for system operations can be met.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" in this Section.

1. Comply with requirements in ASHRAE 62.1-2007, Section 7.2.2, "Air Balancing."
- 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 that comply with requirements in Division 23 Section "Air Duct Accessories."
 3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Division 23 Section "HVAC Insulation."
- 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.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. 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 specified in Division 23 Section "Metal Ducts."

3.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer. Provide sheaves and belts as required to achieve indicated airflows.
 - 1. Measure total airflow.
 - a. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow.
 - 2. Measure fan static pressures as follows to determine actual static pressure:
 - a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
 - b. Measure static pressure directly at the fan outlet or through the flexible connection.
 - c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
 - d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.
 - 3. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.
 - a. Report the cleanliness status of filters and the time static pressures are measured.
 - 4. Measure static pressures entering and leaving other devices, such as sound traps, heat-recovery equipment, and air washers, under final balanced conditions.
 - 5. 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.
 - 6. Obtain approval from Architect for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in Division 23 Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
 - 7. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
 - 1. Measure airflow of submain and branch ducts.

- a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
 2. Measure static pressure at a point downstream from the balancing damper, and adjust volume dampers until the proper static pressure is achieved.
 3. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.
- C. Measure air outlets and inlets without making adjustments.
1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.
- D. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.
1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
 2. Adjust patterns of adjustable outlets for proper distribution without drafts. Provide sheaves and belts as required to achieve indicated airflows.

3.6 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

- A. Prepare hydronic systems for testing and balancing according to the following, in addition to the general preparation procedures specified above:
1. Open all manual valves for maximum flow.
 2. Check liquid level in expansion tank.
 3. Check makeup water-station pressure gage for adequate pressure for highest vent.
 4. Check flow-control valves for specified sequence of operation, and set at indicated flow.
 5. Set system controls so automatic valves are wide open to heat exchangers.
 6. Check air vents for a forceful liquid flow exiting from vents when manually operated.

3.7 PROCEDURES FOR CONSTANT-FLOW HYDRONIC SYSTEMS

- A. Set calibrated balancing valves, if installed, at calculated presettings.
- B. Measure flow at all stations and adjust, where necessary, to obtain first balance.
1. System components that have Cv rating or an accurately cataloged flow-pressure-drop relationship may be used as a flow-indicating device.
- C. Measure flow at main balancing station and set main balancing device to achieve flow that is 5 percent greater than indicated flow.

- D. Adjust balancing stations to within specified tolerances of indicated flow rate as follows:
 - 1. Determine the balancing station with the highest percentage over indicated flow.
 - 2. Adjust each station in turn, beginning with the station with the highest percentage over indicated flow and proceeding to the station with the lowest percentage over indicated flow.
 - 3. Record settings and mark balancing devices.
- E. Measure the differential-pressure-control-valve settings existing at the conclusion of balancing.
- F. Check settings and operation of each safety valve. Record settings.

3.8 PROCEDURES FOR HEAT-TRANSFER COILS

- A. Measure, adjust, and record the following data for each water coil:
 - 1. Entering- and leaving-water temperature.
 - 2. Water flow rate.
 - 3. Water pressure drop.
 - 4. Dry-bulb temperature of entering and leaving air.
 - 5. Wet-bulb temperature of entering and leaving air for cooling coils.
 - 6. Airflow.
 - 7. Air pressure drop.

3.9 PROCEDURES FOR MOTORS

- A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:
 - 1. Manufacturer's name, model number, and serial number.
 - 2. Motor horsepower rating.
 - 3. Motor rpm.
 - 4. Efficiency rating.
 - 5. Nameplate and measured voltage, each phase.
 - 6. Nameplate and measured amperage, each phase.
 - 7. Starter thermal-protection-element rating.
- B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass of the controller to prove proper operation. Record observations including name of controller manufacturer, model number, serial number, and nameplate data.

3.10 TOLERANCES

- A. Set HVAC system's air flow 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.

3.11 REPORTING

- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.
- B. Status Reports: Prepare weekly progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.12 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.
- B. Final Report Contents: In addition to certified field-report data, include the following:
 1. Manufacturers' test data.
 2. Field test reports prepared by system and equipment installers.
 3. 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 contractor.
 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 fan 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. 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. Sheave make, size in inches, and bore.
 - i. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - j. Number, make, and size of belts.
 - k. 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.
 - e. Sheave make, size in inches, and bore.
 - f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
3. Test Data (Indicated and Actual Values):
 - a. Total air flow 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. Coil static-pressure differential in inches wg.
 - g. Outdoor airflow in cfm
 - h. Return airflow in cfm
 - i. Relief airflow in cfm
 - j. Outdoor-air damper position.
 - k. Return-air damper position.
 - l. Relief-air damper position.
 - 4. Plat heat exchanger test report
 - a. Exhaust entering and leaving air temperature in deg F
 - b. Outside air and supply entering and leaving air temperature in deg F
 - c. Face and bypass damper position
- E. 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. Air flow 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. Entering-air, wet- and dry-bulb temperatures in deg F.
 - f. Leaving-air, wet- and dry-bulb temperatures in deg F.
 - g. Water flow rate in gpm.
 - h. Water pressure differential in feet of head or psig.
 - i. Entering-water temperature in deg F.
 - j. Leaving-water temperature in deg F.
 - k. Refrigerant expansion valve and refrigerant types.
 - l. Refrigerant suction pressure in psig.
 - m. Refrigerant suction temperature in deg F.

F. 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.
 - g. Sheave make, size in inches, and bore.
 - h. Center-to-center dimensions of sheave, and amount of adjustments in inches.
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.
 - e. Sheave make, size in inches (mm), and bore.
 - f. Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).
 - g. Number, make, and size of belts.
3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm (L/s).
 - 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.

G. Round 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 air flow rate in cfm.
 - h. Indicated velocity in fpm.
 - i. Actual air flow rate in cfm.
 - j. Actual average velocity in fpm.

H. System-Coil Reports: For reheat coils and water coils of terminal units, include the following:

1. Unit Data:
 - a. System and air-handling-unit identification.
 - b. Location and zone.
 - c. Room or riser served.
 - d. Coil make and size.
 - e. Flowmeter type.
2. Test Data (Indicated and Actual Values):
 - a. Air flow rate in cfm.
 - b. Entering-water temperature in deg F.
 - c. Leaving-water temperature in deg F.
 - d. Water pressure drop in feet of head or psi.
 - e. Entering-air temperature in deg F.
 - f. Leaving-air temperature in deg f.

I. Instrument Calibration Reports:

1. Report Data:
 - a. Instrument type and make.
 - b. Serial number.
 - c. Application.
 - d. Dates of use.
 - e. Dates of calibration.

3.13 INSPECTIONS

A. Initial Inspection:

1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
2. Check the following for each system:
 - a. Measure airflow of at least 10 percent of air outlets.
 - b. Measure water flow of at least 5 percent of terminals.
 - c. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
 - d. Verify that balancing devices are marked with final balance position.
 - e. Note deviations from the Contract Documents in the final report.

B. Final Inspection:

1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Architect.

2. The TAB contractor's test and balance engineer shall conduct the inspection in the presence of Architect.
 3. Architect shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
 4. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
 5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.
- C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:
1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
 2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.
- D. Prepare test and inspection reports.

3.14 ADDITIONAL TESTS

- A. Provide additional TAB visits as required to accommodate project scheduling and phasing.
- B. Within one year of completing TAB, perform two additional TAB visits to verify that balanced conditions are being maintained throughout and to correct unusual conditions. Spacing between visits to be equally divided within the one year time frame and coordinated with the owner.
- C. 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 230593

SECTION 230719 - HVAC PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. All Work shall comply with the requirements of the 2015 International Energy Conservation Code (IECC) including 2017 New York State Supplement to the 2015 IRCC, ASHRAE 90.1-2013, manufacturer's requirements for installation and these specifications. In the event of conflicts between these documents, the more stringent requirements shall met.

1.2 SUMMARY

- A. Section includes insulating the following HVAC piping systems:
 - 1. Heating hot-water piping

1.3 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).
- B. Detail application schedule of intended insulation type for each type of applications.

1.4 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports
- B. Qualification Data: For qualified Installer.
- C. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

- B. 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.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

- A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."
- 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.

1.8 SCHEDULING

- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Comply with requirements in "Piping Insulation Schedule, General" and "Piping Insulation Schedule" articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

2.2 PIPE INSULATION (RIGID FIBERGLASS TYPE)

- A. Glass Fiber insulation meeting ASTM C 552, Type II, Class 2, ASTM C 585, ASTM C 795 and ASTM C 1138; rigid, molded, noncombustible.
- B. Minimum 'K' Value: ASTM C 335, 0.23 at 75°F mean temperature installed value. Maximum Service Temperature: 1000°F.
- C. Vapor Retarder Jacket: ASJ/SSL conforming to ASTM C 1136 Type I, secured with self-sealing longitudinal laps and butt strips.
- D. Field-Applied PVC 30 mil Fitting Covers with Flexible Fiberglass Insulation complying with ASTM C 450 and ASTM C 585: Proto Corporation LoSmoke, UV-resistant fittings and accessories, white. Fitting cover system consists of pre-molded, high-impact PVC materials with blanket type fiberglass wrap inserts. Blanket fiberglass wrap inserts shall have a thermal conductivity ('K') of 0.26 at 75°F mean temperature. Closures to be stainless steel tacks, matching PVC tape, or PVC adhesive per manufacturer's recommendations.

2.3 ACCEPTABLE MANUFACTURERS

- A. Fiberglass and Mineral Wool: Knauf, John Manville, Owen-Corning, Certainteed.

2.4 ADHESIVES

- 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.
 - 1. Small-Scale Environmental Chambers," including 2004 Addenda.
- B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
 - 1. Performance: Subject to compliance with requirements and related documents, provide products meeting a minimum performance of the following:
 - 2. For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
 - 1. Performance: Subject to compliance with requirements and related documents, provide products meeting a minimum performance of the following:
 - 2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Performance: Subject to compliance with requirements and related documents, provide products meeting a minimum performance of the following:
2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.5 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.

1. Performance: Subject to compliance with requirements and related documents, provide products meeting a minimum performance of the following:
2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
5. Color: White.

C. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.

1. Performance: Subject to compliance with requirements and related documents, provide products meeting a minimum performance of the following:
2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: 60 percent by volume and 66 percent by weight.
5. Color: White.

2.6 SEALANTS

A. Joint Sealants:

1. Performance: Subject to compliance with requirements and related documents, provide products meeting a minimum performance of the following:
 - a. Materials shall be compatible with insulation materials, jackets, and substrates.
 - b. Permanently flexible, elastomeric sealant.
 - c. Service Temperature Range: Minus 100 to plus 300 deg F.
 - d. Color: White or gray.

2. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Performance: Subject to compliance with requirements and related documents, provide products meeting a minimum performance of the following:
 - a. Materials shall be compatible with insulation materials, jackets, and substrates.
 - b. Fire- and water-resistant, flexible, elastomeric sealant.
 - c. Service Temperature Range: Minus 40 to plus 250 deg F.
 - d. Color: White.
 - e. For indoor applications, use sealants that have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.7 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. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.

2.8 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
1. Performance: Subject to compliance with requirements and related documents, provide products meeting a minimum performance of the following:
 2. Adhesive: As recommended by jacket material manufacturer.
 3. Color: Color as selected by Architect.
 4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
 - a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.
- C. Flexible non-metallic cladding: UV and mechanical impact resistant, flexible polymer based rubber.

1. Products: Subject to compliance with requirements, provide one of the following or approved equal:
 - a. Armachek R
2. Adhesive: Provide mastics as recommended by jacket material manufacturer.
3. Color: White.
4. Fittings: Made of covering material per manufacturers recommendations.

2.9 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
 1. Performance: Subject to compliance with requirements and related documents, provide products meeting a minimum performance of the following:
 2. Width: 3 inches.
 3. Thickness: 11.5 mils.
 4. Adhesion: 90 ounces force/inch in width.
 5. Elongation: 2 percent.
 6. Tensile Strength: 40 lbf/inch in width.
 7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.
 1. Performance: Subject to compliance with requirements and related documents, provide products meeting a minimum performance of the following:
 2. Width: 2 inches
 3. Thickness: 6 mils
 4. Adhesion: 64 ounces force/inch in width.
 5. Elongation: 500 percent.
 6. Tensile Strength: 18 lbf/inch in width.
- C. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
 1. Performance: Subject to compliance with requirements and related documents, provide products meeting a minimum performance of the following:
 2. Width: 2 inches.
 3. Thickness: 3.7 mils.
 4. Adhesion: 100 ounces force/inch in width.
 5. Elongation: 5 percent.
 6. Tensile Strength: 34 lbf/inch in width.

2.10 SECUREMENTS

- A. Staples:

1. Performance: Subject to compliance with requirements and related documents, provide products meeting a minimum performance of the following:
2. Outward-clinching insulation staples, nominal 3/4-inch wide, stainless steel or Monel.

PART 3 - EXECUTION

3.1 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.

3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.3 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.
 - 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.

3.4 PENETRATIONS

- A. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
 - 1. Seal penetrations with flashing sealant.

2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
 4. Seal jacket to wall flashing with flashing sealant.
- B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- C. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.
1. Comply with requirements in Division 07 Section "Penetration Firestopping" for firestopping and fire-resistive joint sealers.
- D. Insulation Installation at Floor Penetrations:
1. Pipe: Install insulation continuously through floor penetrations.
 2. Seal penetrations through fire-rated assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping."

3.5 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 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, 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. 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.

3.6 INSTALLATION OF FIBERGLASS 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 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, 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.

3.7 FIELD-APPLIED JACKET INSTALLATION

- #### A.
- Where jackets for exterior use are indicated, PVC or Flexible Membrane, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturer's recommended adhesive.

1. Utilizing stiff bristled brush or short pile fabric roller, brush adhesive or roll adhesive. Apply adhesive in a thin, uniform layer to both insulation surface and mating jacket surface. All overlapping joints shall be fully covered with adhesive on mating edges prior to joining.
2. Install seams and joints to prevent any direct paths which may allow water ingress.
3. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

3.8 FINISHES

- A. Pipe Insulation with ASJ or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Division 09 painting Sections.
 1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
 - a. Finish Coat Material: Interior, flat, latex-emulsion size.
- B. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.
- C. Do not field paint aluminum or stainless-steel jackets.

3.9 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections:
 1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.
- D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.10 PIPING INSULATION SCHEDULE, GENERAL

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
- 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.

3.11 PIPING INSULATION SCHEDULE

<u>Service</u>	<u>Insulation Material</u>	<u>Pipe Size</u>	<u>Insulation Thickness</u>	<u>Remarks</u>
Hot water and glycol/hot water (200°F and lower)	Glass fiber,	1-1/2" and Larger: 1-1/4" and Smaller:	2" 1-1/2"	

END OF SECTION 230719

SECTION 230900 - INSTRUMENTATION AND CONTROL FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes control equipment for HVAC systems and components, including control components for terminal heating and cooling units not supplied with factory-wired controls.
- B. Related Sections include the following:
 - 1. Section 230519 "Meters and Gages for HVAC Piping" for measuring equipment that relates to this Section.

1.3 DEFINITIONS

- A. DDC: Direct digital control.
- B. GUI: Graphic User Interface
- C. I/O: Input/output.
- D. LonWorks: A control network technology platform for designing and implementing interoperable control devices and networks.
- E. MS/TP: Master slave/token passing.
- F. PC: Personal computer.
- G. PID: Proportional plus integral plus derivative.
- H. RTD: Resistance temperature detector.

1.4 DESCRIPTION

- A. Provide labor, materials, equipment and services as required for the complete installation designed in Contract Documents. The workstation shall display dynamic, real-time point data on color graphic displays for all points. Provide all required software and hardware. Provide

wiring and conduit required to connect devices furnished as a part of, or accessory to, this automatic control system.

- B. The Building Management System (BMS) shall be as indicated on the drawings and described in these specifications. System must be fully integrated and coordinated with mechanical equipment DDC controllers furnished and installed in the equipment manufacturer's factory as specified in those sections. The intent of the scope is to integrate all mechanical equipment into the County's existing building management system. The existing BMS system is managed by U&S Services. BMS manufacturer authorized representative is responsible to provide all the design, engineering, and field coordination required to ensure all equipment sequence of operations are met as specified and the designated BMS operators have the capability of managing the building mechanical system to ensure occupant comfort while maintaining energy efficiency
- C. The BMS shall meet open protocol communication standards to ensure the system maintains "interoperability" to avoid proprietary arrangements that will make it difficult for the Owner to consider other BMS manufacturers in future projects
- D. Direct Digital Control (DDC) technology shall be used to provide the functions necessary for control of mechanical systems and terminal devices on this project.
- E. The BMS shall accommodate simultaneous multiple user operation. Access to the control system data should be limited only by operator password. Multiple users shall have access to all valid system data. An operator shall be able to log onto any workstation on the control system and have access to all appropriate data
- F. The mechanical systems and terminal devices shall be provided with factory mounted DDC controls that will permit each system to operate in a stand-alone fashion where indicated on drawing schedules. As such, in the event of a BMS network communication failure, or the loss of an individual controller, the other DDC controllers shall continue to independently operate and communicate to the BMS.
- G. Communication between DDC controllers and all workstation(s) shall be over a high-speed network. All nodes on this network shall be peers. The operator shall not have to know the controller identifier or location to view or control a point (object). Application Specific Controllers shall be constantly scanned by the Building Controllers to update point information and alarm information globally
- H. The BMS manufacturer authorized representative shall provide all hardware and software necessary to implement the functions and sequence of operations specified
- I. Control wiring is defined as wiring up to and including 120 volts. Install wiring in accordance with requirements of "Electric Wiring" in Section 260519, and the National Electrical Code. Provide all required devices for proper system operation, including transformers, relays, pushbutton stations, etc. Provide all power distribution and breakers from panel boards to the control panels.
- J. Freestanding panels shall be supported from "Unistrut" securely fastened to walls.

- K. Provide Ethernet data drops at main building controller and at operator workstations

1.5 ACTION SUBMITTALS

- A. BMS manufacturer shall provide shop drawings and manufacturers' standard specification data sheets on all hardware and software being provided for this project. No work may begin on any segment of this project until the Engineer and Owner have reviewed submittals for conformity with the plan and specifications. Five (5) copies are required. All shop drawings shall be provided to the Owner electronically as .pdf file formats once they have been approved and as-built drawings have been completed
- B. Provide the Engineer and Owner, any additional information or data which is deemed necessary to determine compliance with the specifications or which is deemed valuable in documenting and understanding the system to be installed.
- C. Submit for review the following:
 - 1. A complete bill of materials of equipment to be used indicating quantities, manufacturers and model numbers
 - 2. Provide all manufacturers' technical cut sheets for major system components. When technical cut sheets apply to a product series rather than a specific product, the data specifically applicable to the project shall be highlighted or clearly indicated by other means.
 - 3. Each submitted product literature and drawings shall clearly reference the specification page and section number and/or drawing number associated with the product. Include:
 - a. Building Controllers
 - b. Custom Application Controllers
 - c. Application Specific Controllers
 - d. Operator Workstations
 - e. Portable Operator Terminals
 - f. Auxiliary Control Devices
 - g. Proposed Building Automation System architectural diagram depicting various controller types, workstations, device locations, addresses, and communication cable requirements.
 - h. Detailed termination drawings showing all required field and factory terminations, as well as terminal tie-ins to DDC controls provided by mechanical equipment manufacturers. Terminal numbers shall be clearly labeled.
 - i. Points list showing all system objects and the proposed English language object names.
 - j. Sequence of operation for each controlled mechanical system and terminal end devices.
 - k. Provide a Protocol Implementation Conformance Statement (PICS) for each system level device (i.e. Building Controller & Operator Workstations) type. This defines the point list for proper coordination of interoperability with other building systems if applicable for this project.

1. Provide Certification and functional profile SNVT's for unitary-level controllers (i.e. chillers, RTU's, AHU's, Terminal VAV boxes, FCU's, UV's, etc.) for interoperability with other building systems if applicable for this project.
4. Detailed piping and wiring control diagrams and systems description for each system under control.
5. Detailed layout and nameplate list for component control panels and DDC panels.
6. Submit a valve, actuator, and damper schedule showing size, manufacturer, model number, pressure drop configuration, capacity, and locations. Provide apparatus Bulletins and data sheets for all control system components.
7. Submit an airflow station schedule showing size, manufacturer, model number, airflow, velocity, and locations.
8. A complete listing of input and output points, control loops and/or routines, including time of day functions, and facilities management system functions for each controlled system. This listing shall include point logical names, identifiers, and alarmable ranges.
9. Provide as part of a separate submittal a hard copy of all graphics showing system components, sensor locations, setpoints and fixed/variable data. Engineer shall review and approve graphic format prior to final acceptance of system.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.

1.7 CLOSEOUT SUBMITTALS

- A. Upon completion of installation, submit three (3) copies of record (as-built) documents. The documents shall be submitted for approval prior to final completion and include:
 1. Project Record Drawings - These shall be as-built versions of the submittal shop drawings. One set of electronic media including CAD .dwg or .dxf drawing files and .pdf files shall also be provided.
 2. Testing Reports and Checklists signed off by trained factory (equipment manufacturers) and field (BMS) commissioning personnel
 3. Operating and Maintenance (O & M) Manuals - These shall be as-built versions of the submittal product data. In addition to the information required for the submittals, Operating & Maintenance manual shall include:
 - a. Names, address and 24-hour/7-day per week telephone numbers of Contractor personnel managing and installing equipment, along with service personnel responsible for supporting the ongoing warranty and services of the control system.
 - b. Procedures for operating the BMS including logging on/off, alarm management, generation of reports, trends, overrides of computer control, modification of setpoints, and other interactive system requirements
 - c. Description of the programming language including syntax, statement descriptions, algorithms, calculations, point database creation and modification, program creation and modification, and operator use of the editor.

- d. Explanation of how to design and install new points, new DDC controllers, and other BMS hardware.
- e. Preventative Maintenance and calibration procedures; hardware troubleshooting; and hardware repair and/or replacement procedures.
- f. Documentation of all software program logic created for Custom Programmable Controllers including the overall point database. Provide one set of magnetic media containing files of the software and point database.
- g. One set of electronic media containing files of all operator color graphic screens for the project.
- h. A list of recommended spare parts including pricing, manufacturer, supplier, and part numbers.
- i. Documentation, installation, and maintenance information for all third party hardware/software products provided including personal computers, printers, hubs, sensors, valves, etc.
- j. Original issue media for all software provided, including operating systems, programming language, operator workstation software, and graphics software.
- k. Licenses, Guarantee, and Warranty documents for all equipment and systems.
- l. Recommended preventive maintenance procedures for all system components including a schedule of tasks (inspection, cleaning, calibration, etc.) and task descriptions

1.8 QUALITY ASSURANCE

- A. The BMS manufacturer authorized representative shall have an established business office within 50 miles of the project site and must provide 24 hours/day, 7 days/week response in the event of a customer warranty or service call.
- B. The BMS Manufacturer authorized representative shall have factory trained and certified personnel providing all engineering, service, startup, and commissioning field labor for the project from their local office location. BMS manufacturer authorized representative shall be able to provide training certifications for all local office personnel upon request.
- C. The BMS shall be provided by a single manufacturer and this manufacturer's equipment must consist of operator workstation software, Web-based hardware/software, Open Standard Protocol hardware/software, Custom application Programming Language, Graphical Programming Language, Building Controllers, Custom Application Controllers, and Application Specific Controllers. All other products specified herein (i.e., sensors, valves, dampers, actuators, etc.) need not be manufactured by the BMS manufacturer.
- D. Multiple independent representatives of BMS manufacturers are not acceptable. BMS vendor must be corporate owned authorized representative entity of BMS manufacturer.
- E. The complete automatic temperature control system shall be comprised of electric control devices with a microprocessor based Direct Digital Control System. All work shall be installed only by skilled mechanics employed by the BMS Manufacturer authorized representative temperature control contractor or subcontractor.

- F. The BMS Manufacturer authorized representative installer shall have a minimum of five years experience in systems of similar size, type and complexity installed within a 50 mile radius.
- G. All components shall be fully tested and documented to operate as a complete system.
- H. Supplier must guarantee that all replacement parts will be carried in stock for a period of 5 years minimum from the date that the system is commissioned.
- I. All products used in this installation shall be currently manufactured, and shall have been applied to a minimum of three previous projects. This installation shall not be used as a test site for any new products unless explicitly approved by the Owner's representative in writing prior to bid date.

1.9 CONTROL SYSTEM GUARANTEES/WARRANTY

- A. BMS system labor and materials shall be warranted free from defects for a period of twelve (12) months after final completion acceptance by the Owner. BMS failures during the warranty period shall be adjusted, repaired, or replaced at no charge to the Owner. The BMS manufacturer shall respond to the Owner's request for warranty service within 24 hours of the initiated call and will occur during normal business hours (8AM-5PM).
- B. At the end of the final start-up/testing, if equipment and systems are operating satisfactorily to the Owner and Engineer, the Owner shall sign certificates certifying that the BMS is operational, and has been tested and accepted in accordance with the terms of this specification. The date of Owner's acceptance shall be the start of the warranty period.
- C. Operator workstation software, project specific software, graphics, database, and firmware updates shall be provided to the Owner at no charge during the warranty period. Written authorization by the Owner must be granted prior to the installation of these updates
- D. The BMS manufacturer shall provide a web-accessible Users Network for the proposed System and give the Owner free access to question/answer forum, graphics library, user tips, upgrades, and training schedules for a one year period of time correlating with the warranty period.

1.10 SYSTEM MAINTENANCE

- A. Perform Building Automation System preventative maintenance and support for a period of 1 year (beginning the date of substantial completion)
 - 1. Make a minimum of 4 complete Building Automation System inspections, in addition to normal warranty requirements. Inspections to include:
 - a. System Review – Review the BMS to correct programming errors, failed points, points in alarm, and points that have been overridden manually
 - b. Seasonal Control Loop Tuning – Control loops are reviewed to reflect changing seasonal conditions and / or facility heating and cooling loads.

- c. Sequence of operation verification – Systems all verified to be operating as designed and in automatic operation. Scheduling and setpoints are reviewed and modified
 - d. Database back-up
 - e. Operator coaching
 - 2. Technician shall review critical alarm log and advise owner of additional services that may be required
 - 3. Technician shall provide a written report to owner after each inspection
- B. Do not assign or transfer maintenance service to agent or subcontractor without prior written consent of owner.

1.11 SYSTEM ADJUSTMENT AND CALIBRATION

- A. When the Work has been completed, completely adjust and calibrate the control system upgrades. Review the operation of each system input and output, control loops and/or software routings, timing functions, operator entered constants and facilities management functions and observe that they perform their intended functions. When above procedure has been completed and the control system is operating satisfactorily, submit a letter with one copy of completed values and points log to the Owner's Representative advising them that the control system is 100% complete and operates in accordance with the Contract Documents

1.12 INSTRUCTIONS TO THE OWNER'S REPRESENTATIVE

- A. Provide competent control technicians to instruct the Owner's operating personnel and turn over three copies of maintenance manual. Provide a total of 24 hours of instruction at the site, 16 hours during start-up and 8 hours after six months. Instruction sessions shall be scheduled at the owner's convenience and shall be limited to four (4) hours per session.
- B. Training Manuals: The BMS manufacturer shall provide a course outline and copies of training manuals at least two weeks prior to the start of any corporate training class to be attended by the Owner.
- C. All project developed hardware and software shall become the property of the Owner. This includes but is not limited to:
- 1. Operator Graphic files
 - 2. As-built hardware design drawings
 - 3. Operating & Maintenance Manuals
 - 4. BMS System software database
 - 5. Controller application programming databases
 - 6. Application Specific Controller configuration files
 - 7. Required Licensed software

1.13 DELIVERY, STORAGE, AND HANDLING

- A. Factory-Mounted Components: Where control devices specified in this Section are indicated to be factory mounted on equipment, arrange for shipping of control devices to equipment manufacturer.
- B. System Software: Update to latest version of software at Project completion.

1.14 COORDINATION

- A. Coordinate location of thermostats, carbon dioxides sensors, pressure sensors, humidistats, and other exposed control sensors with plans and room details before installation.
- B. Coordinate equipment location.
- C. Coordinate supply of conditioned electrical branch circuits and power requirements for control units and operator workstation.

PART 2 - PRODUCTS

2.1 CONTROL DEVICE

- A. Control Valve
 - 1. Control Valves: Factory fabricated, of type, body material, and pressure class based on maximum pressure and temperature rating of piping system, unless otherwise indicated.
 - 2. Sized by temperature control manufacturer and guaranteed to meet the heating and cooling requirements. Water valves shall be sized on the basis of 15% of the total system pressure drop, but not more than 10 ft. of head drop. Pressure drop for valves shall be submitted for review, including all CV values.
 - 3. Valves shall be equal percentage type, equipped with characteristic type throttling plug, #316 stainless steel or Monel stem, removable composition discs, and EDPM seats. Provide with necessary features to operate in sequence with other valves or damper operators and adjustable throttling range as required by the sequence of operations.
 - 4. Close-off (differential) Pressure Rating: Valve actuator and trim shall be furnished to provide the following minimum close-off pressure ratings:
 - a. Water Valves:
 - 1) Two-way: 150% of total system (pump) head.
 - 2) Three-way: 300% of pressure differential between ports A and B at design flow or 100% of total system (pump) head
 - 5. NPS 2" and Smaller: Globe Valves, bronze body, bronze trim, rising stem, renewable composition disc, and screwed ends with backseating capacity repackable under pressure. Valves shall have allowable media temperature of 20°F to 281°F to assure that the valve

packing will have a long life (valves will narrower allowable media temperatures have no reserve packing capability for long term watertight seal).

6. Hydronic system globe valves shall have the following characteristics:
 - a. Rating: Class 125 for service at 125 psig. and 250°F operating conditions.
 - b. Internal Construction: Replaceable plugs and seats of stainless steel or brass.
 - 1) Single-Seated Valves: Cage trim provides seating and guiding surfaces for plug on top and bottom of guided plugs.
 - 2) Double-Seated Valves: Balanced plug; cage trim provides seating and guiding surfaces for plugs on top and bottom of guided plugs.
 - c. Flow Characteristics: Two-way valves shall have equal percentage characteristics; three-way valves shall have linear characteristics. Operators shall close valves against pump shutoff head.
 - d. Water valves shall be sized on the basis of no more than 10 ft. of head drop.

B. Actuator

1. The actuator shall have electronic overload or digital rotation sensing circuitry to prevent damage to the actuator throughout the rotation of the actuator.
2. Where shown, for power-failure/safety applications, an internal mechanical, spring return mechanism shall be built into the actuator housing
3. All rotary spring return actuators shall be capable of both clockwise or counter clockwise spring return operation. Linear actuators shall spring return to the retracted position
4. All non-spring return actuators shall have an external manual gear release to allow manual positioning of the damper when the actuator is not powered. Spring return actuators with more than 60 in-lb. torque capacity shall have a manual crank for this purpose.
5. Actuators shall be provided with a conduit fitting and a minimum 18" electrical cable and shall be pre-wired to eliminate the necessity of opening the actuator housing to make electrical connections.
6. Actuators shall be Underwriters Laboratories Standard 873 listed.
7. Actuators shall be designed for a minimum of 60,000 full stroke cycles at the actuator's rated torque
8. Valve
 - a. Provide modulating 24 VAC control operators that are 0-10 VDC input proportional with spring return as needed by control sequence and designed for water service valve bodies. Operator shall be synchronous motor driven and force sensor safety stop.
 - b. Provide two position 24 VAC control operators as needed by control sequence for unitary control such as heat pump control and designed for water service valve bodies. Operator shall be synchronous motor driven and force sensor safety stop.
 - c. Run time: 60 seconds or less

9. Damper

- a. Electronic Damper Actuators: Direct-coupled type non hydraulic designed for minimum 100,000 full-stroke cycles at rated torque. The actuator shall have rating of not less than twice the thrust needed for actual operation of the damper.
 - 1) Coupling: V-bolt and V-shaped, toothed cradle.
 - 2) Overload Protection: Electronic overload or digital rotation-sensing circuitry.
 - 3) Fail-Safe Operation: Mechanical, spring-return mechanism. Provide external, manual gear release on non-spring-return actuators.
 - 4) Actuators shall have the ability to be tandem mounted.
 - 5) All spring-return actuators shall have a manual override. Complete manual override shall take no more than 10 turns.
 - 6) Power Requirements (Two-Position Spring Return): 24V ac or dc, Maximum 10VA.
 - 7) Power Requirements (Modulating): Maximum 15 VA at 24V ac.
 - 8) Proportional Signal: 2- to 10-V dc or 4 to 20 mA, and 2- to 10-V dc position feedback signal.
 - 9) Temperature Rating: -22°F to 140°F.
 - 10) Run Time: 200 seconds open, 40 seconds closed
 - 11) Size for running torque calculated as follows, verify with damper manufacturer that damper actuators provide required torque to comply with leakage rate specifications for damper:
 - a) Opposed-Blade Damper with Edge Seals: 5 inch-pounds/sq. ft. of damper.
 - b) Opposed-Blade Damper without Edge Seals: 3 inch-pounds/sq. ft. of damper.
 - c) Dampers with 2 to 3 Inches wg. of Pressure Drop or Face Velocities of 1000 to 2500 FPM Multiply the minimum full-stroke cycles above by 1.5.
 - d) Dampers with 3 to 4 Inches wg. of Pressure Drop or Face Velocities of 2500 to 3000 FPM Multiply the minimum full-stroke cycles above by 2.0.
 - 12) Spring Return Manual Override actuators shall a factory set 5 Degree Damper Preload.

C. Miscellaneous Devices

1. Provide necessary, relays, transformers, cumulators, three-way air valves, positioners, pneumatic electric switches, air switches, required for a complete and operable system.
2. Locate these devices in a separate panel unless specified otherwise.

2.2 SYSTEM PERFORMANCE

- A. Performance Standards. The BMS system shall conform to the following:

1. Graphic Display. The system shall display a graphic with a minimum of 20 dynamic points. All current data shall be displayed within 20 seconds of the operator's request.
2. Graphic Refresh. The system shall update all dynamic points with current data within 30 seconds.
3. Object Command. The maximum time between the command of a binary object by the operator and the reaction by the device shall be 10 seconds. Analog objects shall start to adjust within 10 seconds.
4. Object Scan. All changes of state and change of analog values shall be transmitted over the high-speed network such that any data used or displayed at a controller or workstation will be current within the prior 60 seconds.
5. Alarm Response Time. The maximum time from when an object goes into alarm to when it is annunciated at the workstation shall not exceed 45 seconds.
6. Program Execution Frequency. Custom and standard applications shall be capable of running as often as once every 5 seconds. The Contractor shall be responsible for selecting execution times consistent with the mechanical process under control.
7. Programmable Controllers shall be able to execute DDC PID control loops at a selectable frequency from at least once every 5 seconds. The controller shall scan and update the process value and output generated by this calculation at this same frequency.

2.3 CONTROL CABINETS

- A. Central DDC control panels shall be fully enclosed cabinet, baked enamel, steel, aluminum or composite material construction and shall meet the requirements of NEMA 1 enclosures. Panels shall have hinged door with a locking latch. Cover exposed electrical connections. Each component on front panel shall have an appropriate engraved label describing its function. Components inside the panel shall be appropriately labeled for ease of identification. Stick-on labels are not acceptable. Panels shall be either free-standing or wall-mounted. Provide support steel framing.

2.4 DIRECT DIGITAL CONTROL SYSTEM

- A. The basic elements of the Direct Digital Control System structural shall consist of standard components kept in inventory by the equipment supplier. The components shall not require customizing other than setting jumpers and switches, adding firmware modules or software programming to perform required functions. The system may be expanded to its full capacity by adding sensors and entering programs in available random access memory (RAM). Future expansion shall not require hardware modifications to the controller. The entire system shall be a Direct Digital processing type.
- B. The DDC system shall consist of the following:
 1. Central DDC panels (UNC).
 2. Application specific controllers (ASCI).
 3. System architectural design shall eliminate dependence upon any single device for alarm reporting and control execution. Each DDC panel (Central or ASC) shall operate independently by performing its own specified control, alarm management, operator I/O, and historical data collection. The failure of any single component or network

connection shall not interrupt the execution of control strategies at other operational devices.

- 2.5 Central DDC panels shall be able to access any data form, send control commands and alarm reports directly to any other DDC panel, operator workstation, or printer on the network

2.6 ARCHITECTURE/COMMUNICATION

- A. This project shall be comprised of a high speed Ethernet network communications between System Controllers and Workstations. Communications between System Controllers and sub-networks of Custom Application Controllers and/or Application Specific Controllers shall utilize open protocol communications.

1. Each System Controller shall perform communications to a network of Custom Application and Application Specific Controllers using open protocol communication.
2. The Owner will provide all communication media, connectors, repeaters, network switches, and routers necessary for the high speed Ethernet network. An active Ethernet port will be provided adjacent to each System Controller and operator interface (PC) for connection to this high speed Ethernet network.
3. All values within the system (i.e. schedules, datalogs, points, software variables, custom program variables) shall be readable and controllable (where appropriate) by any System Controller
4. Provide all required convertor control panels between equipment manufacturer supplied controllers and BMS to allow for required communication. Example includes Modbus to BACnet convertors.

- B. Wireless equipment controllers and auxiliary control devices shall conform to:’

1. IEEE 802.15.4 radios to minimize risk of interference and maximize battery life, reliability, and range.
2. Operating range shall be a minimum of 200 feet; open range shall be 2,500 ft. (762 m) with less than 2% packet error rate.
3. To check for proper operation, wireless zone temperature sensors shall include a signal strength and battery condition indicators on the zone sensor display or using LED’s on non-display models.
4. To maintain robust communication, two-way communications shall be used between the wireless zone sensor and receiver to allow channel switching based on varying channel traffic and signal strength.
5. The wireless zone sensor and receiver addresses shall be held in non-volatile memory to ensure operation through system voltage disturbances and to minimize the risk of incorrect association.
6. The wireless zone sensor and receiver shall be addressed using rotary switches with numerical indication to simplify and reduce installation time and minimize risk of incorrect addressing. Two position DIP switches are not acceptable.
7. Installation and replacement of failed sensors shall be accomplished automatically after power up.

8. To allow local troubleshooting without specialized tools, error codes shall be displayed on the digital display through a blinking pattern on the non-display models. Error codes shall include: not associated, address to 000, improper software configuration, input voltage too high, or general sensor failure. Codes shall be indicated on inside of sensor back cover.
9. Certifications shall include FCC CFR47 - RADIO FREQUENCY DEVICES - Section 15.247 & Subpart E

2.7 OPERATOR INTERFACE

- A. System Graphics. Operator interface shall be graphically based and shall include at least one graphic per piece of equipment or occupied zone, graphics for each chilled water and hot water system, and graphics that summarize conditions on each floor of each building included in this contract. Indicate thermal comfort on floor plan summary graphics using colors to represent zone temperature relative to zone set point
 1. Functionality. Graphics shall allow operator to monitor system status, to view a summary of the most important data for each controlled zone or piece of equipment, to use point and-click navigation between zones or equipment, and to edit set points and other specified parameters.
 2. Graphic imagery – graphics shall use 3D images for all standard and custom graphics. The only allowable exceptions will be photo images, maps, schematic drawings, and selected floor plans.
 3. Animation. Graphics shall be able to animate by displaying different Image lies for changed object status.
 4. Alarm Indication. Indicate areas or equipment in an alarm condition using color or other visual indicator.
 5. Format. Graphics shall be saved in an industry-standard format such as BMP, JPEG, PNG, or GIF. Web-based system graphics shall be viewable on browsers compatible with World Wide Web Consortium browser standards. Web graphic format shall require no plug-in (such as HTML and JavaScript) or shall only require widely available no-cost plug-ins (such as Active-X and Macromedia Flash)
- B. Custom Graphics
 1. The operator interface shall be capable of displaying custom graphics in order to convey the status of the facility to its operators.
 2. Graphical Navigation. The operator interface shall provide dynamic color graphics of building areas, systems and equipment.
 3. Graphical Data Visualization. The operator interface shall support dynamic points including analog and binary values, dynamic text, static text, and animation files.
 4. Custom background images. Custom background images shall be created with the use of commonly available graphics packages such as Adobe Photoshop. The graphics generation package shall create and modify graphics that are saved in industry standard formats such as GIF and JPEG
- C. Graphics Library. Furnish a library of standard HVAC equipment such as chillers, air handlers, terminals, fan coils, unit ventilators, rooftop units, and VAV boxes, in 3-dimensional

graphic depictions. The library shall be furnished in a file format compatible with the graphics generation package program

D. Manual Control and Override

1. Point Control. Provide a method for a user to view, override, and edit if applicable, the status of any object and property in the system. The point status shall be available by menu, on graphics or through custom programs.
2. Temporary Overrides. The user shall be able to perform a temporary override wherever an override is allowed, automatically removing the override after a specified period of time.
3. Override Owners. The system shall convey to the user the owner of each override for all priorities that an override exists.
4. Provide a specific icon to show timed override or operator override, when a point, unit controller or application has been overridden manually

E. Engineering Units

1. Allow for selection of the desired engineering units (i.e. Inch pound or SI) in the system.
2. Unit selection shall be able to be customized by locality to select the desired units for each measurement.
3. Engineering units on this project shall be IP

F. Scheduling. A user shall be able to perform the following tasks utilizing the operator interface:

1. Create a new schedule, defining the default values, events and membership.
2. Create exceptions to a schedule for any given day.
3. Apply an exception that spans a single day or multiple days.
4. View a schedule by day, week and month.
5. Exception schedules and holidays shall be shown clearly on the calendar.
6. Modify the schedule events, members and exceptions

G. Trend logs

1. Trend Logs Definition
 - a. The operator interface shall allow a user with the appropriate security permissions to define a trend log for any data in the system.
 - b. The operator interface shall allow a user to define any trend log options as described in the Application and Control Software section
2. Trend Log Viewer
 - a. The operator interface shall allow Trend Log data to be viewed and printed.
 - b. The operator interface shall allow a user to view trend log data in text-based (time-stamp/value).
 - c. The operator shall be able to view the data collected by a trend log in a graphical chart in the operator interface.

- d. Trend log viewing capabilities shall include the ability to show a minimum of 5 points on a chart.
- e. Each data point trend line shall be displayed as a unique color.
- f. The operator shall be able to specify the duration of historical data to view by scrolling and zooming.
- g. The system shall provide a graphical trace display of the associated time stamp and value for any selected point along the x-axis

3. Export Trend Logs

- a. The operator interface shall allow a user to export trend log data in CSV or PDF format for use by other industry standard word processing and spreadsheet packages

H. Alarm/Event Notification

- 1. An operator shall be notified of new alarms/events as they occur while navigating through any part of the system via an alarm icon.
- 2. Alarm/Event Log. The operator shall be able to view all logged system alarms/events from any operator interface.
 - a. The operator shall be able to sort and filter alarms from events. Alarms shall be sorted in a minimum of 4 categories based on severity.
 - b. Alarm/event messages shall use full language, easily recognized descriptors.
 - c. An operator with the proper security level may acknowledge and clear alarms/events.
 - d. All alarms/events that have not been cleared by the operator shall be stored by the building controller.
 - e. The alarm/event log shall include a comment field for each alarm/event that allows a user to add specific comments associated with any alarm.
- 3. Alarm Processing.
 - a. The operator shall be able to configure any object in the system to generate an alarm when transitioning in and out of a normal state.
 - b. The operator shall be able to configure the alarm limits, warning limits, states, and reactions for each object in the system

I. Reports and Logs

- 1. The operator interface shall provide a reporting package that allows the operator to select reports.
- 2. The operator interface shall provide the ability to schedule reports to run at specified intervals of time.
- 3. The operator interface shall allow a user to export reports and logs from the building controller in a format that is readily accessible by other standard software applications including spreadsheets and word processing. Acceptable formats include:
 - a. CSV, HTML, XML, PDF

4. Reports and logs shall be readily printed to the system printer.
5. Provide a means to list and access the last 10 reports viewed by the user.
6. The following standard reports shall be available without requiring a user to manually configure the report:
 - a. All Points in Alarm Report: Provide an on demand report showing all current alarms.
 - b. All Points in Override Report: Provide an on demand report showing all overrides in effect.
 - c. Commissioning Report: Provide a one-time report that lists all equipment with the unit configuration and present operation.
 - d. Points report: Provide a report that lists the current value of all points

2.8 APPLICATION AND CONTROL SOFTWARE

- A. Furnish the following applications software for building and energy management. All software applications shall reside and run in the system controllers. Editing of applications shall occur at the operator interface
 1. Scheduling. Provide the capability to schedule each object or group of objects in the system. Each of these schedules shall include the capability for start, stop, optimal start, optimal stop, and night economizer actions. Each schedule may consist of up to [10] events. When a group of objects are scheduled together, provide the capability to define advances and delays for each member. Each schedule shall consist of the following:
 - a. Weekly Schedule. Provide separate schedules for each day of the week.
 - b. Exception Schedules. Provide the ability for the operator to designate any day of the year as an exception schedule. This exception schedule shall override the standard schedule for that day. Exception schedules may be defined up to a year in advance. Once an exception schedule is executed it will be discarded and replaced by the standard schedule for that day of the week.
 - c. Holiday Schedules. Provide the capability for the operator to define up to 99 special or holiday schedules. These schedules may be placed on the scheduling calendar and will be repeated each year. The operator shall be able to define the length of each holiday period.
 - d. Optimal Start. The scheduling application outlined above shall support an optimal start algorithm. This shall calculate the thermal characteristics of a zone and start the equipment prior to occupancy to achieve the desired space temperature at the specified occupancy time. The algorithm shall calculate separate sets of heating and cooling rates for zones that have been unoccupied for less than and greater than 24 hours. Provide the ability to modify the start algorithm based on outdoor air temperature. Provide an early start limit in minutes to prevent the system from starting before an operator determined time limit
 2. Trend Log Application
 - a. Trend log data shall be sampled and stored on the System Controller panel and shall capable of being archived to a Workstation for longer term storage

- 1) Trend logs shall include interval, start-time, and stop-time.
- 2) Trend log intervals shall be configurable as frequently as 1 minute and as infrequently as 1 year

b. Automated Trend Logs

- 1) The system controller shall automatically create trend logs for defined key measurements for each controlled HVAC device and HVAC application.
- 2) The automatic trend logs shall monitor these parameters for a minimum of 7 days at 15 minute intervals. The automatic trend logs shall be user adjustable.
- 3) Coordinate with owner for final automatic trending parameters.

c. Alarm/Event logs

- 1) Any object in the system shall be configurable to generate an alarm when transitioning in and out of a normal or fault state
- 2) Any object in the system shall allow the alarm limits, warning limits, states, and reactions to be configured for each object in the system
- 3) An alarm/event shall be capable of triggering any of the following actions
 - a) Route the alarm/event to one or more alarm log- The alarm message shall include the name of the alarm location, the device that generated the alarm, and the alarm message itself
 - b) Route an e-mail message to an operator(s)
 - c) Log a data point(s) for a period of time
 - d) Run a custom control program
- 4) Point Control. User shall have the option to set the update interval, minimum on/off time, event notification, custom programming on change of events
- 5) Timed Override. A standard application shall be utilized to enable/disable temperature control when a user selects on/cancel at the zone sensor, operator interface, or the local operator display. The amount of time that the override takes precedence will be selectable from the operator interface
- 6) Anti-Short Cycling. All binary output points shall be protected from short cycling

2.9 PROGRAMMABLE CONTROLLERS

A. For Stand-Alone Operation of Air Handling Controllers Shall:

1. Operate a schedule in a standalone application using a Real Time Clock with a 7 day power backup
 - a. The Controller shall have a built in schedule (assessable with or without a display)\
 - b. Support will be for at least 3 schedules with up to 10 events for each day of the week.

- c. Each of the 3 schedules can be Analog, Binary or Multi-State
 - d. The controller shall support a minimum of 25 exceptions each with up to 10 events
- 2. For ease of troubleshooting, the Controller shall support data trend logging
 - a. 25,000 samples minimum
 - b. Trends shall be capable of being collected at a minimum sample rate of once every second
 - c. Trends shall be capable of being scheduled or triggered
- 3. To meet the sequence of operation for each application, the Controller shall use library programs provided by the controller manufacturer that are either factory loaded or downloaded with service tool to the Controller
- 4. Environment. Controller hardware shall be suitable for the anticipated ambient conditions
 - a. Storage conditions:
 - 1) Temperature: -67°F to 203°F (-55°C to 95°C)
 - 2) Humidity: Between 5% to 100% RH (non-condensing)
 - b. Operating conditions
 - 1) Temperature: -40°F to 158°F (-40°C to 70°C)
 - 2) Humidity: Between 5% to 100% RH (non-condensing)
 - c. Controllers used indoors shall be mounted in a NEMA 1 enclosure at a minimum
 - d. Controllers used outdoors and/or in wet ambient shall be mounted within NEMA 4 type waterproof enclosures, and shall be rated for operation at -40 F to 158 F [-40 C to 70 C]
- 5. Input/Output: The Controller shall have on board or through expansion module all I/O capable of performing all functionality needed for the application. Controls provided by the equipment manufacture must supply the required I/O for the equipment. In addition other controls must meet the following requirements:
 - a. Shall support flexibility in valve type, the controllers shall be capable of supporting the following valve control types 0-10VDC, 0-5VDC, 4-20mA, 24VAC - 2 position.
 - b. Shall support flexibility in sensor type, the Controller shall be of reading sensor input ranges of 0 to10V, 0 to 20mA, 50ms or longer pulses, 200 to 20Kohm and RTD input.
 - c. Shall support flexibility in sensor type, all Analog Outputs shall have the additional capability of being programmed to operate as Universal Inputs or Pulse Width Modulation Outputs.
 - d. Shall support flexibility in sensor type, the Controller and/or expansion modules shall support dry and wetted (24VAC) binary inputs.
 - e. The controller support pulse accumulator for connecting devices like energy meters.

- f. In order to support a wide range of devices, the Controller's binary output shall be able to drive at least 10VA each.
 - g. Any I/O that is unused by functionality needed for the equipment shall be available to be used by custom program on the Controller and by any other controller on the network.
 - h. The Controller shall provide 24VAC and 24VDC power terminals sensors and other devices required.
 - i. The Controller shall provide a dedicated static pressure input
- 6. Input/Output Expandability – The Controller shall provide the following functionality in order to meet current and future application needs
 - a. For the application flexibility, the Controller shall be capable of expanding to a total of at least 100 hardware I/O terminations.
 - b. Expansion I/O can be mounted up to 200m from control
 - c. Expansion I/O can be added in as small as 4 point increments.
 - d. To keep MS/TP network traffic to a minimum, expansion I/O must communicate via an internal controller communication bus (point expansion via the MS/TP network is not allowed)
- 7. Serviceability – The Controller shall provide the following in order to improve serviceability of the Controller.
 - a. Diagnostic LEDs for power/normal operation/status, open protocol communications, sensor bus communications, and binary outputs. All wiring connections shall be clearly labeled and made to be field removable.
 - b. Binary and analog inputs and outputs shall use removable connectors or be connected to terminal strip external to the control box
 - c. Software service tool connection through all of the following methods: direct cable connection to the Controller, connection through another controller on protocol link and through the Controller's zone sensor.
 - d. For configuration, programming, and testing of controller programs must, for safety purposes, be able to be accomplished with the power off to the equipment and the controller.
 - e. The Controller software tool service port shall utilize standard of-the-shelf USB printer cable.
 - f. Capabilities to temporarily override the point values with built-in time expiration in the Controller.
 - g. To aid in service replacement, the Controller shall easily attached to standard DIN rail mounting.
 - h. For future expansion, the Controller shall be capable of adding sequence of operation programming utilizing service tools software with a graphical programming interface (editing or programming in line code is not permissible).
 - i. To aid in service replacement, the Controller shall allow for setting its address must be rotary switches that correspond to a numerical value for the address to allow the setting of the address without the need of a service tool or the control being powered (DIP switch methodologies are not allowed).
 - j. Controller data shall persist through a power failure

8. Software Retention: All Controller operating parameters, setpoints, BIOS, and sequence of operation code must be stored in non-volatile memory in order to maintain such information for months without power.
9. Transformer for the Controller must be rated at minimum of 115% of ASC power consumption, and shall be fused or current limiting type. 24 VAC, +/- 15% nominal, 50-60 Hz, 24 VA plus binary output loads for a maximum of 12 VA for each binary output
10. Controller must meet the following Agency Compliance:
 - a. UL916 PAZX, Open Energy Management Equipment
 - b. UL94-5V, Flammability
 - c. FCC Part 15, Subpart B, Class B Limit
 - d. cUL Marked for international compliance
 - e. CE Marked for international compliance

2.10 APPLICATION SPECIFIC CONTROLLERS

- A. Application Specific Controllers (ASC) shall be microprocessor-based DDC controllers which through hardware or firmware design control specified equipment. They are not user programmable, but are customized for operation within the confines of the equipment they are designed to serve
- B. Zone Controllers are controllers that operate equipment that control the space temperature of single zone
- C. Software
 1. To meet the sequence of operation for each zone control, the controller shall use programs developed and tested by the controller manufacturer that are either factory loaded or downloaded with service tool to the controller.
 2. Stand-Alone Operation: Each piece of equipment identified on in the drawing schedules to have stand-alone controllers shall be controlled by a single controller and provide stand-alone control in the event of communication failure. In case of communications failure stand-alone operation shall use default values or last values for remote sensors read over the network such as outdoor air temperature.
 3. For controlling ancillary devices and for flexibility to change to sequence of operation in the future, the controller shall be capable running custom programs written in a graphical programming language
- D. Environment Controller hardware shall be suitable for the anticipated ambient conditions
 1. Storage: -55 to 203 °F (-48 to 95°C) and 5 to 95% Rh, non-condensing.
 2. Operating: -40 to 158 °F (-40 to 70 °C) and 5 to 95% Rh, non-condensing.
 3. Controllers used indoors shall be mounted in a NEMA 1 enclosure at a minimum
 4. Controllers used outdoors and/or in wet ambient shall be mounted within NEMA 4 type waterproof enclosures, and shall be rated for operation at -40 F to 158 F
- E. Input/Output

1. For flexibility in selection and replacement of valves, the controllers shall be capable of supporting all of the following valve control types 0-10VDC, 0-5VDC, 4-20mA, 24VAC floating point, 24VAC - 2 position (Normally Open or Normally Closed).
 2. For flexibility in selection and replacement of sensors, the controllers shall be capable of reading sensor input ranges of 0 to 10V, 0 to 20mA, pulse counts, and 200 to 20Kohm.
 3. For flexibility in selection and replacement of binary sensors, the controller shall support dry and wetted (24VAC) binary inputs.
 4. For flexibility in selection and replacement devices, the controller's shall have binary output which are able to drive at least 12VA each.
 5. For flexibility in selection and replacement of motors, the controller shall be capable of outputting 24VAC (binary output), DC voltage (0 to 10VDC minimum range) and PWM (in the 80 to 100 Hz range).
 6. For future needs, any I/O that is unused by functionality of equipment control shall be available to be used by custom program on the controller and by another controller on the network.
- F. Serviceability – The controller shall provide the following in order to improve serviceability of the controller
1. Diagnostic LEDs shall indicate correct operation or failures/faults for all of the following: power, sensors, protocol communications, and I/O communications bus.
 2. All binary output shall have LED's indicating the output state.
 3. All wiring connections shall removable without the use of a tool.
 4. Software service tool connection through all of the following methods: direct cable connection to the controller, connection through another controller on protocol link and through the controller's zone sensor.
 5. For safety purposes, the controller shall be capable of being powered by a portable computer for the purposes of configuration, programming, and testing programs so that this work can be accomplished with the power off to the equipment.
 6. Capabilities to temporarily override of point values with built-in time expiration in the controller.
 7. Mack Address shall be set using decimal (0-9) based rotary switches.
 8. Configuration change shall not be made in a programming environment, but rather by a configuration page utilizing dropdown list, check boxes, and numeric boxes.
 9. Trending objects resident on controller
 - a. Minimum of 20,000 trending points total on controller
 - b. Shall be capable of trending all points used by controller
 - c. Shall be capable of 1 second sample rates on all points
- G. Software Retention: All Zone Controller operating parameters, setpoints, BIOS, and sequence of operation code must be stored in non-volatile memory in order to maintain such information for months without power.
- H. Transformer for the controller must be rated at minimum of 115% of ASC power consumption, and shall be fused or current limiting type. 24 VAC, +/- 15% nominal, 50-60 Hz, 24 VA plus binary output loads, for a maximum of 12 VA for each binary output.
- I. Agency Approval: The controller shall have meet the Agency Compliance:

1. UL916 PAZX, Open Energy Management Equipment
2. UL94-5V, Flammability
3. FCC Part 15, Subpart B, Class B Limit

2.11 AUXILIARY EQUIPMENT/DEVICES

- A. Electronic Valve/Damper Position Indication: Visual scale indicating percent of travel and 2-to 10-V dc, feedback signal.
- B. Flow Switches
 1. Flow-proving switches shall be either paddle or differential pressure type, as shown.
 2. Paddle type switches (water service only) shall be UL listed, SPDT snap-acting with pilot duty rating (125 VA minimum). Adjustable sensitivity with NEMA 1 Type enclosure unless otherwise specified:
 3. Differential pressure type switches (air or water service) shall be UL listed, SPDT snap-acting, pilot duty rated (125 VA minimum), NEMA 1 Type enclosure, with scale range and differential suitable for intended application, or as specified.
 4. Current sensing relays may be used for flow sensing or terminal devices
- C. Relays
 1. Control relays shall be UL listed plug-in type with dust cover. Contact rating, configuration, and coil voltage suitable for application.
 2. Time delay relays shall be UL listed solid-state plug-in type with adjustable time delay. Delay shall be adjustable plus or minus 200% (minimum) from set-point shown on plans. Contact rating, configuration, and coil voltage suitable for application. Provide NEMA 1 Type enclosure when not installed in local control panel
- D. Transformers and Power Supplies
 1. Control transformers shall be UL listed, Class 2 current-limiting type, or shall be furnished with over-current protection in both primary and secondary circuits for Class 2 service.
 2. Unit output shall match the required output current and voltage requirements. Current output shall allow for a 50% safety factor. Output ripple shall be 3.0 mV maximum Peak-to-Peak. Regulation shall be 0.10% line and load combined, with 50 microsecond response time for 50% load changes. Unit shall have built-in over-voltage protection.
 3. Unit shall operate between 0 C and 50 C.
 4. Unit shall be UL recognized
- E. Current Switches
 1. Current-operated switches shall be self-powered, solid state with adjustable trip current. The switches shall be selected to match the current of the application and output requirements of the DDC system.
- F. Power Monitors

1. Selectable rate pulse output for kWh reading, 4–20 mA output for kW reading, N.O. alarm contact, and ability to operate with 5.0 amp current inputs or 0–0.33 volt inputs.
2. 1.0% full-scale true RMS power accuracy, + 0.5 Hz, voltage input range 120–600 V, and auto range select.
3. Under voltage/phase monitor circuitry.
4. NEMA 1 enclosure.
5. Current transformers having a 0.5% FS accuracy, 600 VAC isolation voltage with 0–0.33 V output. If 0–5 A current transformers are provided, a three-phase disconnect/shorting switch assembly is required

G. Local Control Panels

1. All indoor control cabinets shall be fully enclosed NEMA 1 Type construction with hinged door, and removable sub-panels or electrical sub-assemblies.
2. Interconnections between internal and face-mounted devices shall be pre-wired with color-coded stranded conductors neatly installed in plastic troughs and/or tie-wrapped. Terminals for field connections shall be UL listed for 600-volt service, individually identified per control/interlock drawings, with adequate clearance for field wiring. Control terminations for field connection shall be individually identified per control drawings.
3. Provide on/off power switch with over-current protection for control power sources to each local panel

2.12 SURGE SUPPRESSION (SP) RECEPTACLE

- A. Provide at each DDC panel and operator workstation locations, a surge suppression receptacle with metal oxide varister to dissipate the electrical energy of voltage spikes. 20 ampere, duplex, NEMA 5-20R configuration. Back and side wiring, high impact nylon body.
- B. Acceptable Make: Hubbell 5352-S

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that conditioned power supply is available to control units and operator workstation.

3.2 INSTALLATION

- A. The Contract Documents shall be thoroughly examined for coordination of control devices their installation, wiring, and commissioning. Coordinate and review mechanical equipment specifications, locations, and identify any discrepancies, conflicts, or omissions that shall be reported to the Architect/Engineer for resolution before rough-in work is started

- B. The BMS manufacturer shall inspect the jobsite in order to verify that control equipment can be installed as required, and any discrepancies, conflicts, or omissions shall be reported to the Architect/Engineer for resolution before rough-in work is started
- C. Install software in control units and operator workstation(s). Implement all features of programs to specified requirements and as appropriate to sequence of operation.
- D. Connect and configure equipment and software to achieve sequence of operation specified.
- E. Verify location of thermostats, humidistats, and other exposed control sensors with Drawings and room details before installation.
- F. Install damper motors on outside of duct in warm areas, not in locations exposed to outdoor temperatures.
- G. Install labels and nameplates to identify control components according to Section 230553 "Identification for HVAC Piping and Equipment."
- H. Install hydronic instrument wells, valves, and other accessories according to Section 232113 "Hydronic Piping."

3.3 GENERAL WORKMANSHIP

- A. Install equipment, piping, wiring/conduit, parallel to building lines (i.e. horizontal, vertical, and parallel to walls) wherever possible
- B. Provide sufficient slack and flexible connections to allow for vibration of piping and equipment
- C. Install all equipment in readily accessible location as defined by National Electric Code (NEC). Control panels shall be attached to structural walls or properly supported in a free-standing configuration, unless mounted in equipment enclosure specifically designed for that purpose. Panels shall be mounted to allow for unobstructed access for service
- D. Verify integrity of all control wiring to ensure continuity and freedom from shorts and grounds prior to commencing the startup and commissioning procedures
- E. All control device installation, and wiring shall comply with Contract Documents, acceptable industry specifications, and industry standards for performance, reliability, and compatibility. Installation and wiring shall be executed in strict adherence to local codes and standard practices referenced in Contract Documents

3.4 ELECTRICAL WIRING AND CONNECTION INSTALLATION

- A. Where Class 2 wires are in concealed and accessible locations; including ceiling return air plenums, approved cables outside of electrical raceway can be used provided that the following conditions are met

1. Circuits meet NEC Class 2 (current-limited) requirements. (Low-voltage power circuits shall be sub-fused when required to meet Class 2 current-limit.)
 2. All cables shall be UL listed for application (i.e., cables used in ceiling plenums shall be UL listed specifically for that purpose)
- B. Do not install Class 2 wiring in conduits containing Class 1 wiring
- C. Where Class 2 wiring is run exposed, wiring shall be run parallel along a surface or perpendicular to it, and bundled, using approved wire ties at no greater than 3 m [10 ft] intervals. Such bundled cable shall be fastened to the structure, using industry approved fasteners, at 1.5 m [5 ft] intervals or more often to achieve a neat and workmanlike result.
- D. All wire-to-device connections shall be made at a terminal blocks or terminal strip. All wire-to-wire connections shall be at a terminal block, or with a crimped connector. All wiring within enclosures shall be neatly bundled and anchored to permit access and prevent restriction to devices and terminals.
- E. Maximum allowable voltage for control wiring shall be 120Vac. If only higher voltages are available for use, the BMS manufacturer shall provide step-down transformers to achieve the desired control voltages.
- F. All control wiring shall be installed as continuous lengths, where possible. Any required splices shall be made only within an approved junction box or other approved protective device.
- G. Install plenum wiring in sleeves where it passes through walls and floors. Maintain fire rating at all penetrations in accordance with Contract Documents and National and/or Local Codes.
- H. Conduit and wire sizing shall be determined by the BMS manufacturer in order to maintain manufacturer's recommendation and must meet National and Local Codes.
- I. Control and status relays are to be located in pre-fabricated enclosures that meet the application. These relays may also be located within packaged equipment control panel enclosures as coordinated. These relays shall not be located within Class 1 starter enclosures.
- J. Follow manufacturer's installation recommendations for all communication and network bus cabling. Network or communication cabling shall be run separately from all control power wiring
- K. BMS manufacturer shall terminate all control and/or interlock wiring and shall maintain updated (as-built) wiring diagrams with terminations identified at the job site.
- L. Flexible metal conduits and liquid-tight flexible metal conduits shall not exceed 3' in length and shall be supported at each end. Flexible metal conduit less than 1/2" electrical trade size shall not be used. In areas exposed to moisture, including chiller and boiler rooms, liquid-tight, flexible metal conduits shall be used.
- M. Install raceways, boxes, and cabinets according to Section 260533 "Raceways and Boxes for Electrical Systems."

- N. Install building wire and cable according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- O. Install signal and communication cable:
 - 1. Conceal cable, except in mechanical rooms and areas where other conduit and piping are exposed.
 - 2. Install exposed cable in raceway.
 - 3. Install concealed cable in raceway.
 - 4. Bundle and harness multiconductor instrument cable in place of single cables where several cables follow a common path.
 - 5. Fasten flexible conductors, bridging cabinets and doors, along hinge side; protect against abrasion. Tie and support conductors.
 - 6. Number-code or color-code conductors for future identification and service of control system, except local individual room control cables.
- P. Connect manual-reset limit controls independent of manual-control switch positions. Automatic duct heater resets may be connected in interlock circuit of power controllers.
- Q. Connect hand-off-auto selector switches to override automatic interlock controls when switch is in hand position.

3.5 GENERAL SYSTEM REQUIREMENTS

- A. The control of each system shall be guaranteed to perform as described in the Sequence of Operation Section. Equipment, remote switches, in finished rooms shall be flush-mounted, if possible.

3.6 PROGRAMMING

- A. Provide sufficient internal memory for all controllers to ensure specified sequence of operations, alarming, trending, and reporting requirements are achieved. BMS manufacturer shall provide a minimum of 25% spare memory capacity for future use
- B. Software Programming
 - 1. Provide programming for individual mechanical systems to achieve all aspects of the sequence of operation specified. It is the BMS manufacturer's responsibility to ensure all mechanical equipment functions and operates as specified in sequence of operations. Provide sufficient programming comments in controller application software to clearly describe each section of the program. The comment statements shall reflect the language used in the sequence of operations
- C. BMS Operator's Interface
 - 1. When Operator Workstation is specified, provide color graphics for each piece of mechanical equipment depicting sufficient I/O to monitor and troubleshoot operation.

Additionally, provide individual floor plans of the building allowing an operator to quickly view the overall floor plan area for any out of tolerance conditions that may need addressing. These standard graphics shall depict all points dynamically as specified in the points list and/or indicated in sequence of operation

2. The BMS manufacturer shall provide all the labor necessary to install, initialize, start-up, and trouble-shoot all operator interface software and their functions as described in this section. This includes any operating system software, the operator interface data base, and any third party software installation and integration required for successful operation of the operator interface.
3. As part of this execution phase, the BMS manufacturer shall perform a complete test of the operator interface. Test duration shall be a minimum of (8) hours on-site. Tests shall be made in the presence of the Owner and/or Engineer.
4. Demonstration: A complete demonstration of the capabilities of the BMS system shall be performed by the BMS manufacturer's field personnel. The BMS manufacturer shall dedicate a minimum of (16) hours on-site with the Owner representatives, and Engineer to demonstrate a complete functional test of all the BMS system requirements, including demonstrating correct sequence of operation. This BMS demonstration shall constitute an acceptance inspection, and will represent the process of approving the BMS as designed and specified.

3.7 SYSTEM COMPONENTS

- A. Valves: Union or flanged connected. Locate close to apparatus controlled with pipe reducers and increasers located closest to valve. Locate, arrange, and pipe per installation diagram.
- B. Mounting height for all new room thermostats or sensors shall be 48 in. to the top of the cover or match existing if sensor is being replaced.
- C. Locate thermostats or sensors on walls symmetrical with adjacent items. Verify exact room location to avoid doors, fixed and portable equipment. Install to minimize damage. Do not install adjacent to lighting dimmers or other heat generating equipment.
- D. Dampers and Damper Operators: Tag dampers for proper location. Install per manufacturer's printed instruction as to motor size and quantity, linkage arrangement, drive connection point. Adjust to close tightly. Allow for conduit sleeve or blank space for roof fan dampers. Where ducts are insulated, set damper operators at least 2 in. away from side of duct to allow for insulation.
- E. Thermometers: Provide with diagrams indicating exact locations prior to start of Work. Arrange for easy reading

3.8 FIRE/FAN SHUTDOWN

- A. Provide a signal to stop air handling unit fans upon activation of the fire alarm system. Wiring to be directly to the individual motor starters, unless otherwise indicated on drawings.
- B. Provide a signal to the DDC control system that the fire alarm system is activated.

3.9 SYSTEM TESTING

- A. At the time of installation, systems shall be tested for control device operation prior to the systems acceptance. A report of each systems performance shall be submitted to the Owner's Representative. The report shall include:

1. Field verification and demonstration checklist of analog input calibration, analog output operation, digital input function, and digital output operation.
2. Trend log of inputs and output, printed every two hours, for one week.
3. Refer to "Instructions and Adjustments"
4. Field verification and demonstration of sequence of operations.

3.10 EXISTING CONTROL DEVICES

- A. Notify the Owner's Representative of existing control devices that need to be replaced or repaired that may be noticed in the process of installation of new work

3.11 INTEGRATION WITH EQUIPMENT CONTROL

- A. The DDC system shall fully integrate to provide full monitoring and control functions for equipment shown.

3.12 POINT DESCRIPTION AND PROGRAM LIST

- A. General:

1. Points listed are the minimum number of points to be provided. Provide additional points as required to satisfy the sequence and operational requirements.
2. Provide spare points. After the system has been completed and tested, the following minimum quantity of spare points shall be available for future connection at each DCP:
 - a. Binary inputs: 2
 - b. Binary outputs: 2
 - c. Analog inputs: 1
 - d. Analog outputs: 1
3. Provide proportional-integral-derivative algorithms for all control programs.
4. Determine, through operation of the system, proportional bands, interval time, integral periods, adjustment rates, and any other input information required to provide stable operation of the control programs.
5. The following definitions apply to the letter descriptors used in the point lists:
 - a. RT - Run time of a piece of equipment. This shall be the total operating time since initial start-up of a piece of equipment.
 - b. T - Indicates the point shall be trendable.

- c. A - Indicates the system shall alarm when the point is outside its range, or upon contact closure or opening.
 - d. CS - Current Sensor
- 6. All alarms shall be trendable. All equipment start/stops shall be trendable.
- 7. At a minimum, each sequence and accompanying point list shall be represented by an individual graphic. Each point listed shall appear on the graphic. Where appropriate and approved, multiple sequences and point lists may be combined into a single graphic.
 - a. For analog outputs, display on the graphic the percent of full signal (percent open for valves and dampers, percent of speed for variable speed drives, percent open for vortex dampers, etc.).
 - b. For analog outputs controlled by analog inputs, provide a probe at the graphic to redefine the proportional, integral, and derivative gains.
 - c. Alarm set points and ranges shall be resettable from the graphic. Control set points and ranges shall be resettable from the graphic.
 - d. Where average point values are called for in the sequence, the average value shall be displayed on the graphic. In response to a probe on the graphic, the individual sensor values and sensor locations shall be displayed
- 8. Where dampers operate in conjunction with fan operation, the damper open signal shall precede the fan start signal by 10 to 15 seconds. The damper close signal shall be delayed 10 to 15 seconds after the fan stop signal.

3.13 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:

- 1. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation. Remove and replace malfunctioning units and retest.
- 2. Test and adjust controls and safeties.
- 3. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
- 4. Test calibration of electronic controllers by disconnecting input sensors and stimulating operation with compatible signal generator.
- 5. Test each point through its full operating range to verify that safety and operating control set points are as required.
- 6. Test each control loop to verify stable mode of operation and compliance with sequence of operation.
- 7. Test each system for compliance with sequence of operation.
- 8. Test software and hardware interlocks.

B. DDC Verification:

- 1. Verify that instruments are installed before calibration, testing, and loop or leak checks.
- 2. Check instruments for proper location and accessibility.
- 3. Check instrument installation for direction of flow, elevation, orientation, insertion depth, and other applicable considerations.

4. Check temperature instruments and material and length of sensing elements.
5. Check control valves. Verify that they are in correct direction.
6. Check DDC system as follows:
 - a. Verify that DDC controller power supply is from emergency power supply, if applicable.
 - b. Verify that wires at control panels are tagged with their service designation and approved tagging system.
 - c. Verify that spare I/O capacity has been provided.
 - d. Verify that DDC controllers are protected from power supply surges.

C. Replace damaged or malfunctioning controls and equipment and repeat testing procedures

3.14 ADJUSTING

A. Calibrating and Adjusting:

1. Calibrate instruments.
2. Make three-point calibration test for both linearity and accuracy for each analog instrument.
3. Calibrate equipment and procedures using manufacturer's written recommendations and instruction manuals. Use test equipment with accuracy at least double that of instrument being calibrated.
4. Control System Inputs and Outputs:
 - a. Check analog inputs at 0, 50, and 100 percent of span.
 - b. Check analog outputs using milliampere meter at 0, 50, and 100 percent output.
 - c. Check digital inputs using jumper wire.
 - d. Check digital outputs using ohmmeter to test for contact making or breaking.
 - e. Check resistance temperature inputs at 0, 50, and 100 percent of span using a precision-resistant source.
5. Stroke and adjust control valves and dampers without positioners, following the manufacturer's recommended procedure, so that valve or damper is 100 percent open and closed.
6. Stroke and adjust control valves and dampers with positioners, following manufacturer's recommended procedure, so that valve and damper is 0, 50, and 100 percent closed.
7. Provide diagnostic and test instruments for calibration and adjustment of system.
8. Provide written description of procedures and equipment for calibrating each type of instrument. Submit procedures review and approval before initiating startup procedures.

B. Adjust initial temperature and humidity set points.

END OF SECTION 230900

SECTION 230993 - SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes control sequences for HVAC systems, subsystems, and equipment.
- B. Related Sections include the following:
 - 1. Division 23 Section "Instrumentation and Control for HVAC" for control equipment and devices and for submittal requirements.

1.3 DEFINITIONS

- A. BMS: Building Management System.

1.4 EXISTING CIVIL DEFENSE AIR HANDLING UNIT

- A. Control Sequence
 - 1. Air handling unit is a constant volume unit which consists of a supply fan, (1) cooling coil with control valve, (1) re-heat coil with control valve, return damper, outside air damper, and (1) remote exhaust fan with exhaust damper.

The air handling unit shall be controlled during the occupied/unoccupied modes via the Building Management System (BMS), through an owner directed time schedule.
 - 2. Automatic/manual control

The unit shall be accompanied by an H-O-A (Hand/Off/Auto) switch on the variable frequency drive. In the "H" position, the system shall be energized and the system safety devices shall protect the circuit. With the H-O-A switch in the "A" position, the unit shall in response to BMS control and system safety circuits.
 - 3. Unoccupied Mode

The “Time of Day” program shall cause the air handling unit to go to unoccupied mode settings when called for by the schedule program. The space temperature settings shall be set to reset to 65 degrees F (adj.) winter and 80 degrees F (adj.) summer. In the unoccupied mode the outside and exhaust air dampers shall be closed. During heating season, the DDC system shall use space temperature sensors to cycle the air handling unit to prevent the space temperature from falling below the minimum setpoint. The outside air damper shall remain closed.

4. Occupied Mode

The “Time of Day” program shall cause the air handling units to go to occupied mode settings to start and run continuously and controls to be energized. The air handling unit control shall be energized and switched from unoccupied temperature setting (66 degrees F (adj.) minimum and 75 degrees F (adj.) maximum) to an occupied setting (70 degrees F (adj.)). The outside air and return dampers shall modulate to maintain outside air volume.

5. Temperature Economizer Control

The BMS shall compare the return and outdoor air temperatures to determine when it is more energy efficient to use outside air for cooling. The BMS shall continually monitor the return air temperature, constantly comparing it to the outdoor air temperature. The BMS shall modulate outside air and return air dampers to achieve mixed air temperature setpoint (adj.)

When the outside air temperature is greater than the return air temperature, the outside air, and return dampers shall return to minimum position. When the mixed air temperature falls below setpoint 55 degrees F (adj.) the outside air and return air dampers shall go to minimum position. If cooling is required, but the return air temperature is lower than the outdoor air temperature, the outside air and return air dampers shall go to their minimum position. If the return air temperature is below an operator definable limit, then a warm-up cycle shall be initiated forcing the outside air damper to its closed position and recirculation air damper 100% open. When return air temperature increases above the limit, plus a definable differential, then the warm-up cycle shall be terminated.

6. Supply Air Temperature Control - Cooling

When the space temperature exceeds the setpoint, the supply fan speed shall remain constant, the outside air and return air dampers shall continue to modulate and the chilled water control valve shall modulate to maintain the scheduled discharge air temperature (adj.).

If the space set point is satisfied the chilled water control valve shall modulate to maintain the discharge air temperature. The supply air temperature shall be maintain a discharge air temperature of 70 degrees F (adj) in the summer and 70 degrees F (adj) in the winter.

7. Supply Air Temperature Control - Heating

When the space temperature exceeds the setpoint, the fan speed shall remain constant, the outside air and return air dampers shall continue to modulate and the hot water control valves shall modulate to maintain the scheduled discharge air temperature (adj).

If the space set point is satisfied the hot water control valve shall modulate to maintain the discharge air temperature. The supply air temperature shall be maintain a discharge air temperature of 70 degrees F (adj) in the summer and 70 degrees F (adj) in the winter.

If cooling is required and the mixed air temperature drops below 53 degrees F (adj) due to the amount of outside air the heating valve shall increase the discharge air temperature to 55 degrees F.

8. Warm-up Cycle Control

When schedule calls for occupied mode startup, and the return air temp is 5 degrees F (adj.) or more below setpoint of 70 degrees F (adj.), a “warm-up” cycle shall initiate. During the warm-up cycle the outside air damper shall be closed. Upon this call for heating the heating control valve shall be open. When return air temperature increases above the setpoint of 66 degrees F (adj.), the warm-up cycle shall be terminated.

9. Occupied Mode - Cooling

When the unit enters the occupied mode and the BMS shall position the Air Handler control equipment as follows:

- Outside air damper = Modulating
- Exhaust air damper = 100% Open
- Return damper = Modulating
- Supply fan = Constant
- Cooling valve = Modulating
- Reheat valve = Closed

10. Occupied Mode - Heating

When the unit enters the occupied mode and the BMS shall position the Air Handler control equipment as follows:

- Outside air damper = Modulating
- Exhaust air damper = Modulating
- Return damper = Modulating
- Supply fan = Constant
- Cooling valve = Closed
- Reheat valve = Modulating

11. Economizer

When the unit enters into economizer and the BMS shall position the Air Handler control equipment as follows:

- Outside air damper = Modulating
- Exhaust air damper = Modulating
- Return damper = Modulating
- Supply fan = Constant
- Cooling valve = Closed
- Reheat valve = Closed

B. Air handling unit Components

1. Supply Fan

The supply fan shall remain constant.

2. Return air damper

The return air damper shall modulate proportionally to the outside air damper position to provide 100% of balanced airflow. (ie if the outside damper is at 60% the return damper is to modulate to 40%)

3. Outside air damper

The outside air dampers shall operate to maintain the minimum outside air quantity setpoint based on scheduled outdoor air quantity. During occupied operation the outside air damper shall open to balanced setpoint. During unoccupied mode, the outside air damper shall be 100% closed.

During economizer control, damper to modulate to maintain a mixed air temperature as described above.

4. Exhaust air damper

The exhaust air damper shall be fully open during scheduled occupancy and fully closed during unoccupied hours.

5. Cooling coil

Valve to modulate, as identified above, to maintain a discharge air temperature setpoint.

6. Re heat coil

Valve to modulate, as identified above, to maintain a discharge air temperature setpoint.

7. Occupied override operation

Provide system override at BMS to manually activate occupied operation during unoccupied time of day programming. Upon activation BMS to sequence the air handling unit based on occupied sequencing for 2 hours (adj).

C. Alarms

1. Fan Failure

If status of a fan, which has been called by the BMS to start, has not been verified as running within a period of 10 seconds (adj.) or if a signal from the VFD is received, the BMS shall initiate an alarm signal at the operator's workstation. The fan shall be identified by its designation and shall be tagged as a "FAN FAILURE".

2. Filter Maintenance

A differential pressure switch with sensors on upstream and downstream side of filter shall signal the BMS system when the differential pressure is equal to or greater than the setpoint (adj.). The BMS shall initiate an alarm signal at the operator's workstation indicating a clogged filter and requirement for maintenance.

3. Low Limit Thermostat

The low limit thermostat shall monitor the discharge air temperature. When temperature drops below 30 degrees F (adj.) the supply and return fan shall shut down, outside air damper close, exhaust damper close, set heating coils to full heat, and the BMS shall initiate an alarm signal at the operator's workstation. The low limit thermostat shall be manually reset before system can resume normal operation.

4. Discharge air temperature

If the unit discharge air temperature is greater than 15 degrees F (adj) from setpoint the BMS shall initiate an alarm signal at the operator's workstation.

PART 2 - PRODUCTS (*Not Used*)

PART 3 - EXECUTION (*Not Used*)

END OF SECTION 230993

SECTION 232113 - HYDRONIC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes pipe and fitting materials, joining methods, special-duty valves, and specialties for the following:
 - 1. Hot-water heating piping.
- B. Related Sections:
 - 1. Section 230553 "Identification for HVAC Piping and Equipment" for valve tags and schedules.
 - 2. Division 23 Section "General-Duty valves."
 - 3. Division 23 Section "HVAC hydronic piping specialties."

1.3 DEFINITIONS

- A. PTFE: Polytetrafluoroethylene.

1.4 PERFORMANCE REQUIREMENTS

- A. Hydronic piping components and installation shall be capable of withstanding the following minimum working pressure and temperature:
 - 1. Hot-Water Heating Piping: 150 psig at 210 deg F.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of the following:
 - 1. Piping
 - 2. Valves. Include flow and pressure drop curves based on manufacturer's testing for calibrated-orifice balancing valves and automatic flow-control valves.
 - 3. Air control devices.
 - 4. Glycol Make-up Unit including a wiring diagram.

5. Escutcheons and floor plates.

- B. Provide piping schedule indicating type of intended installation and installation location. Refer to piping schedule below.
- C. Coordination Drawings: Plans and other details, drawn to scale, on which components are shown and coordinated with each other, using input from installers of the items involved. Refer to Specification Section 230010 General Mechanical Requirements for further information.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Field quality-control test reports.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Installers of Pressure-Sealed Joints: Installers shall be certified by the pressure-seal joint manufacturer as having been trained and qualified to join piping with pressure-seal pipe couplings and fittings.
- B. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

- A. Drawn-Temper Copper Tubing: ASTM B 88, Type L.
- B. DWV Copper Tubing: ASTM B 306, Type DWV.
- C. Fittings (Tees, Elbows, Reducers, etc): Wrought copper or cast bronze as called for in Part 3.1; solder end connections; shall meet applicable ASTM standards F 1974, B16.24 and applicable ASME standards B16.15, B16.18, B16.22, B16.26, and B16.51.
- D. Unions: Use unions, solder type, cast bronze, ground joint, 150 lb swp.

2.2 JOINING MATERIALS

- A. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

2.3 DIELECTRIC FITTINGS

- A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
- B. Dielectric Nipples:
 - 1. Performance: Subject to compliance with requirements and related documents, provide products meeting a minimum performance of the following:
 - 2. Description:
 - a. Standard: IAPMO PS 66
 - b. Electroplated steel nipple, complying with ASTM F 1545.
 - c. Pressure Rating: 300 psig at 230 deg F.
 - d. End Connections: Male threaded.
 - e. Lining: Inert and noncorrosive, propylene.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

- A. Hot-water heating piping, aboveground, NPS 2-1/2 and smaller, shall be the following:
 - 1. Type L, drawn-temper copper tubing, wrought-copper fittings, and soldered joints.

3.2 PIPING INSTALLATIONS

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicate piping locations and arrangements if such were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- B. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

- E. Install piping to permit valve servicing.
- F. Install piping at indicated slopes.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
 - 1. Provide 45 deg lateral fittings and clean out cap on condensate piping 1-1/4" and larger to accommodate cleanout of piping.
- I. Install piping to allow application of insulation.
- J. Select system components with pressure rating equal to or greater than system operating pressure.
- K. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.
- L. Install drains, consisting of a tee fitting, NPS 3/4 ball valve, and short NPS 3/4 threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.
- M. Install piping at a uniform grade of 0.2 percent upward in direction of flow.
- N. Reduce pipe sizes using eccentric reducer fitting installed with level side up.
- O. Install branch connections to mains using tee fittings in main pipe, with the branch connected to the bottom of the main pipe. For up-feed risers, connect the branch to the top of the main pipe.
- P. Install valves according to Section 230523 "General-Duty Valves for HVAC Piping."
- Q. Install unions in piping, NPS 2 and smaller, adjacent to valves, at final connections of equipment, and elsewhere as indicated.
- R. Install strainers on inlet side of each control valve, pressure-reducing valve, solenoid valve, in-line pump, and elsewhere as indicated. Install NPS 3/4 nipple and ball valve in blowdown connection of strainers NPS 2 and larger. Match size of strainer blowoff connection for strainers smaller than NPS 2.
- S. Identify piping as specified in Section 230553 "Identification for HVAC Piping and Equipment."
- T. Install shutoff valve immediately upstream of each dielectric fitting.
- U. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."
- V. Install escutcheons and floor plates for exposed piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons.
 - 1. Install escutcheons for piping with ID to closely fit around pipe, tube, and insulation pipf piping and with OD that completely covers the opening.

2. Install floor plates for piping penetrations of equipment room floors. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers the opening.

3.3 DIELECTRIC FITTING INSTALLATION

- A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
- B. Dielectric Fittings for NPS 2-1/2 and Smaller: Use dielectric nipples or unions.

3.4 HANGERS AND SUPPORTS

- A. Hanger, support, and anchor devices are specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment." Comply with the following requirements for maximum spacing of supports.
- B. Install the following pipe attachments:
 1. Adjustable steel clevis hangers for individual horizontal piping less than 20 feet long.
 2. Adjustable roller hangers and spring hangers for individual horizontal piping 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. Provide copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.
- C. Install hangers for drawn-temper copper piping with the following maximum spacing and minimum rod sizes:
 1. NPS 3/4: Maximum span, 5 feet; minimum rod size, 1/4 inch.
 2. NPS 1: Maximum span, 6 feet; minimum rod size, 1/4 inch.
 3. NPS 1-1/2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
- D. Support vertical runs at roof, at each floor, and at 10-foot intervals between floors.

3.5 PIPE JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

- D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

3.6 TERMINAL EQUIPMENT CONNECTIONS

- A. Sizes for supply and return piping connections shall be the same as or larger than equipment connections. Provide reducer at unit prior to final connection.
- B. Install control valves in accessible locations close to connected equipment
- C. Install ports for pressure gages and thermometers at coil inlet and outlet connections according to Section 230519 "Meters and Gages for HVAC Piping."

3.7 FIELD QUALITY CONTROL

- A. Prepare hydronic piping according to ASME B31.9 and as follows:
 - 1. Leave joints, uninsulated and exposed for examination during test.
 - 2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
 - 3. Flush hydronic piping systems with clean water; then remove and clean or replace strainer screens.
 - 4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve.
 - 5. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.
- B. Using new materials, replace broken and damaged escutcheons and floor plates.
- C. Perform the following tests on hydronic piping:
 - 1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
 - 2. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.
 - 3. Isolate expansion tanks and determine that hydronic system is full of water.
 - 4. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure, but not less than 100 psi for duration of 60 min. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90

percent of specified minimum yield strength or 1.7 times "SE" value in Appendix A in ASME B31.9, "Building Services Piping."

5. After hydrostatic test pressure has been applied for at least 15 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
6. Prepare written report of testing.

D. Perform the following before operating the system:

1. Open manual valves fully.
2. Inspect pumps for proper rotation.
3. Set makeup pressure-reducing valves for required system pressure.
4. Inspect air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).
5. Verify all air has been removed from the system and continuous water flow from each air vent. This includes all equipment associated with the loop that may have been affected by the work performed.
6. Set temperature controls so all coils are calling for full flow.
7. Inspect and set operating temperatures of hydronic equipment to specified values.
8. Verify lubrication of motors and bearings.

END OF SECTION 232113

SECTION 232116 - HYDRONIC PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes special-duty valves and specialties for the following:
 - 1. Hot-water heating piping.
- B. Safety-valve-inlet and -outlet piping Related sections
 - 1. Section 230553 "Identification for HVAC Piping and Equipment" for valve tags and schedules.
 - 2. Division 23 Section "General-Duty valves."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of the following:
 - 1. Valves. Include flow and pressure drop curves based on manufacturer's testing for calibrated-orifice balancing valves and automatic flow-control valves.
 - 2. Air control devices.
 - 3. Hydronic specialties.
- B. Provide valve and hydronic specialties schedule indicating type of intended installation and installation location. Refer to schedule below.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For air-control devices, hydronic specialties, and special-duty valves to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Hydronic piping components and installation shall be capable of withstanding the following minimum working pressure and operating temperature:

1. Hot-Water Heating Piping: 150 psig at 210 deg F.

2.2 VALVES

- A. Gate, Check, and Ball valves: Comply with requirements specified in Section 230523 "General-Duty Valves" for HVAC Piping.

- B. Bronze, Calibrated-Orifice, Balancing Valves:

1. Performance: Subject to compliance with requirements and related documents, provide products meeting a minimum performance of the following:
2. Body: Bronze, ball or plug type with calibrated orifice or venturi.
3. Ball: Brass or stainless steel.
4. Plug: Resin.
5. Seat: PTFE.
6. End Connections: Threaded or socket.
7. Pressure Gauge Connections: Integral seals for portable differential pressure meter.
8. Handle Style: Lever, with memory stop to retain set position.
9. CWP Rating: Minimum 125 psig.
10. Maximum Operating Temperature: 250 deg F.

2.3 AIR-CONTROL DEVICES

- A. Performance: Subject to compliance with requirements and related documents, provide products meeting a minimum performance of the following

- B. Manual Air Vents:

1. Body: Bronze.
2. Internal Parts: Nonferrous.
3. Operator: Screwdriver or thumbscrew.
4. Inlet Connection: NPS 1/2.
5. Discharge Connection: NPS 1/8.
6. CWP Rating: 150 psig.
7. Maximum Operating Temperature: 225 deg F.

- C. Automatic Air Vents:

1. Body: Bronze or cast iron.

2. Internal Parts: Nonferrous.
3. Operator: Noncorrosive metal float.
4. Inlet Connection: NPS 1/2.
5. Discharge Connection: NPS 1/4.
6. CWP Rating: 150 psig.
7. Maximum Operating Temperature: 240 deg F.

2.4 HYDRONIC PIPING SPECIALTIES

A. Y-Pattern Strainers:

1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for NPS 2 and smaller; flanged ends for NPS 2-1/2 and larger.
3. Strainer Screen: 40-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
4. CWP Rating: 125 psig.

PART 3 - EXECUTION

3.1 VALVE APPLICATIONS

- A. Install shutoff-duty valves at each branch connection to supply mains and at supply connection to each piece of equipment.
- B. Install calibrated orifice balancing valves at each branch connection to return mains.
- C. Install balancing valves as required to achieve flow tolerances required by Section 230593 Testing, Adjusting, and Balancing for HVAC.
- D. Install check valves at each pump discharge and elsewhere as required to control flow direction.
- E. Install safety valves at hot-water generators and elsewhere as required by ASME Boiler and Pressure Vessel Code. Install drip-pan elbow on safety-valve outlet and pipe without valves to the outdoors; pipe drain to nearest floor drain or as indicated on Drawings. Comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1, for installation requirements.

3.2 HYDRONIC SPECIALTIES INSTALLATION

- A. Install automatic air vents at high points of system piping in mechanical equipment rooms only. Install manual vents at heat-transfer coils and elsewhere as required for air venting.
- B. Install strainers on inlet side of each control valve, pressure-reducing valve, solenoid valve, in-line pump, and elsewhere as indicated. Match size of strainer blowoff connection for strainers smaller than NPS 2.

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END OF SECTION 232116

SECTION 233113 - METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Single-wall rectangular ducts and fittings.
 - 2. Sheet metal materials.
 - 3. Duct Liners.
 - 4. Sealants and gaskets.
 - 5. Hangers and supports.

- B. Related Sections:

- 1. Division 23 Section "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
 - 2. Division 23 Section "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" Volume Four and performance requirements and design criteria indicated in "Duct Schedule" Article.
- B. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
- C. Structural Performance: Hangers and supports for ductwork shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of the following products:

1. Liners and adhesives.
2. Sealants and gaskets.

1.5 QUALITY ASSURANCE

- A. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-Up."
- B. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

PART 2 - PRODUCTS

2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" volume four 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."

2.2 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. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G90.
 2. Finishes for Surfaces Exposed to View: Mill phosphatized.
- C. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.
- D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.3 DUCT LINER

- A. Flexible Elastomeric Noise Reducing Duct Liner: Preformed, cellular, closed-cell, sheet materials complying with ASTM C 534, Type II, Grade 1; and with NFPA 90A or NFPA 90B.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Armacell LLC, Coilflex.
 - b. Aeroflex USA Inc
 - c. Rubatex International, LLC
 2. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
 3. Minimum thermal conductivity: .25 BTU-in/h-ft²-F
 4. Rated for 180 degree F max and -297 degree F min
 5. Noncorrosive
 6. Antimicrobial
 7. Sound transmission rating: 25
 8. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.
 - a. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Adhesive 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."
- B. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 7-11, "Flexible Duct Liner Installation."
1. Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.

2. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
3. Butt transverse joints without gaps, and coat joint with adhesive.
4. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
5. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and dimensions of standard liner make longitudinal joints necessary.
6. Apply adhesive coating on longitudinal seams in ducts with air velocity of 2500 fpm.
7. Adhere to duct with adhesive and secure liner with mechanical fasteners 4 inches from corners and at intervals not exceeding 12 inches transversely; at 3 inches from transverse joints and at intervals not exceeding 18 inches longitudinally.
8. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:
 - a. Fan discharges.
 - b. Intervals of lined duct preceding unlined duct.
 - c. Upstream edges of transverse joints in ducts where air velocities are higher than 2500 fpm or where indicated.

2.4 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.
- B. Two-Part Tape Sealing System:
 1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
 2. Tape Width: 3 inches.
 3. Sealant: Modified styrene acrylic.
 4. Water resistant.
 5. Mold and mildew resistant.
 6. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
 7. Service: Indoor and outdoor.
 8. Service Temperature: Minus 40 to plus 200 deg F.
 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
 10. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Water-Based Joint and Seam Sealant:
 1. Application Method: Brush on.
 2. Solids Content: Minimum 65 percent.
 3. Shore A Hardness: Minimum 20.

4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

D. Flanged Joint Sealant: Comply with ASTM C 920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.
6. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. 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.

E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

F. Round Duct Joint O-Ring Seals:

1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for 10-inch wg static-pressure class, positive or negative.
2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.5 HANGERS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
- B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
- C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1 (Table 5-1M), "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."
- D. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- E. Trapeze and Riser Supports:
 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.

PART 3 - EXECUTION

3.1 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. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Division 23 Section "Air Duct Accessories" for fire and smoke dampers.
- K. 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."

3.2 INSTALLATION OF EXPOSED DUCTWORK

- A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.

- B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.
- C. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.
- D. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 DUCT SEALING

- A. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":
 - 1. All ductwork: Seal class A

3.4 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, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 - 1. Where practical, install concrete inserts before placing concrete.
 - 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 - 3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
 - 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
 - 5. Do not use powder-actuated concrete fasteners for seismic restraints.
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1 (Table 5-1M), "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.
- D. Hangers Exposed to View: Threaded rod and angle or channel supports.
- E. 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.

3.5 CONNECTIONS

- A. Make connections to equipment with flexible connectors complying with Division 23 Section "Air Duct Accessories."

- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.6 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. Paint materials and application requirements are specified in Division 09 painting Sections.

3.7 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Leakage Tests:
 - 1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
 - 2. Test the following systems:
 - a. Ducts with a Pressure Class Higher Than 2-Inch wg: Test representative duct sections no less than 25 percent of total installed duct area for each designated pressure class.
 - 3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
 - 4. Test for leaks before applying external insulation.
 - 5. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
 - 6. Give fourteen days' advance notice for testing.
- C. Duct System Cleanliness Tests:
 - 1. Visually inspect duct system to ensure that no visible contaminants are present.
 - 2. Test sections of metal duct system, chosen randomly by Owner, for cleanliness according to "Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."
 - a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.
- D. Duct system will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

3.8 DUCT CLEANING

- A. Clean new and existing duct system(s) before testing, adjusting, and balancing.
- B. Use service openings for entry and inspection.
 - 1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Division 23 Section "Air Duct Accessories" for access panels and doors.
 - 2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
 - 3. Remove and reinstall ceiling to gain access during the cleaning process.
- C. Particulate Collection and Odor Control:
 - 1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
 - 2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.
- D. Clean the following components by removing surface contaminants and deposits:
 - 1. Air outlets and inlets (registers, grilles, and diffusers).
 - 2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
 - 3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
 - 4. Coils and related components.
 - 5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
 - 6. Supply-air ducts, dampers, actuators, and turning vanes.
 - 7. Dedicated exhaust and ventilation components and makeup air systems.
- E. Mechanical Cleaning Methodology:
 - 1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
 - 2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
 - 3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
 - 4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.

5. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
6. Provide drainage and cleanup for wash-down procedures.
7. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

3.9 START UP

- A. Air Balance: Comply with requirements in Division 23 Section "Testing, Adjusting, and Balancing for HVAC."

3.10 DUCT SCHEDULE

- A. Fabricate ducts with galvanized sheet steel except as otherwise indicated and as follows:
- B. Supply, Return, Exhaust, Transfer, Outside Air:
 1. Pressure Class: Positive 3-inch wg Negative 2- inch wg
 2. Minimum SMACNA Seal Class: A.
 3. SMACNA Leakage Class for Rectangular: 24.
 4. SMACNA Leakage Class for Round: 24
- C. Intermediate Reinforcement:
 1. Galvanized-Steel Ducts: Galvanized steel or carbon steel coated with zinc-chromate primer.
- D. Liner:
 1. Air Ducts specifically identified with an "L" after the duct size on drawings:
 - a. Flexible elastomeric noise reducing duct liner: 1 inches thick
- E. Elbow Configuration:
 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
 - a. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
- F. Branch Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."
 - a. Rectangular Main to Rectangular Branch: 45-degree lateral or 90-degree with 45-degree entry.
2. Rectangular Main to Round Tap: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.
 - a. Velocity 1000 fpm or Lower: 90-degree tap.
 - b. Velocity 1000 to 1500 fpm: Conical tap.
 - c. Velocity 2000 fpm or Less: 45-degree lateral or 90-degree with 45-degree entry.

END OF SECTION 233113

SECTION 233713 - DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Fixed face registers and grilles.
- B. Related Sections:
 - 1. Division 23 Section "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers, registers, and grilles.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated, include the following:
 - 1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
 - 2. Diffuser, Register, and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

1.4 INFORMATION SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:
 - 1. Ceiling suspension assembly members.
 - 2. Method of attaching hangers to building structure.
 - 3. Size and location of initial access modules for acoustical tile.
 - 4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
 - 5. Duct access panels.

PART 2 - PRODUCTS

2.1 FIXED FACE REGISTERS AND GRILLES

A. Fixed Face Return and transfer Register

1. Performance: Subject to compliance with requirements and related documents, provide products meeting a minimum performance of the following:
2. Registers shall be 45 degree deflection fixed louver type with blades spaced ½ inch on center. The front blades shall run parallel to the long dimension of the register.
3. Material: Refer to drawings.
4. Finish: Powder coated, color selected by Architect.
5. Paint finish shall pass 500 hours of salt spray exposure with no measurable creep in accordance with ASTM D1654 and 1000 hours with no rusting or blistering per ASTM D610 and ASTM D714
6. Frame: 1-1/4 inches wide.
7. Mounting Frame: Welded with precision mitered corners.
8. Mounting: Countersunk screw.
9. Damper Type: Adjustable opposed blade. Damper shall be operable from the register face. Damper material to match register material.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install diffusers, registers, and grilles level and plumb.
- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.3 ADJUSTING

- A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 233713

SECTION 238216 - AIR COILS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following types of air coils that are not an integral part of air-handling units:
 - 1. Hydronic

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each air coil.
 - 2. Include rated capacities, operating characteristics, and pressure drops for each air coil.
 - 3. Include factory test reports.
- B. Shop Drawings: Diagram power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

- A. Field quality-control test reports.
- B. Warranty: Sample of special warranty

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For air coils to include in operation and maintenance manuals.
- B. Include vendor contact information for service and warranty

1.6 WARRANTY

- A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components that fail in materials or workmanship within specified warranty period.
 - 1. Parts: Period of one year from substantial completion, to be free from defects in material and workmanship. Any units or parts which prove defective during the warranty period will be replaced with OEM parts and transportation prepaid.
- B. For Labor: One year(s) from date of Substantial Completion

1.7 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. ASHRAE Compliance:
 - 1. Comply with ASHRAE 33 for methods of testing cooling and heating coils.
 - 2. Comply with applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

PART 2 - PRODUCTS

2.1 HYDRONIC COILS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Luvatta (Basis of Design)
 - 2. SFI coils
 - 3. Aerofin.
 - 4. McQuay
- B. Performance Ratings: Tested and rated according to AHRI 410 and ASHRAE 33.
- C. Maximum Working-Pressure/Temperature Ratings: 350 psig, 300 deg F.
- D. Source Quality Control: Factory tested to 300 psig.
- E. Tubes: ASTM B 743 copper, 5/8 inch, minimum 0.020 inch thick.
- F. Fins: Aluminum, minimum 0.008 inch thick die-formed plate typ. Collars to be full-drawn to provide maximum contact with tubes. Tubes to be mechanically expanded into the fins.

- G. Headers: Extra heavy seamless copper tubing with intruded type holes to provide a strong brazing joint for the coil tubes.
- H. Frames: 16 gauge galvanized-steel channel frame, for flanged mounting.
- I. Drainable

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine ducts, plenums, and casings to receive air coils for compliance with requirements for installation tolerances and other conditions affecting coil performance.
- B. Examine roughing-in for piping systems to verify actual locations of piping connections before coil installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
- D. Coils to be factory tested. Provide test and inspection report.

3.2 INSTALLATION

- A. Install coils level and plumb.
- B. Install coils in metal ducts and casings constructed according to SMACNA's "HVAC Duct Construction Standards, Metal and Flexible."
- C. Straighten bent fins on air coils.
- D. Clean coils using materials and methods recommended in writing by manufacturers, and clean inside of casings and enclosures to remove dust and debris.

3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to coils to allow service and maintenance.
- C. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- D. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

- E. Connect water piping with unions and shutoff valves to allow coils to be disconnected without draining piping. Control valves are specified in Section 230900 "Instrumentation and Control for HVAC," and other piping specialties are specified in Section 232116 "Hydronic Piping Specialties."

3.4 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 1. Operational Test: After electrical circuitry has been energized, operate electric coils to confirm proper unit operation.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

END OF SECTION 238216

SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Electrical equipment coordination and installation.
2. Common electrical installation requirements.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.

1.4 COORDINATION

- A. Coordinate arrangement, mounting, and support of electrical equipment:

1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
3. To allow right of way for piping and conduit installed at required slope.
4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

PART 2 - NOT APPLICABLE

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.

3.2 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials must be approved for specific use.

END OF SECTION 260500

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.
- B. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THHN-2-THWN-2 and Type XHHW-2.
- C. Multiconductor Cable: Comply with NEMA WC 70/ICEA S-95-658 for metal-clad cable, Type MC with ground wire.

2.2 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

- B. Comply with NFPA 70.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper. Stranded for all wire sizes.
- B. Branch Circuits: Copper. Stranded for all wire sizes.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type XHHW-2, single conductors in raceway.
- B. Exposed Feeders: Type THHN-2-THWN-2, single conductors in raceway.
- C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN-2-THWN-2, single conductors in raceway.
- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type XHHW-2, single conductors in raceway.
- E. Exposed Branch Circuits, Including in Crawlspace: Type THHN-2-THWN-2, single conductors in raceway.
- F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-2-THWN-2, single conductors in raceway.
- G. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type XHHW-2, single conductors in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
 - 1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.

3.5 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.7 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

3.8 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors and branch circuit conductors for compliance with requirements.
 - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
- B. Test and Inspection Reports: Prepare a written report to record the following:

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1. Procedures used.
2. Results that comply with requirements.
3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

C. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes methods and materials for grounding systems and equipment.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

- A. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 - 1. Stranded Conductors: ASTM B 8.
 - 2. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 - 3. Bonding Jumper: Copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.2 CONNECTORS

- A. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.

- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, bolted pressure-type, with at least two bolts.

- 1. Pipe Connectors: Clamp type, sized for pipe.

2.3 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel 3/4 inch by 10 feet in diameter.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install stranded conductors for all ground wires, unless otherwise indicated.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
 - 1. Feeders and branch circuits.
 - 2. Lighting circuits.
 - 3. Receptacle circuits.
 - 4. Single-phase motor and appliance branch circuits.
 - 5. Three-phase motor and appliance branch circuits.
- C. Signal and Communication Equipment: For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
 - 1. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-2-by-12-inch (6-by-50-by-300-mm) grounding bus.
 - 2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes, using a bolted clamp connector or by bolting a lug-type connector to a pipe flange, using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

END OF SECTION 260526

SECTION 260533 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. FMC: Flexible metal conduit.
- C. LFMC: Liquidtight flexible metal conduit.
- D. LFNC: Liquidtight flexible nonmetallic conduit.
- E. RNC: Rigid nonmetallic conduit.

1.4 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Alflex Inc.
 - 2. Allied Tube & Conduit; a Tyco International Ltd. Co.
 - 3. O-Z Gedney; a unit of General Signal.
 - 4. Wheatland Tube Company.
- B. Rigid Steel Conduit: ANSI C80.1.
- C. EMT: ANSI C80.3.
- D. FMC: Zinc-coated steel.
- E. LFMC: Flexible steel conduit with PVC jacket.
- F. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed. Coordinate first subparagraph below with Drawings.
 - 1. Fittings for EMT: Set-screw or compression type.

2.2 NONMETALLIC CONDUIT AND TUBING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Anamet Electrical, Inc.; Anaconda Metal Hose.
 - 3. Arnco Corporation.
 - 4. Electri-Flex Co.
 - 5. RACO; a Hubbell Company.
 - 6. Thomas & Betts Corporation.
- B. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise indicated.
- C. LFNC: UL 1660.
- D. Fittings for RNC: NEMA TC 3; match to conduit or tubing type and material.
- E. Fittings for LFNC: UL 514B.

2.3 METAL WIREWAYS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cooper B-Line, Inc.
 - 2. Hoffman.
 - 3. Square D; Schneider Electric.
- B. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 1, unless otherwise indicated.
- C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Wireway Covers: Hinged type.
- E. Finish: Manufacturer's standard enamel finish.

2.4 NONMETALLIC WIREWAYS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Hoffman.
 - 2. Lamson & Sessions; Carlon Electrical Products.
- B. Description: Fiberglass polyester, extruded and fabricated to size and shape indicated, with no holes or knockouts. Cover is gasketed with oil-resistant gasket material and fastened with captive screws treated for corrosion resistance. Connections are flanged, with stainless-steel screws and oil-resistant gaskets.
- C. Description: PVC plastic, extruded and fabricated to size and shape indicated, with snap-on cover and mechanically coupled connections with plastic fasteners.
- D. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

2.5 SURFACE RACEWAYS

- A. Surface Metal Raceways: Galvanized steel with snap-on covers. Manufacturer's standard enamel finish.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Thomas & Betts Corporation.
- b. Walker Systems, Inc.; Wiremold Company (The).
- c. Wiremold Company (The); Electrical Sales Division.

2.6 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Erickson Electrical Equipment Company.
 2. Hoffman.
 3. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.
 4. O-Z/Gedney; a unit of General Signal.
 5. RACO; a Hubbell Company.
 6. Robroy Industries, Inc.; Enclosure Division.
 7. Spring City Electrical Manufacturing Company.
 8. Thomas & Betts Corporation.
- B. Sheet and Device Boxes: NEMA OS 1.
- C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- D. Nonmetallic Outlet and Device Boxes: NEMA OS 2.
- E. Metal Floor Boxes: Cast metal, fully adjustable rectangular.
- F. Nonmetallic Floor Boxes: Nonadjustable, round.
- G. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- H. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, galvanized, cast iron with gasketed cover.
- I. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous-hinge cover with flush latch, unless otherwise indicated.
 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
- J. Cabinets:
 1. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 2. Hinged door in front cover with flush latch and concealed hinge.
 3. Key latch to match panelboards.
 4. Metal barriers to separate wiring of different systems and voltage.
 5. Accessory feet where required for freestanding equipment.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:
 - 1. Exposed Conduit: Rigid steel conduit.
 - 2. Concealed Conduit, Aboveground: Rigid steel conduit.
 - 3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried.
 - 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFNC.
 - 5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Comply with the following indoor applications, unless otherwise indicated:
 - 1. Exposed, Not Subject to Physical Damage: EMT.
 - 2. Exposed, Not Subject to Severe Physical Damage: EMT.
 - 3. Exposed and Subject to Severe Physical Damage: Rigid steel conduit.
 - 4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 - 5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
 - 6. Damp or Wet Locations: Rigid steel conduit.
 - 7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel in damp or wet locations.
- C. Minimum Raceway Size: 3/4-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
 - 1. Rigid Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
- E. Do not install aluminum conduits.

3.2 INSTALLATION

- A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.
- B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Support raceways as specified in Division 26 Section "Hangers and Supports for Electrical Systems."

- E. Arrange stub-ups so curved portions of bends are not visible above the finished slab.
- F. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
- H. Raceways Embedded in Slabs:
 - 1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
 - 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 - 3. Change from ENT to rigid steel conduit, or EMT before rising above the floor.
- I. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- J. Flexible Conduit Connections: Use maximum of 72 inches of flexible conduit for recessed lighting fixtures, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
 - 1. Use LFMC in damp or wet locations subject to severe physical damage.
 - 2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.
- K. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall.
- L. Set metal floor boxes level and flush with finished floor surface.

3.3 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

3.4 PROTECTION

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

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END OF SECTION 260533

SECTION 262923 - VARIABLE-FREQUENCY MOTOR CONTROLLERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 01 and Division 26 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes separately enclosed, preassembled, combination VFCs, rated 600 V and less, for speed control of three-phase, squirrel-cage induction motors.
- B. This specification is to cover a complete Variable Frequency Drive (VFD aka: VSD, AFD, ASD, Inverter, AC Drive, et al) consisting of a pulse width modulated (PWM) inverter designed for use with a standard NEMA Design B induction motor.
- C. The drive manufacturer shall supply the drive and all necessary options as herein specified. The manufacturer shall have been engaged in the production of this type of equipment for a minimum of twenty years. VFDs that are manufactured by a third party and “brand labeled” shall not be acceptable. Drive manufacturers who do not build their own power boards and assemblies, or do not have full control of the power board manufacturing and quality control, shall be considered as a “brand labeled” drive. All VFDs installed on this project shall be from the same manufacturer

1.3 QUALITY ASSURANCE

- A. Referenced Standards and Guidelines:
 - 1. Institute of Electrical and Electronic Engineers (IEEE)
 - a. IEEE 519-1992, Guide for Harmonic Content and Control.
 - 2. Underwriters Laboratories (as appropriate)
 - a. UL508
 - b. UL508A
 - c. UL508C
 - 3. National Electrical Manufacturer’s Association (NEMA)
 - a. ICS 7.0, AC Adjustable Speed Drives
 - 4. International Electrotechnical Commission (IEC)

- a. EN/IEC 61800-3
- 5. National Electric Code (NEC)
 - a. NEC 430.120, Adjustable-Speed Drive Systems
- 6. International Building Code (IBC)
 - a. IBC 2012 Seismic – referencing ASC 7-05 and ICC AC-156
- B. Qualifications:
 - 1. VFDs and options shall be UL508 listed as a complete assembly. The base VFD shall be UL listed for 100 kA SCCR without the need for external input fuses.
 - 2. CE Mark – The base VFD shall conform to the European Union Electromagnetic Compatibility directive, a requirement for CE marking. The VFD shall meet product standard EN 61800-3 for the First Environment restricted level (Category C2). Base drives that only meet the Second Environment (Category C3, C4) shall be supplied with filters to bring the drive in compliance with the First Environment levels.
 - 3. The entire VFD assembly, including the bypass (if specified), shall be seismically certified and labeled as such in accordance with the 2012 International Building Code (IBC):
 - a. VFD manufacturer shall provide Seismic Certification and Installation requirements at time of submittal.

1.4 DEFINITIONS

- A. BAS: Building automation system.
- B. CE: Conformance Europeene (European Compliance).
- C. CPT: Control power transformer.
- D. EMI: Electromagnetic interference.
- E. LED: Light-emitting diode.
- F. NC: Normally closed.
- G. NO: Normally open.
- H. OCPD: Overcurrent protective device.
- I. PID: Control action, proportional plus integral plus derivative.
- J. RFI: Radio-frequency interference.
- K. VFC: Variable-frequency motor controller.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type and rating of VFC indicated.
 - 1. Include dimensions and finishes for VFCs.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For each VFC indicated.
 - 1. Include mounting and attachment details.
 - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Include diagrams for power, signal, and control wiring.

1.6 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Floor plans, drawn to scale, showing dimensioned layout on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Required working clearances and required area above and around VFCs.
 - 2. Show VFC layout and relationships between electrical components and adjacent structural and mechanical elements.
 - 3. Show support locations, type of support, and weight on each support.
 - 4. Indicate field measurements.
- B. Product Certificates: For each VFC from manufacturer.
- C. Harmonic Analysis Report: Provide Project-specific calculations and manufacturer's statement of compliance with IEEE 519.
- D. Source quality-control reports.
- E. Field quality-control reports.
- F. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For VFCs to include in emergency, operation, and maintenance manuals.
 - 1. Manufacturer's written instructions for testing and adjusting thermal-magnetic circuit breaker and motor-circuit protector trip settings.
 - 2. Manufacturer's written instructions for setting field-adjustable overload relays.

3. Manufacturer's written instructions for testing, adjusting, and reprogramming microprocessor control modules.
4. Manufacturer's written instructions for setting field-adjustable timers, controls, and status and alarm points.
5. Load-Current and Overload-Relay Heater List: Compile after motors have been installed, and arrange to demonstrate that selection of heaters suits actual motor nameplate, full-load currents.
6. Load-Current and List of Settings of Adjustable Overload Relays: Compile after motors have been installed, and arrange to demonstrate that switch settings for motor-running overload protection suit actual motors to be protected.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. If stored in space that is not permanently enclosed and air conditioned, remove loose packing and flammable materials from inside controllers and install temporary electric heating, with at least 250 W per controller
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for VFCs, including clearances between VFCs, and adjacent surfaces and other items.

1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace VFCs that fail in materials or workmanship within specified warranty period.
 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 1. Danfoss Inc; Danfoss Drives Div.
 2. Eaton Electrical Sector; Eaton Corporation; Cutler-Hammer Business Unit.
 3. Schneider Electric USA, Inc.
 4. ABB

2.2 VARIABLE FREQUENCY DRIVES

- A. The VFD package as specified herein and defined on the VFD schedule shall be enclosed in a UL Type enclosure (enclosures with only NEMA ratings are not acceptable), completely assembled and tested by the manufacturer in an ISO9001 facility.
- B. The VFD shall provide full rated output from a line of $\pm 10\%$ of nominal voltage. The VFD shall continue to operate without faulting from a line of $+30\%$ to -35% of nominal voltage.
 - 1. VFDs shall be capable of continuous full load operation under the following environmental operating conditions:
 - a. -15 to 40° C (5 to 104° F) ambient temperature. Operation to 50° C shall be allowed with a 10% reduction from VFD full load current.
 - b. Altitude 0 to 3300 feet above sea level. Operation to 6600 shall be allowed with a 10% reduction from VFD full load current.
 - c. Humidity less than 95% , non-condensing.
- C. All VFDs shall have the following standard features:
 - 1. All circuit boards shall be coated to protect against corrosion.
 - 2. All VFDs shall have the same customer interface, including digital display, and keypad, regardless of horsepower rating. The keypad shall be removable, capable of remote mounting and allow for uploading and downloading of parameter settings as an aid for start-up of multiple VFDs.
 - 3. The keypad shall include Hand-Off-Auto selections and manual speed control. The drive shall incorporate “bumpless transfer” of speed reference when switching between “Hand” and “Auto” modes. There shall be fault reset and “Help” buttons on the keypad. The Help button shall include “on-line” assistance for programming and troubleshooting.
 - 4. There shall be a built-in time clock in the VFD keypad. The clock shall have a battery backup with 10 years minimum life span. The clock shall be used to date and time stamp faults and record operating parameters at the time of fault. VFD programming shall be held in non-volatile memory and is not dependent on battery power
 - 5. The VFD’s shall utilize pre-programmed application macros specifically designed to facilitate start-up. The Application Macros shall provide one command to reprogram all parameters and customer interfaces for a particular application to reduce programming time. The VFD shall have two user macros to allow the end-user to create and save custom settings.
 - 6. The VFD shall have cooling fans that are designed for easy replacement. The fans shall be designed for replacement without requiring removing the VFD from the wall or removal of circuit boards. The VFD cooling fans shall operate only when required, based on the temperature of and run command to the drive. VFD protection shall be based on thermal sensing and not cooling fan operation.
 - 7. The VFD shall be capable of starting into a coasting load (forward or reverse) up to full speed and accelerate or decelerate to set point without tripping or component damage (flying start).
 - 8. The VFD shall have the ability to automatically restart after an over-current, over-voltage, under-voltage, or loss of input signal protective trip. The number of restart attempts, trial time, and time between attempts shall be programmable.

9. The overload rating of the drive shall be 110% of its normal duty current rating for 1 minute every 10 minutes, 130% overload for 2 seconds every minute. The minimum FLA rating shall meet or exceed the values in the NEC/UL table 430.250 for 4-pole motors.
10. VFDs through 200 HP shall have internal swinging (non-linear) chokes providing impedance equivalent to 5% to reduce the harmonics to the power line. Swinging choke shall be required resulting in superior partial load harmonic reduction. Linear chokes are not acceptable. 5% impedance may be from dual (positive and negative DC bus) chokes, or 5% swinging AC line chokes. VFD's with only one DC choke shall add an AC line choke.
11. The input current rating of the VFD shall not be greater than the output current rating. VFD's with higher input current ratings require the upstream wiring, protection devices, and source transformers to be oversized per NEC 430.122. Input and output current ratings must be shown on the VFD nameplate.
12. The VFD shall include a coordinated AC transient surge protection system consisting of 4 MOVs (phase to phase and phase to ground), a capacitor clamp, 1600 PIV Diode Bridge and internal chokes. The MOV's shall have a minimum 125 joule rating per phase across the diode bridge. VFDs that do not include coordinated AC transient surge protection shall include an external TVSS (Transient Voltage Surge Suppressor).
13. The VFD shall provide a programmable loss-of-load (broken belt / broken coupling) Form-C relay output. The drive shall be programmable to signal the loss-of-load condition via a keypad warning, Form-C relay output, and / or over the serial communications bus. The loss-of-load condition sensing algorithm shall include a programmable time delay that will allow for motor acceleration from zero speed without signaling a false loss-of-load condition.
14. The VFD shall include multiple "two zone" PID algorithms that allow the VFD to maintain PID control from two separate feedback signals (4-20mA, 0-10V, and / or serial communications). The two zone control PID algorithm will control motor speed based on a minimum, maximum, or average of the two feedback signals. All of the VFD PID controllers shall include the ability for "two zone" control.
15. If the input reference is lost, the VFD shall give the user the option of either (1) stopping and displaying a fault, (2) running at a programmable preset speed, (3) hold the VFD speed based on the last good reference received, or (4) cause a warning to be issued, as selected by the user. The drive shall be programmable to signal this condition via a keypad warning, Form-C relay output and / or over the serial communication bus.
16. The VFD shall have programmable "Sleep" and "Wake up" functions to allow the drive to be started and stopped from the level of a process feedback signal.

D. All VFDs to have the following adjustments:

1. Three (3) programmable critical frequency lockout ranges to prevent the VFD from operating the load continuously at an unstable speed. The lockout range must be fully adjustable, from 0 to full speed.
2. Two (2) PID Set point controllers shall be standard in the drive, allowing pressure or flow signals to be connected to the VFD, using the microprocessor in the VFD for the closed-loop control. The VFD shall have 250 ma of 24 VDC auxiliary power and be capable of loop powering a transmitter supplied by others. The PID set point shall be adjustable from the VFD keypad, analog inputs, or over the communications bus. There shall be

- two independent parameter sets for the PID controller and the capability to switch between the parameter sets via a digital input, serial communications or from the keypad. The independent parameter sets are typically used for night setback, switching between summer and winter set points, etc.
3. There shall be an independent, second PID loop that can utilize the second analog input and modulate one of the analog outputs to maintain the set point of an independent process (i.e. valves, dampers, etc.). All set points, process variables, etc. to be accessible from the serial communication network.
 4. Two (2) programmable analog inputs shall accept current or voltage signals.
 5. Two (2) programmable analog outputs (0-20ma or 4-20 ma). The outputs may be programmed to output proportional to Frequency, Motor Speed, Output Voltage, Output Current, Motor Torque, Motor Power (kW), DC Bus voltage, Active Reference, Active Feedback, and other data.
 6. Six (6) programmable digital inputs for maximum flexibility in interfacing with external devices. All digital inputs shall be programmable to initiate upon an application or removal of 24VDC.
 7. Three (3) programmable, digital Form-C relay outputs. The relay outputs shall include programmable on and off delay times and adjustable hysteresis. The relays shall be rated for maximum switching current 8 amps at 24 VDC and 0.4 A at 250 VAC; Maximum voltage 300 VDC and 250 VAC; continuous current rating of 2 amps RMS. Outputs shall be true Form-C type contacts; open collector outputs are not acceptable. Drives that have only two (2) relay outputs must provide an option card that provides additional relay outputs.
 8. Run permissive circuit - There shall be a run permissive circuit for damper or valve control. Regardless of the source of a run command (keypad, input contact closure, time-clock control, or serial communications), the VFD shall provide a dry contact closure that will signal the damper to open (VFD motor does not operate). When the damper is fully open, a normally open dry contact (end-switch) shall close. The closed end-switch is wired to a VFD digital input and allows VFD motor operation. Two separate safety interlock inputs shall be provided. When either safety is opened, the motor shall be commanded to coast to stop and the damper shall be commanded to close. The keypad shall display "start enable 1 (or 2) missing". The safety input status shall also be transmitted over the serial communications bus.
 9. The VFD control shall include a programmable time delay for VFD start and a keypad indication that this time delay is active. A Form C relay output provides a contact closure to signal the VAV boxes open. This will allow VAV boxes to be driven open before the motor operates. The time delay shall be field programmable from 0 – 120 seconds. Start delay shall be active regardless of the start command source (keypad command, input contact closure, time-clock control, or serial communications), and when switching from drive to bypass.
 10. Seven (7) programmable preset speeds.
 11. Two independently adjustable accel and decel ramps with 1 – 1800 seconds adjustable time ramps.
 12. The VFD shall include a motor flux optimization circuit that will automatically reduce applied motor voltage to the motor to optimize energy consumption and reduce audible motor noise. The VFD shall have selectable software for optimization of motor noise, energy consumption, and motor speed control.

13. The VFD shall include a carrier frequency control circuit that reduces the carrier frequency based on actual VFD temperature that allows higher carrier frequency settings without derating the VFD.
 14. The VFD shall include password protection against parameter changes.
- E. The Keypad shall include a backlit LCD display. The display shall be in complete English words for programming and fault diagnostics (alpha-numeric codes are not acceptable). All VFD faults shall be displayed in English words. The keypad shall include a minimum of 14 assistants including:
1. Start-up assistant
 2. Parameter assistants
 - a. PID assistant
 - b. Reference assistant
 - c. I/O assistant
 - d. Serial communications assistant
 - e. Option module assistant
 - f. Panel display assistant
 - g. Low noise set-up assistant
 3. Maintenance assistant
 4. Troubleshooting assistant
 5. Drive optimizer assistants
- F. All applicable operating values shall be capable of being displayed in engineering (user) units. A minimum of three operating values from the list below shall be capable of being displayed at all times. The display shall be in complete English words (alpha-numeric codes are not acceptable):
1. Output Frequency
 2. Motor Speed (RPM, %, or Engineering units)
 3. Motor Current
 4. Motor Torque
 5. Motor Power (kW)
 6. DC Bus Voltage
 7. Output Voltage
- G. Serial Communications
1. The VFD shall have an EIA-485 port as standard. The standard protocols shall be Modbus, Johnson Controls N2, Siemens Building Technologies FLN, and BACnet. [Optional protocols for LonWorks, Profibus, EtherNet, BACnet IP, and DeviceNet shall be available.] Each individual drive shall have the protocol in the base VFD. The use of third party gateways and multiplexers is not acceptable. All protocols shall be “certified” by the governing authority (i.e. BTL Listing for BACnet). Use of non-certified protocols is not allowed.
 2. The BACnet connection shall be an EIA-485, RS/485 interface operating at 9.6, 19.2, 38.4, or 76.8 Kbps. The connection shall be tested by the BACnet Testing Labs (BTL) and be BTL Listed. The BACnet interface shall conform to the BACnet standard device

type of an Applications Specific Controller (B-ASC). The interface shall support all BIBBs defined by the BACnet standard profile for a B-ASC including, but not limited to:

- a. Data Sharing – Read Property – B.
 - b. Data Sharing – Write Property – B.
 - c. Device Management – Dynamic Device Binding (Who-Is; I-Am).
 - d. Device Management – Dynamic Object Binding (Who-Has; I-Have).
 - e. Device Management – Communication Control – B.
3. Serial communication capabilities shall include, but not be limited to; run-stop controls, speed set adjustment, and lock and unlock the keypad. The drive shall have the capability of allowing the BAS to monitor feedback such as process variable feedback, output speed / frequency, current (in amps), % torque, power (kW), kilowatt hours (resettable), operating hours (resettable), and drive temperature. The BAS shall also be capable of monitoring the VFD relay output status, digital input status, and all analog input and analog output values. All diagnostic warning and fault information shall be transmitted over the serial communications bus. Remote VFD fault reset shall be possible.
 4. Serial communication in bypass (if bypass is specified) shall include, but not be limited to; bypass run-stop control, the ability to force the unit to bypass, and the ability to lock and unlock the keypad. The bypass shall have the capability of allowing the BAS to monitor feedback such as, current (in amps), kilowatt hours (resettable), operating hours (resettable), and bypass logic board temperature. The BAS shall also be capable of monitoring the bypass relay output status, and all digital input status. All bypass diagnostic warning and fault information shall be transmitted over the serial communications bus. Remote bypass fault reset shall be possible.
 5. The VFD / bypass shall allow the BAS to control the drive and bypass digital and analog outputs via the serial interface. This control shall be independent of any VFD function. The analog outputs may be used for modulating chilled water valves or cooling tower bypass valves. The drive and bypass' digital (Form-C relay) outputs may be used to actuate a damper, open a valve or control any other device that requires a maintained contact for operation. In addition, all of the drive and bypass' digital inputs shall be capable of being monitored by the BAS system. This allows for remote monitoring of which (of up to 4) safeties are open.
 6. The VFD shall include an independent PID loop for customer use. The independent PID loop may be used for cooling tower bypass value control, chilled water value / hot water valve control, etc. Both the VFD PID control loop and the independent PID control loop shall continue functioning even if the serial communications connection is lost. As default, the VFD shall keep the last good set point command and last good DO & AO commands in memory in the event the serial communications connection is lost and continue controlling the process.
- H. EMI / RFI filters. All VFD's shall include EMI/RFI filters. The onboard filters shall allow the VFD assembly to be CE Marked and the VFD shall meet product standard EN 61800-3 for the First Environment restricted level (Category C2) with up to 100 feet of motor cable. Second environment (Category C3, C4) is not acceptable, no Exceptions. Certified test reports shall be provided with the submittals confirming compliance to EN 61800-3, First Environment (C2).

- I. DRIVE OPTIONS – Options shall be furnished and mounted by the drive manufacturer. All optional features shall be UL Listed by the drive manufacturer as a complete assembly and carry a UL508 label.
 1. Circuit Breaker - Door interlocked padlockable circuit breaker that will disconnect all input power from the drive and all internally mounted options. Circuit breaker option shall be available with or without systems requiring bypass.
- J. BYPASS – Bypasses shall be furnished and mounted by the drive manufacturer. All VFD with bypass configurations shall be UL Listed by the drive manufacturer as a complete assembly and carry a UL508 label.
 1. A complete factory wired and tested bypass system consisting of a door interlocked, padlockable circuit breaker, output contactor, bypass contactor, and fast acting VFD input fuses. UL Listed motor overload protection shall be provided in both drive and bypass modes.
 2. The bypass enclosure door and VFD enclosure must be mechanically interlocked such that the disconnecting device must be in the “Off” position before either enclosure may be accessed.
 3. The VFD and bypass package shall have a UL listed short circuit current rating (SCCR) of 100,000 Amps and this rating shall be indicated on the UL data label.
 4. The drive and bypass package shall be seismic certified and labeled to the IBC:
 - a. Seismic importance factor of 1.5 rating is required, and shall be based upon actual shake table test data as defined by ICC AC-156.
 - b. Special seismic certification of equipment and components shall be provided by OSHPD preapproval.
 5. Drive Isolation Fuses - To ensure maximum availability of bypass operation, fast acting fuses, exclusive to the VFD, shall be provided to allow the VFD to disconnect from the line prior to clearing upstream branch circuit protection. This maintains bypass operation capability in the event of a VFD failure. Bypass designs which have no such fuses, or that incorporate fuses common to both the VFD and the bypass, will not be accepted. Third contactor “isolation contactors” are not an acceptable alternative to fuses, as contactors could weld closed and are not an NEC recognized disconnecting device.
 6. The bypass shall maintain positive contactor control through the voltage tolerance window of nominal voltage +30%, -35%. This feature is designed to avoid contactor coil failure during brown out / low line conditions and allow for input single phase operation when in the VFD mode. Designs that will not allow input single phase operation in the VFD mode are not acceptable.
 7. Motor protection from single phase power conditions - the bypass system must be able to detect a single phase input power condition while running in bypass, disengage the motor in a controlled fashion, and give a single phase input power indication. Bypass systems not incorporating single phase protection in bypass mode are not acceptable.
 8. The bypass system shall be designed for stand-alone operation and shall be completely functional in both Hand and Automatic modes even if the VFD has been removed from the system for repair / replacement. Serial communications shall remain functional even with the VFD removed. Bypass systems that do not maintain full functionality with the drive removed are not acceptable.

9. Serial communications – the bypass shall be capable of being monitored and / or controlled via serial communications. On-board communications protocols shall include ModBus RTU; Johnson Controls N2; Siemens Building Technologies FLN (P1); and BACnet MS/TP.
 - a. Serial communication capabilities shall include, but not be limited to: bypass run-stop control, the ability to force the unit to bypass, and the ability to lock and unlock the keypad. The bypass shall have the capability of allowing the BAS to monitor feedback such as, current (Amps), kilowatt hours (resettable), operating hours (resettable), and bypass logic board temperature. The BAS shall also be capable of monitoring the bypass relay output status, and all digital input status. All bypass diagnostic warning and fault information shall be transmitted over the serial communications bus. Remote bypass fault reset shall be possible. The following additional status indications and settings shall be transmitted over the serial communications bus and / or via a Form-C relay output – keypad “Hand” or “Auto” selected, bypass selected, and broken belt indication. The BAS system shall also be able to monitor if the motor is running in the VFD mode or bypass mode over serial communications. A minimum of 50 field serial communications points shall be capable of being monitored in the bypass mode.
 - b. The bypass serial communications shall allow control of the drive/bypass (system) digital outputs via the serial interface. This control shall be independent of any bypass function or operating state. The system digital (relay) outputs may be used to actuate a damper, open a valve or control any other device that requires a maintained contact for operation. All system analog and digital I/O shall be capable of being monitored by the BAS system.
10. There shall be an adjustable motor current sensing circuit for the bypass and VFD modes to provide proof of flow (broken belt) indication. The condition shall be indicated on the keypad display, transmitted over the BAS and / or via a Form-C relay output contact closure. The broken belt indication shall be programmable to be a system (drive and bypass) indication. The broken belt condition sensing algorithm shall be programmable to cause a warning or system shutdown.
11. The digital inputs for the system shall accept 24VDC. The bypass shall incorporate an internally sourced power supply and not require an external control power source. The bypass power board shall supply 250 mA of 24 VDC for use by others to power external devices.
12. There shall be a coordinated run permissive circuit for damper or valve control. Regardless of the source of a run command (keypad command, time-clock control, digital input, or serial communications) the bypass shall provide a dry contact closure that will signal the damper to open before the motor can run. When the damper is fully open, a normally open dry contact (end-switch) shall close. The closed end-switch is wired to a bypass system input and allows motor operation. Up to four separate safety interlock inputs shall be provided. When any safety is opened, the motor shall be commanded to coast to stop, and the damper shall be commanded to close. This feature will also operate in Fireman’s override / smoke control mode.
13. The bypass control shall monitor the status of the VFD and bypass contactors and indicate when there is a welded contactor contact or open contactor coil. This failed contactor condition shall be indicated on the bypass LCD display, programmed to activate a Form-C relay output, and / or over the serial communications protocol.

14. The bypass control shall include a programmable time delay bypass start including keypad indication of the time delay. A Form C relay output commands the VAV boxes open. This will allow VAV boxes to be driven open before the motor operates at full speed in the bypass mode. The time delay shall be field programmable from 0 – 120 seconds.
15. There shall be a keypad adjustment to select manual or automatic transfer to bypass. The user shall be able to select via keypad programming which drive faults will result in an automatic transfer to bypass mode and which faults require a manual transfer to bypass. The user may select whether the system shall automatically transfer from drive to bypass mode on the following drive fault conditions:
 - a. Over current
 - b. Over voltage
 - c. Under voltage
 - d. Loss of analog input
16. The following operators shall be provided:
 - a. Bypass Hand-Off-Auto
 - b. Drive mode selector
 - c. Bypass mode selector
 - d. Bypass fault reset
17. The bypass shall include the ability to select the operating mode of the system (VFD/Bypass) from either the bypass keypad or digital input.
18. The bypass shall include a two line, 20 character LCD display. The display shall allow the user to access and view:
 - a. Energy savings – in US dollars
 - b. Bypass motor amps
 - c. Bypass input voltage– average and individual phase voltage
 - d. Bypass power (kW)
 - e. Bypass faults and fault logs
 - f. Bypass warnings
 - g. Bypass operating time (resettable)
 - h. Bypass energy (kilowatt hours – resettable)
 - i. I/O status
 - j. Parameter settings / programming
 - k. Printed circuit board temperature
19. The following indicating lights (LED type) or keypad display indications shall be provided. A test mode or push to test feature shall be provided.
 - a. Power-on (Ready)
 - b. Run enable
 - c. Drive mode selected
 - d. Bypass mode selected
 - e. Drive running
 - f. Bypass running
 - g. Drive fault

- h. Bypass fault
 - i. Bypass H-O-A mode
 - j. Automatic transfer to bypass selected
 - k. Safety open
 - l. Damper opening
 - m. Damper end-switch made
20. The Bypass controller shall have six programmable digital inputs, and five programmable Form-C relay outputs. This I/O allows for a total System (VFD and Bypass) I/O count of 24 points as standard. The bypass I/O shall be available to the BAS system even with the VFD removed.
21. The on-board Form-C relay outputs in the bypass shall be programmable for any of the following indications.
- a. System started
 - b. System running
 - c. Bypass override enabled
 - d. Drive fault
 - e. Bypass fault
 - f. Bypass H-O-A position
 - g. Motor proof-of-flow (broken belt)
 - h. Overload
 - i. Bypass selected
 - j. Bypass run
 - k. System started (damper opening)
 - l. Bypass alarm
 - m. Over temperature
22. The bypass shall provide a separate terminal strip for connection of freeze, fire, smoke contacts, and external start command. All external safety interlocks shall remain fully functional whether the system is in VFD or Bypass mode. The remote start/stop contact shall operate in VFD and bypass modes. The terminal strip shall allow for independent connection of up to four (4) unique safety inputs.
23. The bypass shall include a supervisory control mode. In this bypass mode, the bypass shall monitor the value of the VFD's analog input (feedback). This feedback value is used to control the bypass contactor on and off state. The supervisory mode shall allow the user to maintain hysteresis control over applications such as cooling towers and booster pumps.
24. The user shall be able to select the text to be displayed on the keypad when an external safety opens. Example text display indications include "FireStat", "FreezStat", "Over pressure" and "Low suction". The user shall also be able to determine which of the four (4) safety contacts is open over the serial communications connection. Show VFC pole quantities, voltage, accessories, size and type, short-circuit current (withstand) rating (or available short-circuit currents), and enclosure type for each controller on Drawings. See "Specifying VFCs" Article and Editing Instruction No. 9 in the Evaluations for selection considerations.
25. Standard and optional features vary considerably among VFC manufacturers. Not all features, accessories, and options in this article are available for every rating, with every type of enclosure, and from every listed manufacturer. Also, features and options depend

on motor characteristics and operating criteria of driven equipment. Verify, with manufacturer, availability and unique characteristics. Show on Drawings the features and accessories that apply to each VFC.

- K. Multiple-Motor Capability: Where required provide VFC suitable for variable-speed service to multiple motors. Overload protection shuts down VFC and motors served by it, and generates fault indications when overload protection activates.
 - 1. Configure to allow two or more motors to operate simultaneously at the same speed; separate overload relay for each controlled motor.

2.3 ENCLOSURES

- A. VFC Enclosures: NEMA 250, to comply with environmental conditions at installed location.
 - 1. Dry and Clean Indoor Locations: Type 1.
 - 2. Outdoor Locations: Type 3R.
 - 3. Other Wet or Damp Indoor Locations: Type 4X.
 - 4. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: Type 12.
- B. Plenum Rating: UL 1995; NRTL certification label on enclosure, clearly identifying VFC as "Plenum Rated."

2.4 SOURCE QUALITY CONTROL

- A. Testing: Test and inspect VFCs according to requirements in NEMA ICS 61800-2.
 - 1. Test each VFC while connected to its specified motor.
 - 2. Verification of Performance: Rate VFCs according to operation of functions and features specified.
- B. VFCs will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, surfaces, and substrates to receive VFCs, with Installer present, for compliance with requirements for installation tolerances, and other conditions affecting performance of the Work.
- B. Examine VFC before installation. Reject VFCs that are wet, moisture damaged, or mold damaged.

- C. Examine roughing-in for conduit systems to verify actual locations of conduit connections before VFC installation.
- D. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Wall-Mounting Controllers: Install with tops at uniform height and with disconnect operating handles not higher than 79 inches (2000 mm) above finished floor, unless otherwise indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not on walls, provide freestanding racks complying with Section 260529 "Hangers and Supports for Electrical Systems."
- B. Floor-Mounting Controllers: Install VFCs on 4-inch (100-mm) nominal thickness concrete base.
 - 1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of concrete base.
 - 2. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - 3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 4. Install anchor bolts to elevations required for proper attachment to supported equipment.
- C. Roof-Mounting Controllers: Install VFC on roofs with tops at uniform height and with disconnect operating handles not higher than 79 inches (2000 mm) above finished roof surface unless otherwise indicated, and by bolting units to curbs or mounting on freestanding, lightweight, structural-steel channels bolted to curbs. Seal roof penetrations after raceways are installed.
 - 1. Curbs and roof penetrations are specified in Section 077200 "Roof Accessories."
 - 2. Structural-steel channels are specified in Section 260529 "Hangers and Supports for Electrical Systems."
- D. Seismic Bracing: Comply with requirements specified in Section 260548 "Vibration and Seismic Controls for Electrical Systems."
- E. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- F. Install fuses in each fusible-switch VFC.
- G. Install fuses in control circuits if not factory installed. Comply with requirements in Section 262813 "Fuses."

- H. Install heaters in thermal-overload relays. Select heaters based on actual nameplate full-load amperes after motors are installed.
- I. Install, connect, and fuse thermal-protector monitoring relays furnished with motor-driven equipment.
- J. Comply with NECA 1.

3.3 CONTROL WIRING INSTALLATION

- A. Install wiring between VFCs and remote devices and facility's central-control system. Comply with requirements in Section 260523 "Control-Voltage Electrical Power Cables."
- B. Bundle, train, and support wiring in enclosures.
- C. Connect selector switches and other automatic-control devices where applicable.
 - 1. Connect selector switches to bypass only those manual- and automatic-control devices that have no safety functions when switches are in manual-control position.
 - 2. Connect selector switches with control circuit in both manual and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor-overload protectors.

3.4 IDENTIFICATION

- A. Identify VFCs, components, and control wiring. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each VFC with engraved nameplate.
 - 3. Label each enclosure-mounted control and pilot device.
- B. Operating Instructions: Frame printed operating instructions for VFCs, including control sequences and emergency procedures. Fabricate frame of finished metal, and cover instructions with clear acrylic plastic. Mount on front of VFC units.

3.5 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- B. Perform tests and inspections with the assistance of a factory-authorized service representative.
- C. Acceptance Testing Preparation:

1. Test insulation resistance for each VFC element, bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

D. Tests and Inspections:

1. Inspect VFC, wiring, components, connections, and equipment installation. Test and adjust controllers, components, and equipment.
2. Test insulation resistance for each VFC element, component, connecting motor supply, feeder, and control circuits.
3. Test continuity of each circuit.
4. Verify that voltages at VFC locations are within 10 percent of motor nameplate rated voltages. If outside this range for any motor, notify Architect before starting the motor(s).
5. Test each motor for proper phase rotation.
6. Perform tests according to the Inspection and Test Procedures for Adjustable Speed Drives stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
7. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
8. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

E. VFCs will be considered defective if they do not pass tests and inspections.

F. Prepare test and inspection reports, including a certified report that identifies the VFC and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations made after remedial action.

3.6 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

3.7 ADJUSTING

- A. Program microprocessors for required operational sequences, status indications, alarms, event recording, and display features. Clear events memory after final acceptance testing and prior to Substantial Completion.
- B. Set field-adjustable switches, auxiliary relays, time-delay relays, timers, and overload-relay pickup and trip ranges.
- C. Set the taps on reduced-voltage autotransformer controllers.
- D. Set field-adjustable circuit-breaker trip ranges

- E. Set field-adjustable pressure switches.

3.8 PROTECTION

- A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions until controllers are ready to be energized and placed into service.
- B. Replace VFCs whose interiors have been exposed to water or other liquids prior to Substantial Completion.

3.9 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, reprogram, and maintain VFCs.

END OF SECTION 262923