

**REQUEST FOR PROPOSAL for
REPLACE HVAC SYSTEM OF THE PUBLIC SAFETY BUILDING
Colfax Avenue & Pine Street
Scranton, Pa**

Deliver to: (5) Copies
City of Scranton, Municipal Building
City Controller
Second Floor
340 North Washington Avenue
Scranton PA 18504

Lawrence D West
Business Administrator
City of Scranton

Peters Design Group, Inc.
Since 1949
1415 Price Street Scranton PA 18504
PO Box 273 Lake Winola PA 18625
pdg4997@aol.com Ph 570-498-1995 570 346-8446

INVITATION TO BID

Separate sealed bids for the **Public Safety Building – Replacement of HVAC System** Project will be received by John Murray, City of Scranton Controller, 340 N. Washington Avenue, Scranton, Pa., 18503 until 10:00 a.m. on Wednesday, October 27, 2021, at which time such proposals will be opened in City Council Chambers, 2nd Floor.

CITY OF SCRANTON Public Safety Building – Replacement of HVAC System

All bids shall be in accordance with the specifications which may be obtained by visiting the City of Scranton Website, www.scrantonpa.gov, under the Business Tab, and Open Bid Opportunities, as labeled above. If you intend to submit a bid, you are required to notify Julie Reed, Purchasing Clerk for the City of Scranton via email at jreed@scrantonpa.gov. If you fail to notify the Purchasing Clerk of your intent to submit a bid, you will not receive any Addenda or answers to any questions that may be submitted by other bidders.

Five (5) copies of the bids are to be submitted to John Murray, City of Scranton Controller, 2nd Floor, 340 North Washington Avenue, Scranton, PA 18503. Proposals must be plainly marked and identified as **“Public Safety Building – Replacement of HVAC System,”** so as to arrive by the date and time specified above. If you are hand delivering the Proposals, upon entering City Hall you must contact the Controller’s Office at (570) 348-4125 to come down and accept the sealed proposals. The paper copy of your bid will be the time-stamped official submission.

All bids **must** be accompanied by a certificate of insurance, a signed affirmative action, non-segregated facilities, and non-collusion affidavit and disclosure forms. **Failure to submit these forms will result in your submission being disqualified.**

There will be a **mandatory** Pre-Bid Conference on Monday, October 18, 2021, at 10 a.m. at the project site at the blocks of Colfax Avenue & Pine Street. This Pre-Bid Conference is for the purpose of receiving explicit directions for the project. Only bids from vendors attending the Pre-Bid Conference will be considered.

Lawrence D. West
Business Administrator

TABLE OF CONTENTS

Instructions to Bidders

Bid Bond

Bid Form

Non-Collusion Affidavit of Contractor

Affirmative Action Certification

Certificate of Non-Segregated Facilities

Disclosure by Firm or Contractor

List of Drawings

Notice of Award

Owner/Contractor Agreement

Notice to Proceed

General & Supplementary Conditions

Prevailing Minimum Wage Rate Determination

Technical Specifications

END

INSTRUCTIONS TO BIDDERS

PART 1 GENERAL

INVITATION FOR BIDS

A. Sealed Proposals for **Replace HVAC System of the Public Safety Building** Lackawanna County, Scranton, Pennsylvania will be received by the City of Scranton in the Municipal Building, Office of the City Controller, 340 North Washington Avenue, Scranton PA 18503 at the time and date noted in the published Invitation to Bidders

1.02 OPENING OF BIDS

Sealed bids will be publicly opened and read aloud and made available for inspection in the Scranton City Council Chambers.

All proposals shall be irrevocable for ninety (90) days after bid opening date, unless delayed due to required approvals of another governmental agency, or the award of a grant or grants, in which case bids shall be irrevocable for one hundred twenty (120) days.

1.03 OWNER'S REPRESENTATIVES

The Engineer for the project is **Peters Design Group Inc.** 1415 Price Street, Scranton, PA 18504. The Engineer provides for the design of the Project, as set forth in the Contract Documents generally and the Drawings and Specifications in particular.

All questions regarding the contract documents shall be sent to Peters Design Group Inc, attention Bob Nitch, by fax (570 346 8269) or email (pdg4997@aol.com). All clarifications will be provided by addendum

1.04 DOCUMENTS

A. Bona fide Prime Bidders may obtain sets of Drawings and Project Manual from the Bureau of Purchasing, 4th floor of the Scranton Municipal Building.

1.05 EXAMINATION

A. Bidders shall carefully study and compare the Contract Documents to the extent that it relates to the Work for which the Bid is submitted.

B. Bidders shall examine the Construction Site and location conditions in order to obtain first-hand knowledge of existing conditions and limitations, and shall at once report to the Engineer errors, inconsistencies or ambiguities discovered. Failure to visit the site will not relieve the Contract of responsibility for same nor will extra payment

requests be considered for conditions, which could have been determined by examination of the Site and Documents

C. Bidders shall determine the extent to which an award by the Owner for other work including hazardous materials remediation and technology installation, may bear upon the Work performed by the Contractor.

1.06 BIDDER'S QUALIFICATIONS

A. Upon request, following the receipt of bids, the Bidder may be asked to submit a completed Qualifications Questionnaire. A submitted Qualifications Questionnaire completed in a manner that demonstrates bad faith shall be rejected and the Bid declared non-responsive as per Subparagraph 1.15E. The Bidder shall provide a complete copy of its most recent financial statements, if requested. A negative response to the request for a complete copy of the most recent financial statement shall be conclusively treated as non-responsive and shall disqualify the Bidder.

The City may make such investigation as is deemed necessary to determine the responsibility of the Bidder, including the ability of the Bidder to perform the Work according to the requirements of the Contract Documents. The Bidder shall furnish to the City all such information and data for this purpose as the City may request. The City reserves the right to reject any Bid if, by the evidence submitted or as the result of investigation, the City concludes in its discretion that the Bidder is not properly qualified to carry out the obligations of the Contract or is otherwise not a responsible Contractor under applicable law. The City of Scranton reserves the right to waive minor irregularities in the procedures or proposals if it is deemed in the best interests of the City of Scranton. The City may elect, at its sole and absolute discretion, to award a Contract based on the initial proposals, or, to open negotiations, either written or oral, with one or more proposers to address performance, technical, pricing, delivery, or other provisions. If negotiations are opened, the City may elect, at its sole and absolute discretion, to conclude negotiations at any time if it is determined to be in its best interest, or they will be closed upon settlement of all questions and clarifications. Proposals may be rejected and negotiations terminated by the City. The award will be based on the offers submitted, as well as any and all negotiations conducted. The City further reserves the right to reject all proposals and seek new proposals when such procedure is considered to be in the best interest of the City.

1.07 BID SECURITY

A. Each Bid must be accompanied by a single original Bid Bond, Cashier's Check, Trust Company Treasurer's Check or Certified Check in favor of or made payable to the City of Scranton. Any Bid Bond submitted as Bid Security shall be in the form as provided on the Contract Documents and shall be issued by a surety company licensed to do business in the Commonwealth of Pennsylvania with an A.M. Best rating of A- or better. The failure of the Bidder to submit the Bid Security shall be conclusively treated

as a deficiency requiring the rejection of the Bid. In the event of any inconsistency between a Bid Bond provided and these Instructions to Bidders, the instructions shall control. Bid surety shall be in the amount of \$1,000.

B. Such Bid Security shall be submitted with the understanding that it shall guarantee that the Bidder's Bid will not be withdrawn for the period of time allowed by Pennsylvania Act 1978-317, as amended and other provisions of applicable law; that, if the Bid is accepted, the Bidder will execute the Form of Agreement, Payment and Performance Bonds, insurance certificates, and other submittals required by Paragraph 1.18 of these instructions; and that in the event of withdrawal of said Bid within said period, the failure to furnish documents or information requested to cure a deficiency in the Bid, or the Bidder's failure to enter into said Agreement or provide the submittals required after notice of intent to award has been issued, the Bidder shall be liable for the full amount of such Bid Security as representing the damage to the City on account of the default of the Bidder in any particular hereof.

C. The successful bidder's Security will be retained until the contract is signed and furnished the required submittals. The City of Scranton reserves the right to retain the Security of the next three(3) lowest bidders until the lowest Bidder enters into a Contract or until 60 days after bid opening, whichever is the shorter. All other Bid Security will be returned as soon as practical. If any Bidder refuses to enter into a Contract, the City will retain his Bid Security as liquidated damages, but not as a penalty.

1.08 BIDDER'S ACKNOWLEDGEMENTS REGARDING PROPOSED WORK

A. Contracts will be awarded with the understanding that the Bidder, prior to submission of the Bid, has become acquainted with the requirements of the Contract Documents for all Prime Contracts, the work performed by other Contractors, the condition of the Site, the existing building, terrain, soil conditions, all utilities in existence (including those to which connections are to be made), and all other conditions of the Site and existing structures and has obtained all information necessary for the submission of his Bid and the completion of the Work on or before the submission of his Bid. Acknowledgment by the Bidder constitutes a binding agreement and understanding with the City that a claim may not be submitted based on a matter that is contrary to the subject of the acknowledgment.

B Site Visitation: Contact **Captain Dennis Lukasewicz** at (570) 348-4134 or **Paul O'Hora, Building Maintenance Supervisor**, at (570) 348-4144 to arrange for visitations to the Site and for all inspections of the Site and existing structure.

C. The Bidder acknowledges that he has examined carefully and in detail the character of the Site of the Project, existing structure the Contract documents and all other matters pertinent to the Work contemplated. The Bidder has satisfied himself as to the conditions to be encountered overhead, on the surface and concealed, the character quality and quantities of work to be done and materials to be furnished, and the requirements of the Contract Documents. The Bidder acknowledges that the City makes no representations regarding the subsurface conditions found at the Project Site.

D. The Bidder acknowledges that there is no expressed or implied agreement that the existing conditions have been correctly indicated and the Bidder has taken into account that conditions affecting the cost or quantities of work to be done may differ from those indicated.

E. The Bidder acknowledges that he has carefully examined all Contract Documents and materials pertinent thereto, with respect to all the categories of Work for which the City had advertised and will receive proposals, and is completely aware and satisfied as to the character, quality and quantities of all work, materials and for services required or to be provided or performed and will complete all Work of the Contract and further has examined the Work that will be required of the other Contractors employed by the City on the Project.

F. The Bidder acknowledges that, should Work to be performed be specified or indicated in more than one Prime Contract and no clarifications received by Addendum prior to Bid date, each Prime Contract Bidder so affected who is submitting a Bid shall consider the Work to be part of their Prime Contract. A subsequent determination will be made and an amount commensurate to the labor, material and equipment to be provided will be deducted from the Contractor determined not to be responsible.

G. The Bidder acknowledges that the Bidder has visited or has been given the opportunity to visit the Site, has read the Contract Documents and understands their full character and intent, and that, should the City subsequently accept his proposal, no claims, allowances or concessions will be made, accepted or recognized at any future time for any additional labor, equipment or materials required, or for any difficulties encountered in the Work, or for the lack of any information which could have been foreseen, apparent or ascertained by the Bidder.

H. The Bidder acknowledges that he has ascertained all governmental and utility requirements with respect to wage scales, materials, labor, safety and sanitation and shall base his Bid prices on full compliance therewith.

I. The Bidder acknowledges that he has familiarized himself with labor conditions, which might affect or influence the performance of the Work.

J. The Bidder acknowledges that he is fully aware of the City's status as a governmental entity in relation to this Project and the requirements of Applicable Laws related to certain exemptions from the application of sales taxes.

K. The award will be made to that responsive proposer whose proposal, conforming to requirements of the request, will be most advantageous to the City, price and other factors considered.

L. No proposal will be accepted from or contract awarded to any person, firm or corporation that is in arrears or is in default to the City upon any contract, or that is a

defaulter, as surety or otherwise, upon any obligation to the City or who had failed to faithfully perform any previous contract with the City.

M. The Bidder acknowledges that the Bidder and other Contractors on the Project are responsible for coordination of their own construction activities and for resolving coordination issues between themselves and with other Contractors retained by City in the first instance in accordance with the General Conditions.

N. The Bidder acknowledges that he is aware and has been advised that the Contractor is solely responsible for initiating, maintaining and supervising all safety precautions and programs required under its portion of the Work and the Work of the Bidder's Subcontractors and Sub-Subcontractors and that the Bidder has reviewed, evaluated and taken into consideration these requirements when submitting the Bid.

O. The Bidder acknowledges that he is aware and has been advised that his Subcontractors must be given these requirements for bidding purposes so as to ensure consistency and adherence to the Contract Documents, that the Bidder as Contractor, is responsible fully to the City for the performance of his Subcontractors and that the Bidder will require each Subcontractor, through legally enforceable written agreements, to meet all of the responsibilities with respect to any portion of the Work performed by any Subcontractor.

0. The Bidder acknowledges that he assumes all risks resulting from any changes in the conditions which may occur during the progress of the Work, subject to the right of any Contractor to recover from another Prime Contractor, damages for interference and delay.

1.09 UNDISCLOSED SITE AND BUILDING CONDITIONS - N/A

1.10 REVIEW OF DRAWINGS AND SPECIFICATIONS AND ADDENDA

A. It is the intent of the Engineer to fully clarify all requirements of the Contract Documents. Bidders shall contact the Construction Manager/Project Engineer in writing to discuss any items in question during the Bidding period so that any questionable items can be resolved, and if required, Addenda may be issued prior to submission of Bids.

B No recovery shall be allowed by a Contractor who fails to request clarification of a Contract Document requirement for damages associated with that requirement. The Contractor shall not at any time after submission of the Bid assert any claim whatsoever based upon insufficient data or incorrectly assumed conditions, nor shall the Contractor claim any misunderstanding in regard to the nature, conditions or character of the Work to be done under the Contract, as to which the Contractor failed to inquire.

C. Should any Bidder find discrepancies, duplications or omissions in the documents or have doubt as to the meaning expressed by the Contract Documents, he shall make

inquiry at once in writing to the Engineer. Addenda shall be a part of the Contract Documents. The Contract Documents can be changed prior to Bidding only by the issuance of Addenda by the Engineer.

D. No oral interpretations will be made to any Bidder as to the meaning of the Contract Documents or any part thereof. Every request for such an interpretation shall be made in writing. Any inquiry received three (3) or more days prior to the date fixed for opening Bids will be given consideration. Every interpretation made to the Bidder in the form of an Addendum, and when issued, will be on file in the Purchasing Office of the City, before Bids are opened. In addition, all Addenda will be emailed, sent via facsimile, or otherwise transmitted to each holder of record of a complete set of Contract Documents. The Bidder shall contact the Engineer prior to the submission of the Bid to secure information on the latest Addenda issued. All Addenda shall become part of the Contract Documents and all Bidders shall be bound by such Addenda, whether or not received by the Bidders and whether or not acknowledged in the Bid.

E. The Bidder must base his Bid on the products and manufacturers specified in the Contract Documents, as modified by written Addenda. No substitutions are permissible where the Contract Documents provide for: (I) three products and/or manufacturers; (ii) one explicitly identified proprietary manufacturer; or (iii) one manufacturer where there is no explicit limitation to any identified proprietary product and therefore equal products and/or manufactures are permitted.

1.11 REGULATIONS, APPLICABLE LAW AND PERMITS

A. The law of the Commonwealth of Pennsylvania shall govern the interpretation of this Contract. Applicable law may include any of the following:

1. The Pennsylvania Statewide Building Code: Act 45 - The Uniform Construction Code (UCC) Act of 1999, which adopts the International Code Council Family of Codes - 2003, except that the UCC Administrative Regulations replace Chapter One of each of the International Codes.
2. City of Scranton ordinances, codes and regulations.

B. The general Prevailing Minimum Wage Rates, as determined by the Pennsylvania Department of Labor and Industry, Bureau of Labor Law Compliance for Prevailing Minimum Wage Predetermination, shall be paid for each craft or classification of all workers needed to perform the Contract during the anticipated term thereof, refer to Section 00800 for the rates issued for this Project.

C. Bids shall be submitted on the basis of full and total compliance with all Federal and State laws, regulations, statues, and requirements pertaining to this Project. Bidder shall contact prior to bidding, the City of Scranton Department of Licenses and Permits as having jurisdiction and ascertain the building codes, permits, fees and regulations pertaining to this project. The Bidder shall determine what local ordinances, if any, will affect his Work and shall check for any regulations applicable to the area in which the Project is being constructed and, in addition for any rules or regulations of other

organizations having jurisdiction such as planning commissions, industries or utility companies. Any costs of compliance with local controls shall be included in the Bid, even though requirements of such local controlling agencies are not listed herein.

D. The Bidder shall contact the City of Scranton regarding any requirements for Contractor Licenses and/or bonding, and any ordinances which may restrict early morning, late evening, and/or weekend work hours, as well as any restrictions regarding access routes to the Site. Work hours permitted by the City of Scranton are 7:00 AM to 8:00 PM Monday through Saturday.

1.12 PRE-BID CONFERENCE

A. A Pre-Bid for **Replace HVAC System of the Public Safety Building** will be held at **the Scranton Public Safety Building** located at the intersection of Colfax Avenue and Pine Street, at the time and date identified in the published Invitation to Bidders, for the purpose of reviewing the Project and clarifying any items in the Contract Documents.

B. Questions from this meeting requiring modification of Contract Documents will be issued in the form of an Addendum. Bidders may not rely on the answers and responses given orally and may rely only on written answers to questions raised at pre-bid meeting that are included in an Addendum.

1.13 COMPLETION OF WORK AND LIQUIDATED DAMAGES

A. The Bidder shall submit his Bid with the understanding that (1) The Contractor shall begin on the date indicated in or established by the Notice to Proceed and shall carry the Work forward expeditiously to achieve Substantial Completion on or before the times stipulated in the Contract Documents; (2) the time for the completion of the Work shall be considered of the essence of this Contract, and (3) for the costs of extra inspection, salaries of contingent forces and other expenses entailed by the City by delay in completing the contract, said City shall be entitled to liquidated damages, and not as a penalty, in the amount of \$100 for each and every calendar days delay, provided that the delay was not solely caused by the City or not otherwise excused in accordance with the General Conditions and other Contract Documents.

B. In the event that the work must be conducted beyond the normal working hours specified or if the Project is not completed by the specified duration, the Contractors shall reimburse the Consultants (A/E) for all their expenses. Expenses shall be calculated at the cost times 2.75 on labor and costs times 1.15 on all other items.

C. The reimbursement set forth above are in addition to liquidated damages, if any, and shall be paid to the Consultants by the Contractors prior to final payment or the amounts shall be deducted from the Contractors final payment. Reimbursement to the Consultants for additional work expenses shall not apply to the extent that their overtime or extension is the fault of the Consultant or beyond the reasonable control of the Contractor.

1.14 PREPARATION AND PRESENTATION OF BIDS

A. Each Bidder shall submit a single original Bid using the Bid Forms and two copies of the Bid Forms provided in the Contract Documents. The Bid must be delivered in a sealed opaque envelope on or before the time and at the place stated above. Transmission of a Bid by electronic means, verbally, or by facsimile is not permitted. Name of the Bidder, Prime Contract Name and Number shall appear on the face of the Bid envelope.

B. An original Bid Form for use by the Bidder shall be furnished with the Project Manual. Bidder shall instead use any revised Bid Form issued in an Addendum.

C. The failure to execute or complete a blank on the Bid Form shall cause the Bid to be rejected only if the amount of the Base Bid or Bid for an Alternate cannot be determined. The failure of the Bidder to sign the Bid Form shall be conclusively treated as a nonresponsive Bid and the Bid shall be rejected. The failure to attest to the signature made on behalf of a Bidder shall not make the Bid nonresponsive. If the Bid For is inconsistent, the version most favorable to the City will govern.

D. The blanks provided for the entry of sums on the Bid Form shall permit the Bidder to enter its Bid in words, or in numerical figures, or in both words and numerical figures. In case of discrepancy where both words and numerical figures are entered, the numerical figures shall control. No Bid shall be rejected solely by reason of the failure to enter sums in both words and numerical figures provided that a sum is ascertainable. If a sum is ascertainable, the Bid will conclusively be determined to be responsive.

E. All Bids should be regular in every respect and interlineations, additions, excisions or conditions made or included in the completed Bid Form by the Bidder shall be disregarded and the Bid accepted. Only in the event that, notwithstanding the disregard of the interlineation, addition, excision or condition, the amount of the Base Bid or Bid for an accepted Alternate Bid cannot be predetermined shall be Bid be rejected.

F. The Bid Form must be signed by and on behalf of the Bidder, using any readable medium. The failure of the Bidder to submit and sign the Bid Form and submit Bid Security shall be conclusively treated as a deficiency requiring the rejection of the Bid. The failure to provide an attestation to the signature of the Bidder shall be conclusively treated as an irregularity which, in the discretion of the City, may be ignored and the Bid accepted, provided that the attestation is submitted after the Bid, within three (3) business days of written notice from the City of the deficiency and of the opportunity to cure, If the Bidder fails within the (3) days or other period provided, the Bidder shall forfeit its Bid Security, the Bid shall be rejected as nonresponsive, the Bidder shall be deemed not a responsive Contractor for the next two construction solicitations issued by the City.

G. The failure to complete the envelope containing the completed Bid Form with the information required by this Paragraph shall be conclusively treated as an irregularity

which, in the discretion of the City, may be ignored and the Bid accepted, provided that the omitted information or missing portion of the information is submitted after the Bid within three (3) business days of written notice from the City of the deficiency and of the opportunity to cure. If the Bidder fails to cure within the three days or other period provided, the Bidder shall forfeit its Bid Security, the Bid shall be rejected as nonresponsive.

H. Bids should be submitted by sole proprietors, partnerships, corporations, limited liability companies and forms of business organizations that are for the purposes of the Contract, a functional equivalent. Each Bidder must complete the Bid Form by entering the information requested, including for example, the name of the Bidder, the name of the person signing the Bid, the Bidder's business address with ZIP code, and other information of the type required by sub-subparagraphs to this Sub-paragraph. With the exception of the failure of the Bidder to sign the Bid Form, the failure to complete the Bid Form with regard to such information shall be conclusively treated as an irregularity which, in the discretion of the City, may be ignored and the Bid accepted, provided that the omitted information or missing portion of the information is submitted after the Bid, within three (3) business days of written notice from the City, of the deficiency and of the opportunity to cure. If the Bidder fails to cure within the three days or other period provided, the Bidder shall forfeit its Bid Security, and the Bid shall be rejected as nonresponsive. The failure of the Bidder to sign the Bid Form shall be conclusively treated as a deficiency requiring the rejection of the Bid, and the City may award to the next lowest responsible and responsive Bidder.

I. Bids by sole proprietors must be signed by the individual proprietor and witnessed. Any fictitious name or name under which the sole proprietor trades must be stated.

J. Bids by partnerships must furnish the full name of one or more general partners, and must be signed in the partnership name by one or more general partners.

K. Bids by corporations must be signed by the president of the corporation, a vice president of the corporation, or another corporate representative whose authority is established by an attached resolution. The signature of the representative must be witnessed and attested to by a secretary, assistance secretary, treasurer, assistant treasurer, or another corporate representative whose authority is established by an attached resolution. The Bid of a corporation does not require the affixing of the corporate seal. Any corporate resolutions attached to the Bid in order to establish the authority of a corporate representative may be dated as of the date of the Bid, or for a period of no more than one year prior thereto.

L. Bids by a Limited Liability Company or LLC, or equivalent form of business form of business organization, must submit the Operating Agreement or similar documentation, establishing the authority of the representative who executes the Bid and the authority of the representative who attests to the validity of the signature.

M. When requested by the City, satisfactory evidence of the authority of the individual signing on behalf of the Bidder or attesting to the signature, shall be furnished. The failure to furnish satisfactory evidence of the authority of the individual within three (3) business days, shall be conclusively treated as a deficiency requiring the rejection of the Bid.

N. The Bidder shall ascertain, prior to submitting a Bid that the Bidder has received all Bulletins and other Addenda issued. Bidder by the submission of the Bid acknowledges conclusively that all Addenda properly issued are applicable and operative as a part of the Contract Documents. Failure of any Bidder to receive any Bulletin or Addenda as provided for herein shall not release such Bidder from the obligation of his Bid, and the obligation to comply with the provisions of the Addenda. The failure to list one or more of the Addendum numbers on the Bid Form does not make the Bid nonresponsive.

1.15 CONTRACT FORMS AND SUBMITTALS

A. Bids and Bid Security, in accordance with the Invitation to Bid and these Instructions to Bidders, must be submitted in an opaque sealed envelope and addressed to:

**City of Scranton
Office of the City Controller
2nd Floor
340 North Washington Avenue
Scranton, PA 18503**

and shall be marked:

Replace HVAC System of Public Safety Building

B. The completed Bid must be accompanied by additional documents, completed as required by the Bidding Requirements

C. The failure of the Bidder to submit with his completed and signed Bid For and the Bid Security, the other documents listed or identified in this Paragraph 1.15, shall be conclusively treated as an irregularity, which in the discretion of the City, may be ignored and the Bid accepted, provided that the omitted document or missing portion of the document is submitted after the Bid within three (3) days of written notice from the City, of the deficiency and of the opportunity to cure. If the Bidder fails to cure within the three (3) days or other period provided, the Bidder shall forfeit its Bid Security and the Bid shall be rejected as nonresponsive.

D. In accordance with the Pennsylvania Antibid-Rigging Act 62 Pa C.S. 4501 et seq., the Bidder shall submit with his Bid a Non-Collusion Affidavit.

E. Bidders may be requested to submit a completed Qualification Questionnaire, reflecting a good-faith effort at providing complete information in response to the questions therein. No Bidder will be disqualified on the grounds of nonresponsiveness unless the effort at completing the form is substantially incomplete or demonstrates bad faith. Before making an award, the City may require any Bidder, upon at least three (3) day notice, to present satisfactory evidence, in form specified by the City and in addition to the materials provided in the completed Qualification Statement, of his experience, qualifications, financial ability, and other matters reasonably related to his ability to satisfactorily perform and complete the Work covered by his proposal, or reasonably related to his integrity as a public Contractor. An apparent low Bidder shall upon request submit the most recent audited financial statement or, if an audited financial statement is unavailable, a financial statement prepared after a compilation or review, within three (3) days of the City's request. The City may direct that Bidder appear, by designated representatives, at a meeting called to consider Bidder's responsibility as a Contractor under applicable law. The City reserves the right to request such other information or data as the City and its representatives may deem necessary to evaluate the qualifications of the Bidder and to consider such matters, facts and circumstances presented by the Bidder as shall be permitted by Pennsylvania law, in making a determination whether the Bidder is a responsible Bidder.

1.16 BID WITHDRAWAL and TIME ALLOWED for MAKING AWARD

A. Bidders may withdraw Bids at any time up to the scheduled time for opening of Bids. The withdrawal of a Bid prior to the deadline for bidding may occur only by an official representative of the Bidder. Resubmitted Bids are permitted, provided that the resubmitted Bid meets all the requirements of a Bid under the Contract Documents, including the requirement of submission prior to the bidding deadline. Bids may not be modified after the deadline for submittal.

B. After the deadline for submittal, no Bid may be withdrawn except as permitted by the Bid Withdrawal Act.

1.17 AWARD of CONTRACT

A. The Contract will be awarded in accordance with the provisions of applicable law, as set forth in Paragraph 1.18 to the lowest responsible Bidder, provided the Bid complies with the requirements of these Instructions to Bidders and other Contract Documents and is reasonable and provided further that it is in the best interests of the City to accept it.

B. The City shall have the right to accept Alternates in any order or combination and to determine the low Bidder on the basis of the sum of the Base Bid and Alternates accepted on the date of Contract Award.

C. The City reserves the right to waive any informality in bids when such waiver is in the interest of the City of Scranton.

D. The City reserves the right to reject any and all bids when such rejection is in the interest of the City of Scranton, and to reject to bid of any Bidder, who in the City's judgment, is not in a position to perform the Contract. The City reserves the right to reject an unbalanced Bid, including a Bid with a Unit Price that unreasonably states the cost to the Bidder of a unit of Work or a Bid with an Alternate that is intended to be selected by the City and that is priced in an amount that unreasonably varies from the Alternate's cost to the Bidder.

E. The Resolution of the City's selecting a Bidder as the successful Contractor on the Bid, shall constitute (1) notice of the intent to award for the purpose of Paragraph 1.18, and (2) the award for the purpose of the deadline for awarding a contract under the Award and Execution of Contracts Act.

F. Each Bidder agrees to waive any claim it has or may have against the City, the Engineer and their respective employees, arising out of or in connection with the administration, evaluation, or recommendation of any bid.

1.18 SUBMITTALS REQUIRED POST-AWARD

A. The City, during the period allowed and any extensions thereof, in its sole discretion, may, after selection of a Bidder, issue a notice of intent to award. Any such notice is not a Contract Document. Thereafter, City may award a Contract to the Bidder selected by City provided that the Bidder delivers to the City the following:

1. Executed Agreement (executed in the required number of counterparts) in the form set forth in the Contract Documents.
2. Performance and Payment Bonds in the form set forth in Contract Documents and in accordance with these Instructions to Bidders.
3. Insurance Certificates, policies or other evidence of insurance for insurance coverages that the Contractor is required to maintain.
4. Other documents, affidavits, and submittals required by the Contract Documents.

Failure of the Bidder to whom notice of intent to award has been given to deliver above items required by the Contract Documents shall constitute grounds for the City to declare the Bidder's Bid Security forfeited and to award to another Bidder.

B. The City-Contractor Agreement in final form will be prepared by City of Scranton Law Department.

C. Bidder shall furnish a Performance Bond and a Payment Bond on the forms provided as requested by the City. At least one (1) copy of the Bonds must be an original. The Surety Company shall be licensed in the Commonwealth of Pennsylvania with an A.M. Best rating of no less than A minus.

D. The Contractor shall deliver said Bonds to the City prior to executing the agreement. Failure or neglecting to deliver said Bonds, as specified, shall be considered as having abandoned the Contract and the Bid Security will be retained as liquidated damages.

E. The insurance certificates submitted must meet the requirements set forth in the General Conditions

F. After approval of Agreement, Bonds, insurance, and other submittals, the City will sign and date the Agreement. The City shall return to the successful Bidder within a reasonable period of time one (1) original of the dated, executed Agreement.

1.19 OTHER LAWS AND REGULATIONS

A. The Bidder's attention is directed to the fact that all applicable Federal and State laws, municipal ordinances and codes, and the rules and regulations of all authorities having jurisdiction over construction of the Project shall apply to the Contract throughout, and they are deemed to be included in the Contract the same as though herein written in full.

B. Federal Occupational Safety and Health Act of 1970 (OSHA)

1. Attention is directed to the terms, provisions and conditions of the William-Steiger Safety and Health Act of 1970, which is specifically applicable to this Project.

2. The Contractor agrees to be bound by them and further agrees and promises to conform and comply with the Standards set forth in the Act.

3. The Contractor is required to promptly perform all reporting and recording, compliance and safety as required by said Act.

C. Pennsylvania Act 287 - Utilities Protection

The Contractor will be responsible for complying with Pennsylvania Act 287, commonly known as the "Call Before You Dig Act". Excavation or digging Contractors may learn the utilities and authority Owners by calling 1-800-242-1776 statewide, prior to excavation work. One call locates utility lines and the utilities are notified.

D. Pennsylvania Prevailing Wage 442

1. The General Prevailing Minimum Wage Rates, including contributions for employees benefits as shall have been determined by the Secretary of Labor and Industry, which must be paid to the workman employed in the performance of the Contract, are included in this Project Manual.

The Contract shall specifically provide the Contractor pay no less than the wage rates as determined in the decision of the Secretary of Labor and Industry, and shall comply with the conditions of the Pennsylvania Prevailing Wage Act approved August 15, 1961 (Act No. 442), as amended August 9, 1963 (Act No. 342), and the Regulations issued pursuant thereto, to assure the full and proper payment of said rates.

2. The Contract shall contain the stipulation that such workmen shall be paid no less than such general Prevailing minimum wage rates and such other provisions to assure payment thereof as heretofore set forth in this section.

3. The Contract provisions shall apply to all work performed on the contract by the Contractor and to all work performed on the contract by all Subcontractors.

4. The Contractor shall insert in each of their subcontracts all of the stipulations contained in these required provisions and such other stipulations as may be required.

5. The Contract shall provide that no workmen may be employed on the public work except in the classifications set forth in the decisions of the Secretary of Labor and Industry. In the event that additional or different classifications are necessary, the procedure set forth in Section 7 of these Regulations shall be followed.

6. The Contract shall provide that all workmen employed or working on the public work shall be paid unconditionally, regardless of whether any contractual relationship exists or the nature of any contractual relations which may be alleged to exist between any Contractor, Subcontractor and workmen.

7. The Contract shall provide that the Contractor and each Subcontractor shall post for the entire period of construction, the wage determination decisions of the Secretary of Labor and Industry, including to effective date of any changes thereof, in a prominent and easily accessible place or places used by them to pay workmen their wages. The posted notices of wage rates must contain the following information:

a. Name of Project

b. Name of public bid of which it is being constructed

c. The crafts and classifications of workmen listed in the Secretary's general Prevailing Minimum Wage Rate determination for the particular project.

d. The general Prevailing Minimum Wage Rates determined for each craft and classification and the effective date of any changes.

e. The statement advising workmen that if they have been paid less than the general prevailing minimum wage rate for their job classification or that the Contractor and/or subcontractor are not complying with the Act or these Regulations in any manner whatsoever, they may file a protest in writing with the Secretary of Labor and Industry within three (3) months of the date of the occurrence, objecting to the payment to any Contractor to the extent of the amount or amounts due or to become due to them as wages for work performed on the Public Work Project. Any workmen paid less than the rate specified in the contract, shall have civil right of action for the difference between the wage paid and the wages stipulated in the contract, which right of action must be exercised within six (6) months from the occurrence of the event creating such right.

8. The Contract shall provide that the Contractor and all Subcontractors shall keep an accurate record showing the name, craft and/or classification, number of hours worked per day and the actual hourly rate of wage paid (including employee benefits) to each workman employed by them in connection with the public work and such record must include any deductions from each workman. The record shall be preserved for two years from the date of payment and shall be open at all reasonable hours to the inspection of the public body awarding the Contract and to the Secretary of Labor and Industry or his duly authorized representatives.

9. The Contract shall provide that apprentices shall be limited to such members as shall be in accordance with a bona fide apprenticeship program registered with and approved by the Pennsylvania Apprenticeship and Training Council and only apprentices whose training and employment are in full compliance with the provisions of the Apprenticeship and Training Act approved July 14, 1961 (Act No. 304) and the Rules and Regulations issued pursuant thereto shall be employed on the public work Project. Any workman using the tools of a craft who does not qualify as an apprentice within the provisions of this subsection shall be paid the rate predetermined for journeymen in that particular craft and/or classification.

10. Wages shall be paid without any deductions except authorized deductions. Employers not parties to a contract requiring contributions for employee benefits which the Secretary of Labor and Industry has determined to be included in the general Prevailing Minimum Wage Rate shall pay the monetary equivalent thereof directly to the workman.

11. Payment of compensation to workmen for work performed on public work on a lump sum basis, or a piece work system, or a price certain

for the completion of a certain amount of work, or the production of a certain result shall be deemed a violation of the Act and these Regulations, regardless of the average hourly earnings resulting there from.

12. The provisions of the Act and these Regulations shall be incorporated by reference in the contract.

E. Nondiscrimination

1. According to 62 Pa. C.S.A. 3701, the Contractor agrees that:

a. In the hiring of employees for the performance of work under the contract or any subcontract, no Contractor, subcontractor, or any person acting on behalf of the Contractor or subcontractor shall by reason of gender, race, creed or color discriminate against any citizen of this Commonwealth who is qualified and available to perform the work to which the employment relates.

b. No Contractor or subcontractor or any person on their behalf shall in any manner discriminate against or intimidate any employee hired for the performance of work under the contract on account of gender, race, creed or color.

c. The contract may be canceled or terminate by the government agency, and all money due or to become due under the contract may be forfeited for a violation of the terms or conditions of that portion of the contract.

F. Human Relations Act

1. The provisions of the Pennsylvania Human Relations Act, Act 222 of October 27, 1955 (P.L. 741 (43 P.S. Section 951, et seq.) of the Commonwealth of Pennsylvania prohibit discrimination because of race, color, religious creed, ancestry, age, sex, national origin, handicap or disability by employees, employers, employment agencies, labor organizations, Contractors and others. The Contractor shall agree to comply with the provisions of this Act as amended that is made part of the Specifications. Your attention is directed to the language of the Commonwealth's nondiscrimination clause in 16 Pa. Code 349.101.

G. Competent Workmen

No personal shall be employed to do Work under such contract except competent and first class workmen and mechanics. No workmen shall be regarded as competent, first class, within the meanings of this act except those who are duly skilled in their respective branches of labor, and who shall be paid that such rates and or such hours worked as shall be established and current rate of pay for such hours by employers of organized labor in doing of similar work in the City where work is being done.

H. Steel and Steel Products Procurement

In accordance with Act 3 of the 1978 General Assembly of the Commonwealth of Pennsylvania approved March 3, 1978, and as amended by Act 161 of 1982, and by Act No. 1984-44, if any steel or cast iron products are to be used or supplied in the performance of this Contract only steel or cast iron products produced in the United States as defined therein, shall be used or supplied in the performance of the Contract or any contracts thereunder.

I. Taxes

1. Contractor shall be responsible for and shall pay all applicable sales, use, excise or other taxes required by law on all materials, tools, apparatus, equipment, fixtures, services, incidentals, or otherwise which may be purchased or used in connection with the Work or portions thereof. The Bid shall be made in accordance with such laws and shall include all applicable taxes in the Bid amount.

2. Notwithstanding the foregoing, however, the City is exempt from sales and/or use tax in Pennsylvania on certain transactions. The City shall have no obligation to produce a tax clearance certificate evidencing its tax exemption status but may do so if requested. Contractor and all Subcontractors shall comply with the requirements in the General Conditions pertaining to the payment of taxes.

J. No Cash Allowance

No cash allowances for any purpose are included in the Specifications for this Project.

K. Standard of Quality

The various materials and products specified in the Contract Documents by name or description are given to establish a standard of quality and cost for bid purpose. Accordingly, no substitutions are permissible where the Contract Documents provide for: (I) 3 products and/or manufacturers: (ii) 1 or equal products and/or manufacturers; or (iii) proprietary manufacturers.

M. Asbestos -Free Certification

The successful Contractor shall certify that "no asbestos containing materials (ACM) and no "asbestos containing building materials" (ACBM) in this installation.

N. No Drugs or Alcohol on the Site

The Project Site is governed by the City's Policy on Drug-Free Facilities. Contractor's employees will abide by the same prohibitions as are applicable to the City's employees. Any person discovered on-site with/or under the influence of any illegal drugs or alcoholic beverages will be told to leave the Site by each Prime Contractor, shall not return, and will be prosecuted by law. Each Prime Contractor shall be responsible to monitor and enforce this issue with his own employees and those of the Subcontractors.

O No weapons on Site

Any person discovered on-site possessing a weapon will be told to leave the Site by each Prime Contractor, shall not return, and will be prosecuted by law, if appropriate. Each Prime Contractor shall be responsible to monitor and enforce this issue with his own employees and Subcontractors.

P.. No smoking On the Site

Any provision of federal and state law are therefore applicable to Contractor or Contractor's employees and prohibits any tobacco use on building grounds.

Q. Pollution Control - Preservation of Natural Resources

1. In compliance with Act No. 247 of the 1972 Session of General Assembly of the Commonwealth of Pennsylvania, Federal and/or state statues, rules or regulations dealing with the prevention of environmental pollution of preservation of public natural resources that may affect the Specifications. The Contractor shall fully comply with the latest revisions of said Acts and shall ensure compliance by all of the Contractor's Subcontractors.

2. All demolition and construction waste materials and/or rubbish shall be disposed of off the Project site. All demolition and construction waste materials and/or rubbish shall be disposed of in accordance with the latest Pennsylvania Solid Waste Laws at an approved facility.

3. The Contractor shall obtain from the PA Department of Environmental Protection an approved plan for soil erosion control. The plan is to be considered as part of the Contract Documents. The General Contractor shall maintain the plan on the Project site at all times and shall be responsible for complying with all laws, regulations and guidelines of the Department.

R. Proposal Insurance Requirements

By submitting a Proposal, the proposer agrees that it now carries or will carry throughout the term of any Contract generated as a result of this Request for Proposal, at a minimum, the following types and amounts of insurance:

Workers' Compensation	Statutory
Employer's Liability	\$500,000
Professional Liability	\$1,000,000 each occurrence \$1,000,000 aggregate
Comprehensive General Liability (including Blanket Contractual Liability Insurance)	
Bodily Injury	\$1,000,000 each person \$1,000,000 each occurrence \$1,000,000 aggregate
Property Damage	\$500,000 each occurrence
Personal Injury	\$500,000
Comprehensive Automobile Liability	
Bodily Injury	\$300,000 each person \$500,000 each occurrence
Property Damage	\$500,000 each occurrence

Certificates of Insurance shall be furnished to the City of Scranton upon request.

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, _____

(hereinafter called the "Principal") as Principal, and _____
(hereinafter called "Surety") as Surety, are held and firmly bound unto **City of Scranton**
(hereinafter called the "Obligee") as Obligee, in the sum of _____
_____ (\$ _____)DOLLARS, lawful money of the
United States of America; for payment which we bind ourselves and each of our
respective heirs, legal representatives, successors and assigns, jointly and which we bind
ourselves and each of our respective heirs, legal representatives, successors and assigns,
jointly and severally, by these presents on this day of _____, 20 _____

WHEREAS, said Principal is herewith submitting to the Obligee, a proposal to perform
Replace HVAC System of the Public Safety Building, pursuant to plans, specifications
and other Contract Documents incorporated into said proposal by reference; and it is a
condition of the Obligee's receipt and consideration of said proposal that the proposal be
accompanied by bid security to be held by the Obligee on terms embodied herein.

NOW, THEREFORE, the condition of this obligation is that if said Principal shall timely
furnish Performance Bond, Payment Bond, and Insurance Certificates to the Obligee
upon the Obligee's delivery to the Principal of notice of intention to accept his proposal
and to make a formal award of contract to hi, and shall enter into such contract, all as
required by said Contract Documents, or the Obligee shall reject all bids submitted in
association with the aforementioned project or work, then this obligation shall be void;
otherwise it shall remain in full force and the Principal and Surety will pay to the Obligee
the difference, not to exceed the penalty hereof, between the amount specified in said
proposal and such larger amount for which the Obligee may in good faith contract with
another party to perform the work covered by said proposal, plus any advertising,
architectural, legal and other lawfully recoverable costs incurred by the Obligee by reason
of the Principal's default.

Payment under this Bond shall be made within fifteen (15) days of written notice to the
Surety of the Bidder's default.

The Surety shall cause to be attached hereto a current and effective Power of Attorney
evidencing the authority of the person executing this Bond, on the Surety's behalf to
execute, seal and deliver this Bond and thereby bind the Surety.

Any suit or action under this Bond shall be commenced only in the Court of Common
Pleas of Lackawanna County, Pennsylvania.

BID BOND
Scranton Public Safety Building

IN WITNESS WHEREOF the Principal and Surety, intending to be legally bound, have executed this bond the day and year aforementioned.

(Principal)

(Seal)

(Witness)
(Title)

(Witness)

(Surety)

(Title)

BID FORM

FOR

CONTRACT NAME **Replace HVAC System of the Public Safety Building**

DATE: _____

For the

**CITY of SCRANTON
340 North Washington Avenue
Scranton, PA 18503**

Proposal of (Name) _____
(Address) _____
(Telephone) _____
(Contact Person) _____

**City of Scranton
Office of the City Controller
2nd Floor
340 North Washington Avenue
Scranton, PA 18503**

In conformity with the Plans and Specifications prepared by **Peters Design Group, Inc, 1415 Price Street, Scranton, PA 18504**, and after an examination of the site and the Bidding Requirements and other Contract Documents, the undersigned submits this proposal and encloses herewith bid security in an amount of not less than ten percent (10) of the total of the hereinafter stated Base Bid, made payable to and indemnifying the "**City of Scranton**" Scranton, PA which is understood will be held by the City, as security as provided in the Instruction to Bidders. If this proposal of any part thereof is accepted by the City, and the undersigned shall fail to furnish approved bonds, execute the Agreement and otherwise comply with the Bidding Requirements, then the City may proceed to collect against the bid security as provided in the Instructions. Should the City fail to make an award, then the City may proceed to collection against the bid security as provided in the Instructions. Should the City fail to make an award on this project through no fault or failure on the part of the Bidder, then the City shall return said bid security.

It is hereby certified that the undersigned is the only person(s) interested in this proposal as principal, and that the proposal is made without collusion with any person, firm or corporation. The Bidder submits herewith, as such, a Non-Collusion Affidavit in accordance with the provisions of the Pennsylvania Anti-Bid Rigging Act of October 28, 1983.

Bidder hereby agrees to execute the Agreement, to furnish surety company bonds in the form incorporated in the Contract Documents in the amount of one-hundred percent (100%) of the contract price for the Performance Bond and Labor and Material Payment Bond, and to furnish the other documents set forth in the Instructions to Bidders, and to begin work in accordance with the Notice to Proceed.

Bidder guarantees that, if awarded the contract, he will furnish and deliver all materials, tools, equipment, tests, transportation, secure all permits and licenses, do and perform all labor, superintendence and all means of construction pay, all fees and do all incidental work, and to execute, construct and finish, in an expeditious, substantial and workmanlike manner, in accordance with the plans and specifications to the complete satisfaction and acceptance of the City, for the work of this Contract, for the **Replace HVAC System of the Public Safety Building**

It is understood that the City, reserves the right to reject any or all proposals, or part thereof, or items therein and to waive technicalities required for the best interest of the City. It is further understood that competency and responsibility of bidders will receive consideration before the award of the contract.

Bidder submits this proposal with the understanding that the work shall be substantially completed within thirty (30) calendar days from the date of Notice to Proceed, and that time for completion of the work of all contracts shall be considered as of the essence of this Contract.

The bidder agrees that he will not assign his bid or any of the rights or interests thereunder without the written consent of the City. In the event of a discrepancy between the verbiage (words) and numbers entered here below, the verbiage shall govern.

The following is a list of documents which are to be included with this bid:

1. Bid Security
2. Affirmative Action Certification
3. Certificate of Non-Segregated Facilities
4. Non-Collusion Affidavit
5. Disclosure by Firm or Contractor

THE BID, as called for, is submitted as follows:

BASE BID

For all Construction Work, complete, as shown and specified in the Contract Documents as associated with the HVAC System the lump sum of:

Dollars

(Complete the amount of the bid in words)

(\$ _____)

(Complete the amount of the bid in numerals)

BULLETINS WILL BE ISSUED, IF REQUIRED, TO CONTAIN THE FOLLOWING:

ADDENDA

In submitting this Bid, I acknowledge receipt of the following Addenda, and the cost, if any, of such revisions has been included in the bid sum:

Addendum No. Dated Addendum No. Dated Addendum No. Dated

In accordance with Subparagraph 1.14T of the Instructions to Bidders, each Addendum issued becomes part of the Contract without regard to whether noted here.

Signature Pages to follow

SIGNATURES

Name of Bidder (Printed)

Signature of Bidder

Witness

Business Name _____

Business Address _____

Non-Collusion Affidavit of Prime Bidder

STATE OF _____

COUNTY OF _____

_____, being first duly sworn,deposes and says that:

1. He is _____
(Owner, partner, officer, representative or agent)

of _____ , the Bidder that has submitted the bid;
2. He is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid;
3. Such Bid is genuine and is not a collusive or sham Bid;
4. Neither the said Bidder nor any of its officers, partners, owners, agents, Representatives, employees or parties in interest, including this affiant, has in any way colluded, conspired, connived or agreed, directly or indirectly with any other Bidder, firm or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such Contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other Bidder, or to Bidder, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against the City of Scranton (Local Public Agency) or any person interested in the proposed Contract; and;
5. The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the bidder or any of its agents, representatives, owners, employees or parties in interest, including this affiant.

Non-Collusion Affidavit
Signature Page

Signed _____

(TITLE)

SUBSCRIBED AND SWORN TO BEFORE ME

THIS _____ DAY OF _____
_____, 20_____

(TITLE)

MY COMMISSION EXPIRES _____
_____, 20_____

Affirmative Action Certification

During the term of this contract, Bidder agrees as follows:

1. Bidder shall not discriminate against any employee, applicant for employment, independent contractor or any other person because of race, color, religious creed, ancestry, national origin, age, sex or handicap. Bidder shall take affirmative action to insure that applicants are employed, and that employees or agents are treated during employment, without regard to their race, color, religious creed, ancestry, national origin, age, sex or handicap. Such affirmative action shall include, but is not limited to the following: employment, upgrading, demotion or transfer; recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training. Bidder shall post in conspicuous places, available to employees, agents, applicants for employment, and other persons, a notice to be provided by the contracting agency setting forth the provision of this affirmative action certification.
2. Bidder shall, in advertisements or requests for employment placed by it or on its behalf, state all qualified applicants will received consideration for employment without regard to race, color, religious creed, ancestry, national origin, age, sex or handicap.
3. Bidder shall send each labor union or workers' representative with which it has a collective bargaining agreement to other contract or understanding, a notice advising said labor union or worker's representative of its commitment to this affirmative action certification. Similar notice shall be sent to every other source of recruitment regularly utilized by bidder.
4. It shall be no defense to a finding of noncompliance with this affirmative action certification that bidder has delegated some of its employment practices to any union, training program, or other source of recruitment which prevents it from meeting its obligations. However, if the evidence indicates that the bidder was not on notice of the third-party discrimination or made a good faith effort to correct it, such a factor shall be considered in mitigation in determining appropriate sanctions.
5. Where the practices of a union or of any training program or other source of recruitment will result in the exclusion of minority group persons, so bidder will be unable to meet its obligations under this affirmative action certification, bidder shall then employ and fill vacancies through other affirmative action employment procedures.
6. Bidder shall comply with all state and federal laws prohibiting discrimination in hiring or employment opportunities. In the event of bidder's noncompliance with affirmative action certification of this contract or with any such laws, this contract may be terminated or suspended, in whole or in part, and bidder may be declared temporarily ineligible for further City of Scranton contracts, and other sanctions may be imposed and remedies invoked.
7. Bidder shall furnish all necessary employment documents and records to, and permit access to its books, records, and accounts by, the City of Scranton Department of Business Administration, for purposes of investigation to ascertain Compliance with the provision of this certification. If bidder does not possess documents or records reflecting the

necessary information requested, it shall furnish such information on reporting forms supplied by the City of Scranton Department of Business Administration.

8. Bidder shall actively recruit minority subcontractors or subcontractors with substantial minority representation among their employees.
9. Bidder shall include the provisions of this affirmative action certification in every subcontract, so that such provisions will be binding upon each subcontractor.
10. Bidder's obligations under this clause are limited to the bidder's facilities within Pennsylvania, or where the contract is for purchase of goods manufactured outside of Pennsylvania, the facilities at which such goods are actually produced.

DATE: _____

(Name of Bidder)

BY _____

TITLE _____

Certificate of Non-Segregated Facilities

The bidder certifies that he does not maintain or provide for his employees and segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location under his control where segregated facilities are maintained. The Bidder certifies further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location under his control where segregated facilities are maintained. The Bidder agrees that a breach of this certification will be a violation of the Equal opportunity clause in any contract resulting from acceptance of his bid. As used in this certification, the term "segregated Facilities," means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing directive or are in fact segregated on the basis of race, color, religion, or national origin, because of habit, local custom, or otherwise. The Bidder agrees that (except where he has obtained identical certifications from proposal sub-contractors for specific time periods) he will obtain identical certifications from proposed sub-contractors prior to the award of sub-contracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity clause, and that he will retain such certification in his files.

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. §1001.

DATE: _____

(Name of Bidder)

BY _____

TITLE _____

Disclosures by Firm or Contractor

I. Included in the proposal shall be a provision for the names and titles of all individuals providing professional services to the City of Scranton. After each name, please provide the responsibilities of that person with regard to the professional services provided to the City of Scranton.

- List the names of any of the above individuals who are current or former officials or employees of the City of Scranton, their position, and dates of employment or public service.

2. Within the past five years, has the firm or contractor made a political contribution to any municipal official or candidate for municipal office in the City of Scranton or to the political party or political committee for whom the solicitation was made.
3. Does the firm or contractor have a direct financial, commercial, or business relationships with any municipal official or employee of the City of Scranton. With regard to every municipal official for which the answer is yes, identify that individual and provide a summary description of that relationship.
4. Within the past five years, has the firm or contractor conferred any gift of more than nominal value to any municipal official or employee of the City of Scranton within their capacity as a municipal official or employee of the City? A gift includes money, services, loans, travel, and entertainment, at value or discounted value.
5. Regarding the provision of professional services to the City of Scranton, are you aware of any conflicts of interest, whether apparent, potential, or actual, with respect to any officer, director, or employee of the firm or contractor and officials or employees of the City of Scranton. If yes, please provide a summary written explanation of the circumstances, which you believe provide a basis to conclude that an apparent potential, or actual conflict of interest may exist.

6. Omission of any responses required in questions one through five may result in the disqualification of the proposal.

VERIFICATION

I, _____ hereby state that I am (title) _____ for,

_____ and am authorized to make this verification.

Signature:

Date:

LIST OF DRAWINGS

M-1 Mechanical Floor Plan

M-2 Basement and Second Floor Plan

M-3 Mechanical Schedules

M-4 Piping Schematics

M-5 Mechanical Details

M-6 Radiant Heat Layout

M-7 Mechanical Details & Sequence

End

NOTICE OF AWARD

TO: _____

PROJECT DESCRIPTION Replace HVAC System of the Scranton Public Safety Building.

1. The Owner has considered the Bid submitted by you, **dated** _____, for the above described work, in response to its Invitation to Bid and Instructions to Bidders.
2. You are hereby notified that your bid in the following amount is accepted:

A. **Lump Sum Base Bid:** \$ _____
3. You are required by the Invitation to Bid to execute the Acceptance of Notice of Award immediately and to execute the Agreement between Owner and Contractor and sign Stipulation Against Liens within ten (10) days hence.
4. If you fail to execute said Agreement within ten (10) days from the date of this Notice, said Owner will be entitled to consider all your rights arising out of the Owner's acceptance of your Bid as abandoned. The Owner will be entitled to such other rights as may be granted by law.
5. Within three (3) days following the execution of the Agreement, you are required to deliver Contractor's Performance and Payment Bond, written on AIA Document A312, each in the amount of 100% of the Contract Sum. The Bonds shall be dated on, or after, the date of the Contract. The attorney-in-fact who executes the required bonds on behalf of the surety shall affix thereto a certified and current copy of the power of attorney.
6. Within three (3) days following the execution of the Agreement, you are required to furnish a Certificate of Contractor's Liability Insurance of the type and amounts specified, including thirty (30) days prior written notice of cancellation.
7. You are required to return an acknowledged copy of this Notice of Award to the Architect/Engineer.

Dated this ____ day of _____, 20 ____.

Owner: City of Scranton

By: _____

Title: _____

OWNER/CONTRACTOR AGREEMENT

THIS AGREEMENT, executed this _____ day of _____ 20____, by and between the

City of Scranton, 340 North Washington Avenue, Scranton, Pennsylvania

18503, hereinafter called the "Owner", and _____
(Name of Company)

of _____ a _____,
(Address of Company) (Form of Organization)

organized under the laws of the State/Commonwealth of Pennsylvania

hereinafter called the "Contractor".

ARTICLE 1 - THE CONTRACT DOCUMENT

The Contract Documents consist of this Agreement between the Owner and the Contractor, the documents identified in the Instructions to Bidders and the General Conditions, Addenda issued prior to execution of this Agreement, and Amendments and other modifications issued subsequent to the execution of this Agreement. These form the Contract, and all are as fully a part of this Agreement, as if attached hereto or repeated herein.

ARTICLE 2 - THE WORK

The Contractor shall perform all of the Work required by the Contract Documents for the **Replace HVAC System of the Public Safety Building**, Lackawanna County, Scranton, as described in the Contract Documents and Addenda.

ARTICLE 3 - DESIGN AND CONSTRUCTION PROFESSIONALS

The Engineer for the Project is **Peters Design Group, Inc.**, main office:

1415 Price Street, Scranton, Pennsylvania 18504, (570) 346-8446.

ARTICLE 4 - TIME OF COMMENCEMENT AND COMPLETION

The work to be performed under this Contract shall be commenced with all off-site and on-site activities required by the Contract Documents after receipt of, and on the date or dates set forth in, the Notice or Notices to Proceed. The Contractor shall complete all contract Work to the satisfaction and approval, in every respect, of Owner, within the overall Contract Time for the Project and within the Completion Dates for each Milestone, for each Phase, and for Substantial and Final Completion, as set forth in the Contract Documents. Contractor agrees that time is of the essence in the performance of this Contract, and that if he shall fail to complete the Work within the times specified for

Substantial Completion of the identified Phases or Milestones or such extensions thereof as shall be granted as herein provided, the Contractor shall pay Owner, as Liquidated Damages and not as a penalty for each such failure, the amounts set forth in Subparagraph 1.13A of the Instructions to Bidders.

ARTICLE 5 - CONTRACT SUM

Owner shall pay the Contractor for the performance of the Work subject to additions and deductions by Change Order in current funds, the Contract Sum of

\$ _____

Dollars (\$ _____) for the Based Bid all as set forth in the General Conditions, Specifications and Drawings of this Contract.

ARTICLE 6 - PROGRESS PAYMENTS

Based upon Applications for Payment submitted by the Contractor, Owner shall make progress payments on account of the contract sum to the Contractor, as provided in the General Conditions of the Contract.

ARTICLE 7 - FINAL PAYMENT

Final payment, constituting the entire unpaid balance of the Contract Sum, shall be paid by Owner to the Contractor after Final Completion of the Work, provided the Work has then been completed, the Contract fully performed, a Final Inspection held, Warranty provided, and a Final Certificate of Payment has been issued, all as set forth in the General Conditions of the Contract.

ARTICLE 8 - MISCELLANEOUS PROVISIONS

- 8.1 Terms used in this Agreement shall have the meanings designated in the Contract Documents.
- 8.2 The Payment and Performance Bonds given by the Contractor conditioned upon the faithful performance of the Contract; the payment of labor, material, equipment rental and public utility service claims; and the correction of defective installation or non-conforming materials and equipment are attached hereto and made a part hereof. However, no third party shall acquire any rights against Owner under the Contract Documents.
- 8.3 The Contractor agrees to abide and be bound by the Applicable Laws relating to and regulating wages to be paid and the hours and conditions of employment and relating to equal employment opportunity.

8.4 The Contractor agrees to be bound by the Non-Discrimination Clause set forth in and to the contract documents.

IN WITNESS WHEREOF, the City of Scranton and the Contractor have caused these presents to be executed on the day and year above written.

City of Scranton
("Owner")

Attested:

Title _____

Title _____

For Individual Bidder:

Name of Bidder (Printed)

Witness

(Signature of Individual)

Trading and doing business as: * _____

Business Address _____

* If fictitious or trade name is employed in conduct of business, complete, by deletion as appropriate, the following statement:

Foregoing fictitious or trade name (has) (has not) been registered by the individual proprietorship under Pennsylvania Law.

For Partnership Bidder

* _____
(Name of Partnership)

Name of General Partner(Printed)

witness

Business Address _____

The partners constituting the partnership herein named are:

Partner: _____ Address: _____

Partner: _____ Address _____

Partner: _____ Address _____

Partner: _____ Address _____

(Add addition lines for the names and address of additional Partners, if there are more than four Partners in the Partnership, by Attaching an addition page or pages to this Bid).

* If fictitious or trade name is employed by the partnership in conduct of its business, insert name here:

Next, complete, by deletion as appropriate, the following statement:

Foregoing fictitious or trade name (has) (has not) been registered by the partnership under Pennsylvania Law.

For Corporate Bidder

(Name of Contractor)

(Print name of Corporation)

Attest: _____
Signature of Secretary
Secretary, Treasurer, Asst.
Treasurer or other authorized
representative.**

By: _____
Signature of President, Vice
President or other authorized
representative*.

Print name of Representative

Print name of representative

* If a representative other than the President or a Vice President of the Corporation signs this Bid on its behalf, then attached a valid corporate resolution or other appropriate proof, dated prior to or as of the date of the Bid, evidencing authority to execute this Bid on behalf of the Corporation.

** If a representative other than the Secretary, an Assistant Secretary, the Treasurer or an Assistant Treasurer attest to the signature of the corporate representative, then attached a valid corporate resolution or other appropriate proof, dated prior to or as of the date of the Bid, evidencing authority to attest to the execution of this Bid on behalf of the Corporation.

(1) Complete the following statement:

The Corporation has been organized and is existing under laws of the State/Commonwealth of _____.

(2) If a Corporation has been organized under laws of a State other than those of the Commonwealth of Pennsylvania, complete, by deletion as appropriate, the following statement:

The Corporation (has) (has not) been granted a certificate of authority to do business in the Commonwealth of Pennsylvania under applicable laws.

(3) If Corporation has been organized under laws other than those of the Commonwealth of Pennsylvania and has NOT been granted a certificate of authority, complete, by deletion as appropriate, the following statement:

The Corporation (has) (has not) applied for a certificate applied for a certificate of authority to do business in the Commonwealth of Pennsylvania and (has) (has not) attached a copy of the pending application to this Bid.

Limited Liability Company (LLC) Bidder

(Name of Contractor)

(Print Name of Limited Liability Company)

Attest: _____
Signature of Authorized
Representative*

By: _____
Signature of Authorized Representative

* The individual attesting verifies and represents that the person whose signature is affixed to this Bid on behalf of the Limited Liability Company (LLC) is duly authorized in accordance with the representations herein set forth.

** Check the box with applies to this Bid:

_____ The Certificate or Organization provides that LLC is to be managed by managers, and this Bid has been executed by a Manager fully authorized by the Certificate, by the Operating Agreement and by Resolutions of the LLC. Copies of the relevant documents are provided with the Bid or can be provided upon request within three(3) working days.

_____ The Certificate or Organization does not provide that LLC is to be managed by managers, and this Bid has been executed by a Member fully authorized by the Certificate, by the Operating Agreement and by Resolutions of the LLC. Copies of the relevant documents are provided with the Bid or can be provided upon request within three (3) working days.

_____ This Bid has been executed by a representative of the LLC who is not a Manager or a Member of the LLC, and instead who holds the office of _____(insert title), and the execution of this Bid is fully authorized by the Certificate, by the Operating Agreement and by Resolutions of the LLC. Copies of the relevant documents are provided with the Bid or can be provided upon request within three (3) working days.

The Bidder and the individuals signing and attesting to the execution of this document further represent that (1) execution of the Bid is carrying on business in the usual way; (2) the LLC authorizes the execution of this Bid even if execution and submission of this Bid is not carrying on business in the usual way for the LLC; and (3) to the best of the individuals' information and belief, the Owner has no knowledge of the Member's or the Manager's lack of actual authority, or of any applicable and relevant restriction on his or her authority.

Complete the following statement:

The LLC has been organized and is existing under laws of the State/Commonwealth of _____.

If the LLC has been organized under laws of the State other than those of the Commonwealth of Pennsylvania, complete, by deletion as appropriate, the following statement:

The LLC (has)(has not) been granted a certificate of authority to do business in the Commonwealth of Pennsylvania under applicable laws.

If the LLC has been organized under laws other than those of the Commonwealth of Pennsylvania and has NOT been granted a certificate of authority, complete, by deletion as appropriate, the following statement:

The LLC (has) (has not) applied for a certificate of authority to do business in the Commonwealth of Pennsylvania and (has (has not) attached a copy of the pending application to this Bid.

END of DOCUMENT

NOTICE TO PROCEED

RE: **Replace HVAC System of the Public Safety Building for the City of Scranton.**

TO: _____ Date: _____

You are hereby notified to commence work in accordance with the Agreement dated _____, 20_____, on or before _____, 20_____, with the date of **Substantial Completion** being _____ 20_____

Owner: City of Scranton
By: _____
Title: _____

Acceptance of Notice to Proceed

Receipt of the above Notice to Proceed is hereby acknowledged by

Contractor Name

this is the _____ day of _____ 20_____

By: _____

Title: _____

GENERAL CONDITIONS

General Conditions of the Contract shall be as set forth in AIA Document A201, "General Conditions of the Contract for Construction," 1997 edition, and this publication shall by reference become part of the Contract Documents.

Articles contained in this document include:

1. General Provisions
2. Owner
3. Contractor
4. Administration of the Contract
5. Subcontractors
6. Construction by Owner or by Separate Contractors
7. Changes in the Work
8. Time
9. Payments and Completion
10. Protection of Persons and Property
11. Insurance and Bonds
12. Uncovering and Correction of Work
13. Miscellaneous Provisions
14. Termination or Suspension of the Contract

Any Bidder not familiar with this document may examine a copy at the Architect's/Engineer's office during normal working hours.

SUPPLEMENTARY GENERAL CONDITIONS

The following items supplement, modify, change, delete from, or add to the "General Conditions of the Contract for Construction," AIA Document A201, 14th edition, 1997. Where any article of the General Conditions is modified or any paragraph, subparagraph, or clause thereof is modified or deleted by these supplements, the unaltered provisions of that article, paragraph, or clause shall remain in effect. If there are any instances where the Supplementary General Conditions conflict with standard Federal documents included herein, the Federal documents shall supersede.

1.1 ARTICLE 1, GENERAL PROVISIONS

A. Modifications to Paragraph 1.1, BASIC DEFINITIONS:

1. Revise the last sentence of Subparagraph 1.1.1 as follows:

- a. The Contract Documents shall also consist of the Form of Proposal and the Invitation to Bid.

B. Modification to Paragraph 1.2, EXECUTION, CORRELATION, AND INTENT:

1. Add the following sentence to Subparagraph 1.2.2:

- a. Before submitting Proposal for his work, the Contractor will be held to have examined the premises and satisfied himself as to the existing conditions under which he will be obliged to operate, or that will in any way or manner affect the work under this Contract. No allowance shall be made subsequently in this connection in behalf of the Contractor for any error or negligence on his part.

2. Add Paragraph 1.2.6, EXECUTION OF CONTRACT DOCUMENTS, as follows:

- a. It shall be understood that the Architect's/Engineer's drawings are diagrammatic and that it is the Contractor's responsibility to exactly locate in the field the work to be accomplished.

3. Add Paragraph 1.2.7, CONTRACTOR'S OBLIGATION TO REVIEW DOCUMENTS FOR ERROR:

- a. The Architect acknowledges fallibility and herewith places the obligation on the Contractor to call to the Architect/Engineer's attention any part of the Contract Documents, which is obscure, contradictory or would in some way prevent completion of the work as intended. This shall be done prior to signing of a Contract, or thereafter, the A/E and Owner shall evoke their full authority to interpret the Contract Documents, and the Contractor shall be bound by such intent, as spelled out in the General Conditions.

4. Add Paragraph 1.2.8, STANDARD SPECIFICATIONS, as follows:
 - a. All reference to standard designated specifications or associations for tests, materials, or Federal Specifications, will be enforced. When the Contractor is unfamiliar with such Specifications, he must bear the burden of replacement of materials or labor due to non-conformance.

5. Add Paragraph 1.2.9, as follows:
 - a. Substitutions - Whenever a material, article or piece of equipment is identified on the Drawings, or in the Specifications by reference to manufacturers' or vendors' names, trade names, catalog numbers or the like, it is so identified for the purpose of establishing a standard, and any material, article, or piece of equipment of other manufacturers or vendors which will perform adequately the duties imposed by the general design will be considered equally acceptable provided the material, article, or piece of equipment so proposed is, in the opinion of the Architect/Engineer, of equal substance, appearance and function. It shall not be purchased or installed by the Contractor without the Architect's written approval.
 - b. "Satisfactory evidence" of compliance with material specifications shall consist of certified documentation by an independent source approved by the A/E.

6. Add the following Paragraph 1.2.10:
 - a. Approved Equal - In all cases where the choice of more than one make or type of article or material is specified, the final selection rests with the Owner and Architect/Engineer. Where the Specifications call for a stipulated item "or approved equal," the Contractor shall submit his bid based upon the stipulated item(s). "Approved equal" substitutions where applicable shall be proposed to the A/E for consideration by the successful low bidder after award of contract and prior to purchase and/or installation. Satisfactory evidence of material specification compliance, testing agency results, code approvals, Federal Specification standards, optional accessories, available finishes, samples, etc., all dates required for direct comparison of the proposed substitution to the specified item shall be verified by the Contractor prior to submittal by the Contractor for A/E evaluation. The A/E's decision shall be final, and the Contractor shall not proceed with the proposed substitution without the A/E's written approval. The phrase "equal to" or "similar to" shall carry the same intent as "or approved equal."

1.2 ARTICLE 3 - CONTRACTOR

1. Add the sentences below to Subparagraph 3.2.2:
 - a. Before ordering any material or doing any work, the Contractor shall verify all measurements at the building and shall be responsible for the correctness of same. No extra compensation will be allowed on account of difference between actual dimensions and measurements and those indicated on the drawings. Any significant difference which may be found shall be submitted to the Architect for consideration before proceeding with the work.

2. Add the sentences below to Subparagraph 3.3.1:
 - a. The Contractor's supervision and procedures shall include the responsibility for calling pre-construction planning session(s) to be attended by all Contractors, including those indirectly under the Owner. He shall coordinate and mesh the Contractor's means, methods, and techniques, sequence and procedures, with each other to his own, so that each provide for the physical and scheduling needs of the other. No reimbursement will be made by the Owner because of lack of proper coordination or cooperation between contractors which results in additional cost to one or any.
 - b. The Contractor shall inform the Architect/Engineer of any delay, due to any cause, which affects the progress of any work and for anything which affects the quality of the work.

3. Add Paragraph 3.12.12, as follows:
 - a. Shop Drawings or Samples: The Contractor shall send Three (3) sets of Shop Drawings to the A/E, who will retain two (2) copies.
 - (1) All shop drawings submitted must bear the stamp of approval of the Contractor as evidence that the Drawings have been checked by the Contractor. **ANY DRAWINGS SUBMITTED WITHOUT THIS STAMP OF APPROVAL WILL NOT BE CONSIDERED AND WILL BE RETURNED TO THE CONTRACTOR FOR PROPER RESUBMISSION.**

4. Modification to Paragraph 3.18, INDEMNIFICATION; add the following Subparagraph 3.18.4:
 - a. Contractor shall save the Owner harmless from any and all claims, damages, liabilities, and loss growing out of injury to or death of Contractor's employees or any other person while on or about Owner's

premises in connection with any matters relating to the performance of this Contract.

5. Modification to Paragraph 3.5 WARRANTY; add sentence below to Subparagraph 3.5.1:
 - a. The guarantee for each trade shall be for a period of one year from the date of the final Certificate of Payment. Should the guarantee required under any trade section of the specifications be for a period of more than one year, the Contractor's guarantee shall, with respect to such trade or trades, be for such longer period.

1.3 ARTICLE 5 - SUBCONTRACTORS

1. Add Paragraph 5.1.3, as follows:
 - a. Definition: When used throughout the trade sections of the specifications, the term "Contractor" is intended to mean any Contractor, Subcontractor, Sub-Subcontractor or Supplier who performs all or any part of the work in that section.
2. Add Paragraph 5.3.2, as follows:
 - a. All Subcontractors, Sub-Subcontractors, and Suppliers shall comply with the General Conditions, the Supplementary General Conditions, and all applicable portions of Division-1 - General Requirements, as outlined at the beginning of each trade section.
3. The following Paragraph 5.3.3 shall be added:
 - a. All Subcontractors, whether under separate contract with the Owner or the General Contractor, are to cooperate and consult with each other so that as a whole the work shall be finished complete and perfect, without interference, one of its kind, and to avoid hindering each other or delaying the progress of the work.

1.4 ARTICLE 9 - PAYMENTS AND COMPLETION

1. Add the following to paragraph 9.3.2:
 - a. Payment of stored construction equipment/materials on or off-site will not be made to the Contractor until all of the following has been completed and approved:
 - (1) The Contractor has submitted a copy of the paid invoice from the supplier for material/equipment stored on or off-site.
 -) If storage is required off-site for construction materials/equipment, then the following additional requirements apply:
 - (a) The Contractor must request, in writing, approval from the Owner to store materials/equipment off-site.
 - (b) Certificates of insurance for off-site storage of construction materials/equipment must be submitted by the Contractor, including insurance coverage to transport the materials/equipment to the construction site.
 - (c) The Owner's representative shall visit the location of any off-site stored materials/equipment and take photographs. This visitation shall be at the Contractor's expense, including all costs for transportation, lodging, and meals where applicable.
 - (d) Payment of off-site stored construction materials/equipment will not be made until all the above has been completed and approved.

1.5 ARTICLE 10 - PROTECTION OF PERSONS AND PROPERTY

1. Add Paragraph 10.2.8, as follows:
 - a. It shall be the duty and responsibility of the Contractor performing cutting operations using welding or torching methods, to comply with the safety provisions of the National Fire Protection Association's National Fire Codes pertaining to such work and the Contractor shall be responsible for all damages resulting from a failure to so comply.

1.6 ARTICLE 11 - INSURANCE AND BONDS

1. Add the following Subparagraph 11.1.4 to Paragraph 11.1 - CONTRACTOR'S LIABILITY INSURANCE:

a. During the term of the Contract, the Contractor and each Subcontractor shall, at their own expense, purchase and maintain the following insurance in companies properly licensed in the Commonwealth of Pennsylvania and satisfactory to the Owner.

(1) Workmen's Compensation:

- (a) Statutory as required by law.
- (b) Employer's Liability---\$500,000 each accident

(2) Comprehensive General Liability including coverage for direct operations, sublet work, elevators, contractual liability, completed operations, and "XCU" coverage with limits not less than those stated below:

- (a) Personal Injury Each Person \$500,000
 Each Occurrence \$500,000
- (b) Bodily Injury Each Person \$1,000,000
 Each Occurrence \$1,000,000
- (c) Property Damage Each Occurrence \$500,000
 (Broad Form) Aggregate \$500,000

(3) Comprehensive Automobile Liability Insurance including coverage for owned, non-owned, and hired vehicles with limits not less than those stated below:

- (a) Bodily Injury Each Person \$300,000
 Each Accident \$500,000
- (b) Property Damage Each Occurrence \$500,000

Liability insurance may be arranged by comprehensive general liability and comprehensive automobile liability policies for the full limits required; or by a combination of underlying comprehensive liability policies for lesser limits with remaining limits provided by an Excess or Umbrella Liability Policy.

2. Add the following Subparagraph 11.4.3 to Paragraph 11.4:
 - a. Within three (3) days following the date of execution of the Contract, the Contractor shall deliver to the Owner/Architect Surety Bond in the amount of \$5,000 as a guarantee to furnish services as specified. The Bonds shall be dated on or after the date of the Contract.
3. Add paragraph set forth below to Article 11.
 - a. 11.5 INSURANCE CANCELLATION 11.5.1 - All Contractors' liability insurance, Owner's liability insurance and property insurance shall contain a thirty (30) day prior written notice of cancellation of any policy.

1.7 ARTICLE 12 - MISCELLANEOUS PROVISIONS

1. Add Paragraph 13.5.7 as follows:
 - a. Inspection and Tests: When tests not specified in the Contract Documents are required by the Owner to establish compliance with the Contract Documents, the Contractor shall pay cost of services when tests indicate non-compliance, and the Contractor shall pay cost of all subsequent re-testing until compliance is established. Test results shall be submitted directly to the Architect, by approved testing laboratory.

1.8 ADD THE FOLLOWING ARTICLE 15 - STIPULATION AGAINST LIENS

- 15.1 Waiver by each Contractor of the right to file mechanics liens shall be executed by each Contractor and will be filed in the office of the Prothonotary in the County in which the work is being done. The document shall be prepared by the Owner's Solicitor. The Owner will file the document and pay the filing fee.

END OF SUPPLEMENTARY GENERAL CONDITIONS

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project Name:	New HVAC for Public Safety Building
Awarding Agency:	City of Scranton
Contract Award Date:	8/30/2021
Serial Number:	21-05905
Project Classification:	Building
Determination Date:	8/5/2021
Assigned Field Office:	Scranton
Field Office Phone Number:	(570)963-4577
Toll Free Phone Number:	(877)214-3962
Project County:	Lackawanna County

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 21-05905 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Asbestos & Insulation Workers	7/1/2016		\$32.48	\$18.52	\$51.00
Asbestos & Insulation Workers	7/1/2018		\$32.83	\$19.17	\$52.00
Asbestos & Insulation Workers	7/1/2019		\$33.33	\$19.67	\$53.00
Asbestos & Insulation Workers	7/1/2020		\$33.33	\$20.67	\$54.00
Asbestos & Insulation Workers	7/1/2021		\$34.58	\$20.67	\$55.25
Asbestos & Insulation Workers	7/1/2022		\$35.83	\$20.67	\$56.50
Boilermaker (Commercial, Institutional, and Minor Repair Work)	3/1/2017		\$28.52	\$18.22	\$46.74
Boilermaker (Commercial, Institutional, and Minor Repair Work)	3/1/2018		\$29.52	\$18.22	\$47.74
Boilermaker (Commercial, Institutional, and Minor Repair Work)	1/1/2019		\$29.26	\$18.48	\$47.74
Boilermakers	1/1/2018		\$46.26	\$33.36	\$79.62
Boilermakers	3/1/2018		\$45.89	\$33.73	\$79.62
Boilermakers	1/1/2019		\$45.51	\$34.11	\$79.62
Boilermakers	8/1/2019		\$47.21	\$34.11	\$81.32
Boilermakers	1/1/2021		\$49.32	\$34.90	\$84.22
Bricklayers, Stone Masons, Pointers, Caulkers, Cleaners	5/1/2017		\$33.82	\$16.56	\$50.38
Bricklayers, Stone Masons, Pointers, Caulkers, Cleaners	5/1/2018		\$34.44	\$16.74	\$51.18
Bricklayers, Stone Masons, Pointers, Caulkers, Cleaners	5/1/2019		\$35.15	\$16.93	\$52.08
Bricklayers, Stone Masons, Pointers, Caulkers, Cleaners	5/3/2020		\$34.94	\$18.14	\$53.08
Bricklayers, Stone Masons, Pointers, Caulkers, Cleaners	5/1/2021		\$36.82	\$17.36	\$54.18
Carpenters, Drywall Hangers, Framers, Instrument Men, Lathers, Soft Floor Layers	5/1/2016		\$28.53	\$16.08	\$44.61
Carpenters, Drywall Hangers, Framers, Instrument Men, Lathers, Soft Floor Layers	6/1/2018		\$29.53	\$17.43	\$46.96
Carpenters, Drywall Hangers, Framers, Instrument Men, Lathers, Soft Floor Layers	5/1/2019		\$30.18	\$17.93	\$48.11
Carpenters, Drywall Hangers, Framers, Instrument Men, Lathers, Soft Floor Layers	5/1/2020		\$30.88	\$18.43	\$49.31
Cement Finishers & Plasterers	5/2/2021		\$29.02	\$18.48	\$47.50
Cement Finishers	6/1/2016		\$32.43	\$11.35	\$43.78
Cement Masons	5/1/2019		\$34.08	\$13.00	\$47.08
Cement Masons	6/1/2020		\$34.78	\$13.50	\$48.28
Drywall Finisher	5/1/2017		\$27.81	\$18.17	\$45.98
Drywall Finisher	5/1/2019		\$28.61	\$20.04	\$48.65
Drywall Finisher	5/1/2020		\$29.19	\$20.71	\$49.90
Drywall Finisher	5/1/2021		\$29.58	\$21.57	\$51.15
Electricians	6/1/2012		\$33.37	\$15.19	\$48.56
Electricians	6/1/2013		\$33.77	\$16.04	\$49.81
Electricians	6/1/2014		\$34.36	\$16.95	\$51.31
Electricians	6/1/2015		\$34.36	\$17.80	\$52.16
Electricians	6/1/2016		\$34.36	\$18.80	\$53.16

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 21-05905 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Electricians	6/1/2017		\$34.36	\$19.85	\$54.21
Electricians	6/1/2020		\$41.23	\$20.31	\$61.54
Electricians	12/1/2020		\$41.23	\$20.81	\$62.04
Electricians	6/1/2021		\$42.23	\$21.59	\$63.82
Elevator Constructor	1/1/2016		\$45.04	\$30.28	\$75.32
Elevator Constructor	1/1/2018		\$47.48	\$33.00	\$80.48
Glazier	5/1/2016		\$29.02	\$15.51	\$44.53
Glazier	5/1/2019	4/30/2020	\$29.57	\$17.36	\$46.93
Glazier	5/1/2020	4/30/2021	\$29.57	\$18.36	\$47.93
Glazier	5/1/2021		\$29.57	\$19.36	\$48.93
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	7/1/2017		\$32.32	\$28.42	\$60.74
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	7/1/2018		\$33.07	\$28.42	\$61.49
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	7/1/2019		\$32.76	\$29.88	\$62.64
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	7/1/2020		\$33.76	\$30.13	\$63.89
Laborers (Class 01 - See notes)	5/1/2017		\$21.15	\$16.88	\$38.03
Laborers (Class 01 - See notes)	5/1/2018		\$21.40	\$17.63	\$39.03
Laborers (Class 01 - See notes)	5/1/2019	4/30/2020	\$21.70	\$18.33	\$40.03
Laborers (Class 01 - See notes)	5/1/2020		\$22.05	\$19.32	\$41.37
Laborers (Class 01 - See notes)	5/2/2021		\$22.65	\$19.53	\$42.18
Laborers (Class 01 - See notes)	5/1/2022		\$25.82	\$20.33	\$46.15
Laborers (Class 01 - See notes)	4/30/2023		\$26.32	\$21.03	\$47.35
Laborers (Class 02 - See notes)	5/1/2017		\$23.15	\$16.88	\$40.03
Laborers (Class 02 - See notes)	5/1/2018		\$23.40	\$17.63	\$41.03
Laborers (Class 02 - See notes)	5/1/2019		\$23.70	\$18.33	\$42.03
Laborers (Class 02 - See notes)	5/1/2020		\$24.05	\$19.03	\$43.08
Laborers (Class 02 - See notes)	5/3/2020		\$26.47	\$19.03	\$45.50
Laborers (Class 02 - See notes)	5/2/2021		\$24.65	\$19.53	\$44.18
Laborers (Class 02 - See notes)	5/1/2022		\$27.32	\$20.33	\$47.65
Laborers (Class 02 - see notes)	4/30/2023		\$27.82	\$21.03	\$48.85
Laborers (Class 03 - See notes)	5/1/2017		\$23.67	\$17.17	\$40.84
Laborers (Class 03 - See notes)	5/1/2018		\$24.02	\$17.92	\$41.94
Laborers (Class 03 - See notes)	5/1/2019		\$24.47	\$18.62	\$43.09
Laborers (Class 03 - See notes)	5/3/2020		\$26.97	\$19.03	\$46.00
Laborers (Class 03 - See notes)	5/2/2021		\$25.42	\$19.53	\$44.95
Laborers (Class 03 - See notes)	5/1/2022		\$27.82	\$20.33	\$48.15
Laborers (Class 03 - See notes)	4/30/2023		\$28.32	\$21.03	\$49.35
Laborers (Class 04 - See notes)	5/1/2017		\$25.17	\$17.17	\$42.34
Laborers (Class 04 - See notes)	5/1/2018		\$25.52	\$17.92	\$43.44
Laborers (Class 04 - See notes)	5/1/2019		\$25.97	\$18.62	\$44.59
Laborers (Class 04 - See notes)	5/3/2020		\$24.62	\$19.03	\$43.65
Laborers (Class 04 - See notes)	5/2/2021		\$26.72	\$19.53	\$46.25
Laborers (Class 04 - See notes)	5/1/2022		\$25.47	\$20.33	\$45.80

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 21-05905 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Laborers (Class 04 - See notes)	4/30/2023		\$25.97	\$21.03	\$47.00
Laborers (Class 05 - See notes)	5/1/2017		\$25.67	\$17.17	\$42.84
Laborers (Class 05 - See notes)	5/1/2018		\$26.02	\$17.92	\$43.94
Laborers (Class 05 - See notes)	5/1/2019		\$23.70	\$18.33	\$42.03
Laborers (Class 05 - See notes)	5/1/2020		\$24.05	\$19.03	\$43.08
Laborers (Class 05 - See notes)	5/3/2020		\$26.12	\$19.03	\$45.15
Laborers (Class 05 - See notes)	5/2/2021		\$24.65	\$19.53	\$44.18
Laborers (Class 05 - See notes)	5/1/2022		\$26.97	\$20.33	\$47.30
Laborers (Class 05 - See notes)	4/30/2023		\$27.47	\$21.03	\$48.50
Laborers (Class 06 - See notes)	5/1/2017		\$23.92	\$16.88	\$40.80
Laborers (Class 06 - See notes)	5/1/2018		\$24.17	\$17.63	\$41.80
Laborers (Class 06 - See notes)	5/1/2019		\$24.47	\$18.33	\$42.80
Laborers (Class 06 - See notes)	5/1/2020		\$24.82	\$19.03	\$43.85
Laborers (Class 06 - See notes)	5/3/2020		\$26.62	\$19.03	\$45.65
Laborers (Class 06 - See notes)	5/2/2021		\$27.02	\$19.68	\$46.70
Laborers (Class 06 - See notes)	5/1/2022		\$27.47	\$20.33	\$47.80
Laborers (Class 06 - See notes)	4/30/2023		\$27.97	\$21.03	\$49.00
Marble Mason	5/1/2017		\$31.03	\$15.10	\$46.13
Marble Mason	5/1/2018		\$31.85	\$15.28	\$47.13
Marble Mason	5/1/2019		\$32.66	\$15.47	\$48.13
Marble Mason	5/1/2020		\$33.45	\$15.68	\$49.13
Marble Mason	5/1/2021		\$34.23	\$15.90	\$50.13
Millwright	5/1/2017		\$33.79	\$18.16	\$51.95
Millwright	5/1/2018	4/30/2019	\$34.41	\$18.64	\$53.05
Millwright	5/1/2019	4/30/2020	\$35.30	\$18.90	\$54.20
Millwright	5/1/2020		\$36.04	\$19.31	\$55.35
Operators (Building, Class 01 - See Notes)	5/1/2017		\$35.24	\$24.58	\$59.82
Operators (Building, Class 01 - See Notes)	5/1/2018		\$36.78	\$25.03	\$61.81
Operators (Building, Class 01 - See Notes)	5/1/2019		\$36.78	\$27.03	\$63.81
Operators (Building, Class 01 - See Notes)	5/1/2020		\$38.32	\$27.49	\$65.81
Operators (Building, Class 01 - See Notes)	5/1/2021		\$39.87	\$27.94	\$67.81
Operators (Building, Class 01A - See Notes)	5/1/2017		\$37.49	\$25.23	\$62.72
Operators (Building, Class 01A - See Notes)	5/1/2018		\$39.03	\$25.69	\$64.72
Operators (Building, Class 01A - See Notes)	5/1/2019		\$39.03	\$27.69	\$66.72
Operators (Building, Class 01A - See Notes)	5/1/2020		\$40.57	\$28.15	\$68.72
Operators (Building, Class 01A - See Notes)	5/1/2021		\$42.12	\$28.60	\$70.72
Operators (Building, Class 02 - See Notes)	5/1/2017		\$34.96	\$24.49	\$59.45
Operators (Building, Class 02 - See Notes)	5/1/2018		\$36.50	\$24.95	\$61.45
Operators (Building, Class 02 - See Notes)	5/1/2019		\$36.50	\$26.94	\$63.44
Operators (Building, Class 02 - See Notes)	5/1/2020		\$38.05	\$27.39	\$65.44
Operators (Building, Class 02 - See Notes)	5/1/2021		\$39.59	\$27.85	\$67.44
Operators (Building, Class 02A - See Notes)	5/1/2016		\$36.43	\$23.93	\$60.36
Operators (Building, Class 02A - See Notes)	5/1/2017		\$37.21	\$25.16	\$62.37
Operators (Building, Class 02A - See Notes)	5/1/2018		\$38.75	\$25.61	\$64.36

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 21-05905 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Operators (Building, Class 02A - See Notes)	5/1/2019		\$38.75	\$27.61	\$66.36
Operators (Building, Class 02A - See Notes)	5/1/2020		\$40.30	\$28.06	\$68.36
Operators (Building, Class 02A - See Notes)	5/1/2021		\$41.84	\$28.52	\$70.36
Operators (Building, Class 03 - See Notes)	5/1/2017		\$32.23	\$23.68	\$55.91
Operators (Building, Class 03 - See Notes)	5/1/2018		\$33.78	\$24.12	\$57.90
Operators (Building, Class 03 - See Notes)	5/1/2019		\$33.78	\$26.13	\$59.91
Operators (Building, Class 03 - See Notes)	5/1/2020		\$35.32	\$26.59	\$61.91
Operators (Building, Class 03 - See Notes)	5/1/2021		\$36.87	\$27.04	\$63.91
Operators (Building, Class 04 - See Notes)	5/1/2017		\$30.33	\$22.12	\$52.45
Operators (Building, Class 04 - See Notes)	5/1/2018		\$32.63	\$23.80	\$56.43
Operators (Building, Class 04 - See Notes)	5/1/2019		\$32.63	\$25.81	\$58.44
Operators (Building, Class 04 - See Notes)	5/1/2020		\$34.18	\$26.26	\$60.44
Operators (Building, Class 04 - See Notes)	5/1/2021		\$35.72	\$26.72	\$62.44
Operators (Building, Class 05 - See Notes)	5/1/2017		\$29.87	\$21.99	\$51.86
Operators (Building, Class 05 - See Notes)	5/1/2018		\$32.18	\$23.69	\$55.87
Operators (Building, Class 05 - See Notes)	5/1/2019		\$32.19	\$25.67	\$57.86
Operators (Building, Class 05 - See Notes)	5/1/2020		\$33.73	\$26.13	\$59.86
Operators (Building, Class 05 - See Notes)	5/1/2021		\$35.27	\$26.59	\$61.86
Operators (Building, Class 06 - See Notes)	5/1/2017		\$29.00	\$21.72	\$50.72
Operators (Building, Class 06 - See Notes)	5/1/2018		\$31.31	\$23.41	\$54.72
Operators (Building, Class 06 - See Notes)	5/1/2019		\$31.31	\$25.41	\$56.72
Operators (Building, Class 06 - See Notes)	5/1/2020		\$32.86	\$25.86	\$58.72
Operators (Building, Class 06 - See Notes)	5/1/2021		\$34.40	\$26.32	\$60.72
Operators (Building, Class 07A- See Notes)	5/1/2017		\$42.44	\$28.13	\$70.57
Operators (Building, Class 07A- See Notes)	5/1/2018		\$44.29	\$28.68	\$72.97
Operators (Building, Class 07A- See Notes)	5/1/2019		\$44.60	\$30.77	\$75.37
Operators (Building, Class 07A- See Notes)	5/1/2020		\$46.46	\$31.31	\$77.77
Operators (Building, Class 07A- See Notes)	5/1/2021		\$48.31	\$31.86	\$80.17
Operators (Building, Class 07B- See Notes)	5/1/2017		\$42.09	\$28.03	\$70.12
Operators (Building, Class 07B- See Notes)	5/1/2018		\$43.95	\$28.58	\$72.53
Operators (Building, Class 07B- See Notes)	5/1/2019		\$44.26	\$30.66	\$74.92
Operators (Building, Class 07B- See Notes)	5/1/2020		\$46.11	\$31.21	\$77.32
Operators (Building, Class 07B- See Notes)	5/1/2021		\$47.96	\$31.77	\$79.73
Painters Class 1 (see notes)	5/1/2017		\$27.25	\$18.17	\$45.42
Painters Class 1 (see notes)	5/1/2019		\$28.05	\$20.04	\$48.09
Painters Class 1 (see notes)	5/1/2020		\$28.63	\$20.71	\$49.34
Painters Class 1 (see notes)	5/1/2021		\$29.02	\$21.57	\$50.59
Painters Class 2 (see notes)	5/1/2017		\$30.15	\$18.17	\$48.32
Painters Class 2 (see notes)	5/1/2019		\$30.95	\$20.04	\$50.99
Painters Class 2 (see notes)	5/1/2020		\$31.53	\$20.71	\$52.24
Painters Class 2 (see notes)	5/1/2021		\$31.92	\$21.57	\$53.49
Painters Class 3 (see notes)	5/1/2017		\$36.25	\$18.17	\$54.42
Painters Class 3 (see notes)	5/1/2021		\$38.02	\$21.57	\$59.59
Pile Driver Divers (Building, Heavy, Highway)	1/1/2017		\$49.13	\$17.95	\$67.08

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 21-05905 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Pile Driver Divers (Building, Heavy, Highway)	1/1/2020		\$53.10	\$19.70	\$72.80
Pile Driver Divers (Building, Heavy, Highway)	1/1/2021		\$54.75	\$20.10	\$74.85
Pile Driver Divers (Building, Heavy, Highway)	1/1/2022		\$56.40	\$20.50	\$76.90
Piledrivers	1/1/2018		\$33.55	\$18.55	\$52.10
Piledrivers	1/1/2019		\$34.30	\$19.30	\$53.60
Piledrivers	1/1/2020		\$35.40	\$19.70	\$55.10
Piledrivers	1/1/2021		\$36.50	\$20.10	\$56.60
Piledrivers	1/1/2022		\$37.60	\$20.50	\$58.10
Plasterers	6/1/2016		\$32.94	\$10.92	\$43.86
Plasterers	5/1/2019		\$34.66	\$12.50	\$47.16
Plasterers	6/1/2020		\$35.36	\$13.00	\$48.36
Plumbers and Steamfitters	6/1/2017		\$41.24	\$20.77	\$62.01
Plumbers and Steamfitters	6/1/2018		\$42.64	\$20.77	\$63.41
Plumbers and Steamfitters	6/1/2019		\$43.54	\$21.27	\$64.81
Plumbers and Steamfitters	12/1/2020		\$44.74	\$21.82	\$66.56
Roofers	6/1/2017		\$27.50	\$19.08	\$46.58
Roofers	5/1/2019		\$29.50	\$19.81	\$49.31
Roofers	5/1/2020		\$30.25	\$20.36	\$50.61
Roofers	5/1/2021		\$31.00	\$20.86	\$51.86
Sheet Metal Workers	5/1/2017		\$30.61	\$22.95	\$53.56
Sheet Metal Workers	5/1/2018		\$30.63	\$23.73	\$54.36
Sheet Metal Workers	5/1/2019		\$30.79	\$25.07	\$55.86
Sheet Metal Workers	5/1/2020		\$31.04	\$26.32	\$57.36
Sheet Metal Workers	5/1/2021		\$31.60	\$27.26	\$58.86
Sign Makers and Hangars	7/17/2021		\$29.49	\$23.90	\$53.39
Sprinklerfitters	4/1/2017		\$37.40	\$21.74	\$59.14
Sprinklerfitters	4/1/2018		\$38.80	\$22.74	\$61.54
Sprinklerfitters	4/1/2020		\$38.90	\$26.42	\$65.32
Terrazzo Finisher	5/1/2017		\$31.64	\$15.62	\$47.26
Terrazzo Finisher	5/1/2018		\$32.35	\$15.91	\$48.26
Terrazzo Finisher	5/1/2019		\$33.04	\$16.22	\$49.26
Terrazzo Finisher	5/1/2020		\$32.26	\$18.48	\$50.74
Terrazzo Finisher	5/1/2021		\$33.23	\$19.03	\$52.26
Terrazzo Grinder	5/1/2020		\$32.95	\$18.48	\$51.43
Terrazzo Grinder	5/1/2021		\$33.94	\$19.03	\$52.97
Terrazzo Mechanics	5/1/2020		\$32.91	\$20.11	\$53.02
Terrazzo Mechanics	5/1/2021		\$33.83	\$20.78	\$54.61
Terrazzo Setter	5/1/2017		\$30.63	\$18.85	\$49.48
Terrazzo Setter	5/1/2018		\$31.23	\$19.25	\$50.48
Terrazzo Setter	5/1/2019		\$31.81	\$19.67	\$51.48
Tile & Marble Finisher	5/1/2017		\$28.12	\$14.60	\$42.72
Tile & Marble Finisher	5/1/2018		\$28.94	\$14.78	\$43.72
Tile & Marble Finisher	5/1/2019		\$29.30	\$15.42	\$44.72
Tile & Marble Finisher	5/1/2020		\$30.54	\$15.18	\$45.72

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 21-05905 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Tile & Marble Finisher	5/1/2020		\$30.54	\$15.18	\$45.72
Tile & Marble Finisher	5/1/2021		\$31.32	\$15.40	\$46.72
Tile Setter	5/1/2017		\$31.03	\$15.10	\$46.13
Tile Setter	5/1/2018		\$31.85	\$15.28	\$47.13
Tile Setter	5/1/2019		\$32.66	\$15.47	\$48.13
Tile Setter	5/1/2020		\$33.05	\$16.08	\$49.13
Tile Setter	5/1/2020		\$33.45	\$15.68	\$49.13
Tile Setter	5/1/2021		\$34.23	\$15.90	\$50.13
Truckdriver class 1(see notes)	5/1/2017		\$34.47	\$0.00	\$34.47
Truckdriver class 1(see notes)	5/1/2018		\$35.32	\$0.00	\$35.32
Truckdriver class 1(see notes)	5/1/2019		\$36.12	\$0.00	\$36.12
Truckdriver class 1(see notes)	5/1/2020		\$36.92	\$10.73	\$47.65
Truckdriver class 1(see notes)	5/1/2021		\$37.72	\$11.02	\$48.74
Truckdriver class 2 (see notes)	5/1/2017		\$34.54	\$0.00	\$34.54
Truckdriver class 2 (see notes)	5/1/2018		\$35.39	\$0.00	\$35.39
Truckdriver class 2 (see notes)	5/1/2019		\$36.19	\$0.00	\$36.19
Truckdriver class 2 (see notes)	5/1/2020		\$36.99	\$10.73	\$47.72
Truckdriver class 2 (see notes)	5/1/2020		\$37.48	\$10.73	\$48.21
Truckdriver class 2 (see notes)	5/1/2021		\$37.79	\$11.02	\$48.81
Truckdriver class 2 (see notes)	5/1/2021		\$38.28	\$11.02	\$49.30
Truckdriver class 3 (see notes)	5/1/2017		\$35.03	\$0.00	\$35.03
Truckdriver class 3 (see notes)	5/1/2018		\$35.88	\$0.00	\$35.88
Truckdriver class 3 (see notes)	5/1/2019		\$36.68	\$0.00	\$36.68
Window Film / Tint Installer	6/1/2019		\$24.52	\$12.08	\$36.60

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 21-05905 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Carpenter and Piledriver	5/1/2018	4/30/2019	\$30.75	\$15.96	\$46.71
Carpenter and Piledriver	5/1/2019	4/30/2020	\$31.51	\$16.55	\$48.06
Carpenter and Piledriver	5/1/2020	4/30/2021	\$32.22	\$17.19	\$49.41
Carpenter and Piledriver	5/1/2021		\$33.12	\$17.74	\$50.86
Carpenters	5/1/2016		\$29.67	\$14.54	\$44.21
Carpenters	5/1/2017		\$30.12	\$15.34	\$45.46
Cement Finishers	6/1/2016		\$32.43	\$11.35	\$43.78
Electric Lineman	1/1/2018		\$55.43	\$22.48	\$77.91
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	7/1/2017		\$32.32	\$28.42	\$60.74
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	7/1/2018		\$33.07	\$28.42	\$61.49
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	7/1/2019		\$32.76	\$29.88	\$62.64
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	7/1/2020		\$33.76	\$30.13	\$63.89
Iron Workers	7/1/2016		\$29.42	\$28.78	\$58.20
Laborers (Class 01 - See notes)	5/1/2016		\$19.81	\$15.79	\$35.60
Laborers (Class 01 - See notes)	5/1/2017		\$20.36	\$16.29	\$36.65
Laborers (Class 01 - See notes)	5/1/2018		\$20.96	\$16.79	\$37.75
Laborers (Class 01 - See notes)	5/1/2019		\$21.61	\$17.29	\$38.90
Laborers (Class 01 - See notes)	5/1/2020		\$22.41	\$17.69	\$40.10
Laborers (Class 01 - See notes)	5/1/2021		\$23.21	\$18.09	\$41.30
Laborers (Class 01 - See notes)	5/1/2022		\$24.01	\$18.54	\$42.55
Laborers (Class 01 - See notes)	5/1/2023		\$24.81	\$18.99	\$43.80
Laborers (Class 01 - See notes)	5/1/2024		\$25.61	\$19.49	\$45.10
Laborers (Class 02 - See notes)	5/1/2016		\$26.43	\$15.79	\$42.22
Laborers (Class 02 - See notes)	5/1/2017		\$26.98	\$16.29	\$43.27
Laborers (Class 02 - See notes)	5/1/2018		\$27.58	\$16.79	\$44.37
Laborers (Class 02 - See notes)	5/1/2019		\$28.23	\$17.29	\$45.52
Laborers (Class 02 - See notes)	5/1/2020		\$29.03	\$17.69	\$46.72
Laborers (Class 02 - See notes)	5/1/2021		\$29.83	\$18.09	\$47.92
Laborers (Class 02 - See notes)	5/1/2022		\$30.63	\$18.54	\$49.17
Laborers (Class 02 - See notes)	5/1/2023		\$31.43	\$18.99	\$50.42
Laborers (Class 02 - See notes)	5/1/2024		\$32.23	\$19.49	\$51.72
Laborers (Class 03 - See notes)	5/1/2016		\$23.42	\$15.79	\$39.21
Laborers (Class 03 - See notes)	5/1/2017		\$23.97	\$16.29	\$40.26
Laborers (Class 03 - See notes)	5/1/2018		\$24.57	\$16.79	\$41.36
Laborers (Class 03 - See notes)	5/1/2019		\$25.22	\$17.29	\$42.51
Laborers (Class 03 - See notes)	5/1/2020		\$26.02	\$17.69	\$43.71
Laborers (Class 03 - See notes)	5/1/2021		\$26.82	\$18.09	\$44.91
Laborers (Class 03 - See notes)	5/1/2022		\$27.62	\$18.54	\$46.16
Laborers (Class 03 - See notes)	5/1/2023		\$28.42	\$18.99	\$47.41
Laborers (Class 03 - See notes)	5/1/2024		\$29.22	\$19.49	\$48.71
Laborers (Class 04 - See notes)	5/1/2016		\$23.77	\$15.79	\$39.56
Laborers (Class 04 - See notes)	5/1/2017		\$24.32	\$16.29	\$40.61

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 21-05905 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Laborers (Class 04 - See notes)	5/1/2018		\$24.92	\$16.79	\$41.71
Laborers (Class 04 - See notes)	5/1/2019		\$25.57	\$17.29	\$42.86
Laborers (Class 04 - See notes)	5/1/2020		\$26.37	\$17.69	\$44.06
Laborers (Class 04 - See notes)	5/1/2021		\$27.17	\$18.09	\$45.26
Laborers (Class 04 - See notes)	5/1/2022		\$27.97	\$18.54	\$46.51
Laborers (Class 04 - See notes)	5/1/2023		\$28.77	\$18.99	\$47.76
Laborers (Class 04 - See notes)	5/1/2024		\$29.57	\$19.49	\$49.06
Laborers (Class 05 - See notes)	5/1/2016		\$24.44	\$15.79	\$40.23
Laborers (Class 05 - See notes)	5/1/2017		\$24.99	\$16.29	\$41.28
Laborers (Class 05 - See notes)	5/1/2018		\$25.59	\$16.79	\$42.38
Laborers (Class 05 - See notes)	5/1/2019		\$26.24	\$17.29	\$43.53
Laborers (Class 05 - See notes)	5/1/2020		\$27.04	\$17.69	\$44.73
Laborers (Class 05 - See notes)	5/1/2021		\$27.84	\$18.09	\$45.93
Laborers (Class 05 - See notes)	5/1/2022		\$28.64	\$18.54	\$47.18
Laborers (Class 05 - See notes)	5/1/2023		\$29.44	\$18.99	\$48.43
Laborers (Class 05 - See notes)	5/1/2024		\$30.24	\$19.49	\$49.73
Laborers (Class 06 - See notes)	5/1/2016		\$23.86	\$15.79	\$39.65
Laborers (Class 06 - See notes)	5/1/2017		\$24.41	\$16.29	\$40.70
Laborers (Class 06 - See notes)	5/1/2018		\$25.01	\$16.79	\$41.80
Laborers (Class 06 - See notes)	5/1/2019		\$25.66	\$17.29	\$42.95
Laborers (Class 06 - See notes)	5/1/2020		\$26.46	\$17.69	\$44.15
Laborers (Class 06 - See notes)	5/1/2021		\$27.26	\$18.09	\$45.35
Laborers (Class 06 - See notes)	5/1/2022		\$28.06	\$18.54	\$46.60
Laborers (Class 06 - See notes)	5/1/2023		\$28.86	\$18.99	\$47.85
Laborers (Class 06 - See notes)	5/1/2024		\$29.66	\$19.49	\$49.15
Laborers (Class 07 - See notes)	5/1/2016		\$24.15	\$15.79	\$39.94
Laborers (Class 07 - See notes)	5/1/2017		\$24.70	\$16.29	\$40.99
Laborers (Class 07 - See notes)	5/1/2018		\$25.30	\$16.79	\$42.09
Laborers (Class 07 - See notes)	5/1/2019		\$25.95	\$17.29	\$43.24
Laborers (Class 07 - See notes)	5/1/2020		\$26.75	\$17.69	\$44.44
Laborers (Class 07 - See notes)	5/1/2021		\$27.55	\$18.09	\$45.64
Laborers (Class 07 - See notes)	5/1/2022		\$28.35	\$18.54	\$46.89
Laborers (Class 07 - See notes)	5/1/2023		\$29.15	\$18.99	\$48.14
Laborers (Class 07 - See notes)	5/1/2024		\$29.95	\$19.49	\$49.44
Laborers (Class 08 - See notes)	5/1/2016		\$24.63	\$15.79	\$40.42
Laborers (Class 08 - See notes)	5/1/2017		\$25.18	\$16.29	\$41.47
Laborers (Class 08 - See notes)	5/1/2018		\$25.78	\$16.79	\$42.57
Laborers (Class 08 - See notes)	5/1/2019		\$26.43	\$17.29	\$43.72
Laborers (Class 08 - See notes)	5/1/2020		\$27.23	\$17.69	\$44.92
Laborers (Class 08 - See notes)	5/1/2021		\$28.03	\$18.09	\$46.12
Laborers (Class 08 - See notes)	5/1/2022		\$28.83	\$18.54	\$47.37
Laborers (Class 08 - See notes)	5/1/2023		\$29.63	\$18.99	\$48.62
Laborers (Class 08 - See notes)	5/1/2024		\$30.43	\$19.49	\$49.92
Operators (Heavy, Class 01 - See Notes)	5/1/2016		\$32.16	\$22.64	\$54.80

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 21-05905 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Operators (Heavy, Class 01 - See Notes)	5/1/2017		\$33.80	\$24.16	\$57.96
Operators (Heavy, Class 01 - See Notes)	5/1/2018		\$35.35	\$24.61	\$59.96
Operators (Heavy, Class 01 - See Notes)	5/1/2019		\$35.35	\$26.61	\$61.96
Operators (Heavy, Class 01 - See Notes)	5/1/2020		\$36.90	\$27.06	\$63.96
Operators (Heavy, Class 01 - See Notes)	5/1/2021		\$38.44	\$27.52	\$65.96
Operators (Heavy, Class 01A - See Notes)	5/1/2017		\$36.05	\$24.82	\$60.87
Operators (Heavy, Class 01A - See Notes)	5/1/2018		\$37.60	\$25.27	\$62.87
Operators (Heavy, Class 01A - See Notes)	5/1/2019		\$37.60	\$27.27	\$64.87
Operators (Heavy, Class 01A - See Notes)	5/1/2020		\$39.14	\$27.73	\$66.87
Operators (Heavy, Class 01A - See Notes)	5/1/2021		\$40.69	\$28.18	\$68.87
Operators (Heavy, Class 02 - See Notes)	5/1/2017		\$33.52	\$24.07	\$57.59
Operators (Heavy, Class 02 - See Notes)	5/1/2018		\$35.07	\$24.52	\$59.59
Operators (Heavy, Class 02 - See Notes)	5/1/2019		\$35.07	\$26.52	\$61.59
Operators (Heavy, Class 02 - See Notes)	5/1/2020		\$36.61	\$26.98	\$63.59
Operators (Heavy, Class 02 - See Notes)	5/1/2021		\$38.16	\$27.43	\$65.59
Operators (Heavy, Class 02A - See Notes)	5/1/2017		\$35.78	\$24.72	\$60.50
Operators (Heavy, Class 02A - See Notes)	5/1/2018		\$37.32	\$25.19	\$62.51
Operators (Heavy, Class 02A - See Notes)	5/1/2019		\$37.32	\$27.19	\$64.51
Operators (Heavy, Class 02A - See Notes)	5/1/2020		\$38.87	\$27.64	\$66.51
Operators (Heavy, Class 02A - See Notes)	5/1/2021		\$40.41	\$28.10	\$68.51
Operators (Heavy, Class 03 - See Notes)	5/1/2017		\$30.60	\$23.21	\$53.81
Operators (Heavy, Class 03 - See Notes)	5/1/2018		\$32.15	\$23.66	\$55.81
Operators (Heavy, Class 03 - See Notes)	5/1/2019		\$32.15	\$25.66	\$57.81
Operators (Heavy, Class 03 - See Notes)	5/1/2020		\$33.69	\$26.12	\$59.81
Operators (Heavy, Class 03 - See Notes)	5/1/2021		\$35.24	\$26.57	\$61.81
Operators (Heavy, Class 04 - See Notes)	5/1/2017		\$29.47	\$22.88	\$52.35
Operators (Heavy, Class 04 - See Notes)	5/1/2018		\$31.01	\$23.32	\$54.33
Operators (Heavy, Class 04 - See Notes)	5/1/2019		\$31.01	\$25.33	\$56.34
Operators (Heavy, Class 04 - See Notes)	5/1/2020		\$32.55	\$25.79	\$58.34
Operators (Heavy, Class 04 - See Notes)	5/1/2021		\$34.10	\$26.24	\$60.34
Operators (Heavy, Class 05 - See Notes)	5/1/2017		\$29.02	\$22.74	\$51.76
Operators (Heavy, Class 05 - See Notes)	5/1/2018		\$30.56	\$23.20	\$53.76
Operators (Heavy, Class 05 - See Notes)	5/1/2019		\$30.56	\$25.20	\$55.76
Operators (Heavy, Class 05 - See Notes)	5/1/2020		\$32.11	\$25.65	\$57.76
Operators (Heavy, Class 05 - See Notes)	5/1/2021		\$33.65	\$26.11	\$59.76
Operators (Heavy, Class 06 - See Notes)	5/1/2017		\$28.14	\$22.49	\$50.63
Operators (Heavy, Class 06 - See Notes)	5/1/2018		\$29.68	\$22.93	\$52.61
Operators (Heavy, Class 06 - See Notes)	5/1/2019		\$29.68	\$24.94	\$54.62
Operators (Heavy, Class 06 - See Notes)	5/1/2020		\$31.23	\$25.39	\$56.62
Operators (Heavy, Class 06 - See Notes)	5/1/2021		\$32.77	\$25.84	\$58.61
Operators (Heavy, Class 07A - See Notes)	5/1/2017		\$40.73	\$27.63	\$68.36
Operators (Heavy, Class 07A - See Notes)	5/1/2018		\$42.58	\$28.18	\$70.76
Operators (Heavy, Class 07A - See Notes)	5/1/2019		\$42.89	\$30.27	\$73.16
Operators (Heavy, Class 07A - See Notes)	5/1/2020		\$44.74	\$30.82	\$75.56

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 21-05905 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Operators (Heavy, Class 07A - See Notes)	5/1/2021		\$46.59	\$31.37	\$77.96
Operators (Heavy, Class 07B - See Notes)	5/1/2017		\$40.38	\$27.53	\$67.91
Operators (Heavy, Class 07B - See Notes)	5/1/2018		\$42.23	\$28.09	\$70.32
Operators (Heavy, Class 07B - See Notes)	5/1/2019		\$42.54	\$30.17	\$72.71
Operators (Heavy, Class 07B - See Notes)	5/1/2020		\$44.39	\$30.72	\$75.11
Operators (Heavy, Class 07B - See Notes)	5/1/2021		\$46.25	\$31.26	\$77.51
Operators (Highway, Class 01 - See Notes)	5/1/2016		\$32.16	\$22.64	\$54.80
Operators (Highway, Class 01 - See Notes)	5/1/2017		\$32.93	\$23.87	\$56.80
Operators (Highway, Class 01 - See Notes)	5/1/2018		\$34.47	\$24.33	\$58.80
Operators (Highway, Class 01 - See Notes)	5/1/2019		\$34.47	\$26.33	\$60.80
Operators (Highway, Class 01 - See Notes)	5/1/2020		\$37.56	\$25.24	\$62.80
Operators (Highway, Class 01 - See Notes)	5/1/2021		\$39.10	\$25.70	\$64.80
Operators (Highway, Class 01a - See Notes)	5/1/2017		\$35.18	\$24.56	\$59.74
Operators (Highway, Class 01a - See Notes)	5/1/2018		\$36.72	\$25.01	\$61.73
Operators (Highway, Class 01a - See Notes)	5/1/2019		\$36.72	\$27.01	\$63.73
Operators (Highway, Class 01a - See Notes)	5/1/2020		\$39.81	\$25.92	\$65.73
Operators (Highway, Class 01a - See Notes)	5/1/2021		\$41.35	\$26.38	\$67.73
Operators (Highway, Class 02 - See Notes)	5/1/2016		\$30.98	\$22.31	\$53.29
Operators (Highway, Class 02 - See Notes)	5/1/2017		\$31.75	\$23.53	\$55.28
Operators (Highway, Class 02 - See Notes)	5/1/2018		\$33.30	\$23.98	\$57.28
Operators (Highway, Class 02 - See Notes)	5/1/2019		\$33.29	\$25.99	\$59.28
Operators (Highway, Class 02 - See Notes)	5/1/2020		\$36.38	\$24.90	\$61.28
Operators (Highway, Class 02 - See Notes)	5/1/2021		\$37.93	\$25.35	\$63.28
Operators (Highway, Class 03 - See Notes)	5/1/2016		\$30.28	\$22.10	\$52.38
Operators (Highway, Class 03 - See Notes)	5/1/2017		\$31.06	\$23.32	\$54.38
Operators (Highway, Class 03 - See Notes)	5/1/2018		\$32.59	\$23.80	\$56.39
Operators (Highway, Class 03 - See Notes)	5/1/2019		\$32.59	\$25.79	\$58.38
Operators (Highway, Class 03 - See Notes)	5/1/2020		\$35.69	\$24.69	\$60.38
Operators (Highway, Class 03 - See Notes)	5/1/2021		\$37.23	\$25.16	\$62.39
Operators (Highway, Class 03 - See Notes)	5/1/2021		\$35.24	\$26.57	\$61.81
Operators (Highway, Class 04 - See Notes)	5/1/2016		\$29.82	\$21.98	\$51.80
Operators (Highway, Class 04 - See Notes)	5/1/2017		\$30.60	\$23.20	\$53.80
Operators (Highway, Class 04 - See Notes)	5/1/2018		\$32.14	\$23.66	\$55.80
Operators (Highway, Class 04 - See Notes)	5/1/2019		\$32.14	\$25.66	\$57.80
Operators (Highway, Class 04 - See Notes)	5/1/2020		\$35.23	\$24.57	\$59.80
Operators (Highway, Class 04 - See Notes)	5/1/2021		\$36.77	\$25.03	\$61.80
Operators (Highway, Class 05 - See Notes)	5/1/2016		\$29.31	\$21.83	\$51.14
Operators (Highway, Class 05 - See Notes)	5/1/2017		\$30.08	\$23.06	\$53.14
Operators (Highway, Class 05 - See Notes)	5/1/2018		\$31.63	\$23.51	\$55.14
Operators (Highway, Class 05 - See Notes)	5/1/2019		\$31.63	\$25.51	\$57.14
Operators (Highway, Class 05 - See Notes)	5/1/2020		\$34.72	\$24.42	\$59.14
Operators (Highway, Class 05 - See Notes)	5/1/2021		\$36.26	\$24.87	\$61.13
Operators (Highway, Class 06 - See Notes)	5/1/2016		\$32.40	\$22.70	\$55.10
Operators (Highway, Class 06 - See Notes)	5/1/2017		\$33.17	\$23.94	\$57.11

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 21-05905 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Operators (Highway, Class 06 - See Notes)	5/1/2018		\$34.71	\$24.39	\$59.10
Operators (Highway, Class 06 - See Notes)	5/1/2019		\$34.71	\$26.39	\$61.10
Operators (Highway, Class 06 - See Notes)	5/1/2020		\$36.25	\$26.85	\$63.10
Operators (Highway, Class 06 - See Notes)	5/1/2021		\$39.33	\$25.78	\$65.11
Operators (Highway, Class 06/A - See Notes)	5/1/2016		\$34.65	\$23.36	\$58.01
Operators (Highway, Class 06/A - See Notes)	5/1/2017		\$35.42	\$24.59	\$60.01
Operators (Highway, Class 06/A - See Notes)	5/1/2018		\$36.96	\$25.05	\$62.01
Operators (Highway, Class 06/A - See Notes)	5/1/2019		\$36.96	\$27.05	\$64.01
Operators (Highway, Class 06/A - See Notes)	5/1/2020		\$40.04	\$25.97	\$66.01
Operators (Highway, Class 06/A - See Notes)	5/1/2021		\$41.58	\$26.43	\$68.01
Operators (Highway, Class 07/A - See Notes)	5/1/2016		\$38.56	\$25.99	\$64.55
Operators (Highway, Class 07/A - See Notes)	5/1/2017		\$39.66	\$27.31	\$66.97
Operators (Highway, Class 07/A - See Notes)	5/1/2018		\$41.52	\$27.84	\$69.36
Operators (Highway, Class 07/A - See Notes)	5/1/2019		\$41.82	\$29.95	\$71.77
Operators (Highway, Class 07/A - See Notes)	5/1/2020		\$45.23	\$28.94	\$74.17
Operators (Highway, Class 07/A - See Notes)	5/1/2021		\$47.08	\$29.49	\$76.57
Operators (Highway, Class 07/B - See Notes)	5/1/2016		\$37.17	\$25.57	\$62.74
Operators (Highway, Class 07/B - See Notes)	5/1/2017		\$38.25	\$26.89	\$65.14
Operators (Highway, Class 07/B - See Notes)	5/1/2018		\$40.10	\$27.44	\$67.54
Operators (Highway, Class 07/B - See Notes)	5/1/2019		\$40.41	\$29.53	\$69.94
Operators (Highway, Class 07/B - See Notes)	5/1/2020		\$43.81	\$28.53	\$72.34
Operators (Highway, Class 07/B - See Notes)	5/1/2021		\$45.66	\$29.08	\$74.74
Painters Class 2 (see notes)	5/1/2020		\$31.53	\$20.71	\$52.24
Painters Class 3 (see notes)	5/1/2019		\$37.05	\$20.04	\$57.09
Painters Class 3 (see notes)	5/1/2020		\$37.63	\$20.71	\$58.34
Pile Driver Divers (Building, Heavy, Highway)	1/1/2017		\$49.13	\$17.95	\$67.08
Pile Driver Divers (Building, Heavy, Highway)	1/1/2020		\$53.10	\$19.70	\$72.80
Pile Driver Divers (Building, Heavy, Highway)	1/1/2021		\$54.75	\$20.10	\$74.85
Pile Driver Divers (Building, Heavy, Highway)	1/1/2022		\$56.40	\$20.50	\$76.90
Piledrivers	1/1/2017		\$32.75	\$17.95	\$50.70
Piledrivers	1/1/2018		\$33.55	\$18.55	\$52.10
Piledrivers	5/1/2018		\$30.75	\$15.96	\$46.71
Piledrivers	1/1/2019		\$34.30	\$19.30	\$53.60
Piledrivers	5/1/2019		\$31.51	\$16.55	\$48.06
Piledrivers	5/1/2020		\$32.22	\$17.19	\$49.41
Piledrivers	5/1/2021		\$33.12	\$17.74	\$50.86
Steamfitters (Heavy and Highway - Gas Distribution)	5/1/2017		\$40.98	\$32.53	\$73.51
Truckdriver class 1(see notes)	5/1/2016		\$33.57	\$0.00	\$33.57
Truckdriver class 1(see notes)	5/1/2017		\$34.47	\$0.00	\$34.47
Truckdriver class 1(see notes)	5/1/2018		\$35.32	\$0.00	\$35.32
Truckdriver class 1(see notes)	5/1/2019		\$36.12	\$0.00	\$36.12
Truckdriver class 1(see notes)	5/1/2020		\$36.92	\$10.73	\$47.65
Truckdriver class 1(see notes)	5/1/2021		\$37.72	\$11.02	\$48.74
Truckdriver class 2 (see notes)	5/1/2016		\$33.64	\$0.00	\$33.64

**BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES**

Project: 21-05905 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Truckdriver class 2 (see notes)	5/1/2017		\$34.54	\$0.00	\$34.54
Truckdriver class 2 (see notes)	5/1/2018		\$35.39	\$0.00	\$35.39
Truckdriver class 2 (see notes)	5/1/2019		\$36.19	\$0.00	\$36.19
Truckdriver class 2 (see notes)	5/1/2020		\$37.48	\$10.73	\$48.21
Truckdriver class 2 (see notes)	5/1/2020		\$36.99	\$10.73	\$47.72
Truckdriver class 2 (see notes)	5/1/2021		\$38.28	\$11.02	\$49.30
Truckdriver class 2 (see notes)	5/1/2021		\$37.79	\$11.02	\$48.81
Truckdriver class 3 (see notes)	5/1/2016		\$34.13	\$0.00	\$34.13
Truckdriver class 3 (see notes)	5/1/2017		\$35.03	\$0.00	\$35.03
Truckdriver class 3 (see notes)	5/1/2018		\$35.88	\$0.00	\$35.88
Truckdriver class 3 (see notes)	5/1/2019		\$36.68	\$0.00	\$36.68

TECHNICAL SPECIFICATIONS:

SECTION 230050 - BASIC MECHANICAL MATERIALS AND METHODS

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

SECTION 232500 - HVAC WATER TREATMENT

SECTION 235200 - CAST IRON BOILERS

SECTION 238219 - FAN-COIL UNITS

SECTION 238225 - AIR COOLED CONDENSING UNITS

SECTION 230050 - BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following basic mechanical materials and methods to complement other Division 15 Sections.

1. Piping materials and installation instructions common to most piping systems.
2. Concrete base construction requirements.
3. Escutcheons.
4. Dielectric fittings.
5. Flexible connectors.
6. Mechanical sleeve seals.
7. Equipment nameplate data requirements.
8. Labeling and identifying mechanical systems and equipment is specified in Division 15 Section "Mechanical Identification."
9. Nonshrink grout for equipment installations.
10. Field-fabricated metal and wood equipment supports.
11. Installation requirements common to equipment specification sections.
12. Mechanical demolition.
13. Cutting and patching.

PUBLIC SAFETY BUILDING

SCRANTON, PA

14. Touchup painting and finishing.

B. Pipe and pipe fitting materials are specified in Division 15 piping system Sections.

1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. The following are industry abbreviations for plastic materials:

1. ABS: Acrylonitrile-butadiene-styrene plastic.

2. CPVC: Chlorinated polyvinyl chloride plastic.

3. NP: Nylon plastic.

4. PE: Polyethylene plastic.

5. PVC: Polyvinyl chloride plastic.

G. The following are industry abbreviations for rubber materials:

PUBLIC SAFETY BUILDING

SCRANTON, PA

1. CR: Chlorosulfonated polyethylene synthetic rubber.
2. EPDM: Ethylene propylene diene terpolymer rubber.

1.4 SUBMITTALS

- A. Product Data: For dielectric fittings, flexible connectors, mechanical sleeve seals, and identification materials and devices.
- B. Shop Drawings: Detail fabrication and installation for metal and wood supports and anchorage for mechanical materials and equipment.
- C. Coordination Drawings: For access panel and door locations.
- D. Coordination Drawings: Detail major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Show space requirements for installation and access. Indicate if sequence and coordination of installations are important to efficient flow of the Work. Include the following:
 1. Planned piping layout, including valve and specialty locations and valve-stem movement.
 2. Clearances for installing and maintaining insulation.
 3. Clearances for servicing and maintaining equipment, accessories, and specialties, including space for disassembly required for periodic maintenance.
 4. Equipment and accessory service connections and support details.
 5. Exterior wall and foundation penetrations.
 6. Fire-rated wall and floor penetrations.
 7. Sizes and location of required concrete pads and bases.
 8. Scheduling, sequencing, movement, and positioning of large equipment into building during construction.
 9. Floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
- E. Samples: Of color, lettering style, and other graphic representation required for each identification material and device.

PUBLIC SAFETY BUILDING

SCRANTON, PA

1.5 QUALITY ASSURANCE

A. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

B. Equipment Selection: Equipment of higher electrical characteristics, physical dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased. Additional costs shall be approved in advance by appropriate Contract Modification for these increases. If minimum energy ratings or efficiencies of equipment are specified, equipment must meet design and commissioning requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and prevent entrance of dirt, debris, and moisture.

B. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.

C. Protect flanges, fittings, and piping specialties from moisture and dirt.

1.7 SEQUENCING AND SCHEDULING

A. Coordinate mechanical equipment installation with other building components.

B. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.

C. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components, as they are constructed.

PUBLIC SAFETY BUILDING

SCRANTON, PA

D. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning before closing in building.

E. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.

F. Coordinate installation of identifying devices after completing covering and painting, if devices are applied to surfaces. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Dielectric Unions:

- a. Capitol Manufacturing Co.
- b. Central Plastics Co.
- c. Eclipse, Inc.; Rockford-Eclipse Div.
- d. Epco Sales Inc.
- e. Hart Industries International, Inc.
- f. Watts Industries, Inc.; Water Products Div.
- g. Zurn Industries, Inc.; Wilkins Div.

2. Dielectric Flanges:

PUBLIC SAFETY BUILDING

SCRANTON, PA

- a. Capitol Manufacturing Co.
- b. Central Plastics Co.
- c. Epco Sales Inc.
- d. Watts Industries, Inc.; Water Products Div.

3. Dielectric-Flange Insulating Kits:

- a. Calpico, Inc.
- b. Central Plastics Co.

4. Dielectric Couplings:

- a. Calpico, Inc.
- b. Lochinvar Corp.

5. Dielectric Nipples:

- a. Grinnell Corp.; Grinnell Supply Sales Co.
- b. Perfection Corp.
- c. Victaulic Co. of America.

6. Metal, Flexible Connectors:

- a. ANAMET Industrial, Inc.
- b. Central Sprink, Inc.
- c. Flexicraft Industries.
- d. Flex-Weld, Inc.
- e. Grinnell Corp.; Grinnell Supply Sales Co.
- f. Hyspan Precision Products, Inc.
- g. McWane, Inc.; Tyler Pipe; Gustin-Bacon Div.
- h. Mercer Rubber Co.

PUBLIC SAFETY BUILDING

SCRANTON, PA

- i. Metraflex Co.
 - j. Proco Products, Inc.
 - k. Uniflex, Inc.
7. Rubber, Flexible Connectors:
- a. General Rubber Corp.
 - b. Mercer Rubber Co.
 - c. Metraflex Co.
 - d. Proco Products, Inc.
 - e. Red Valve Co., Inc.
 - f. Uniflex, Inc.

8. Mechanical Sleeve Seals:
- a. Calpico, Inc.
 - b. Metraflex Co.
 - c. Thunderline/Link-Seal.

2.2 PIPE AND PIPE FITTINGS

- A. Refer to individual Division 15 piping Sections for pipe and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

- A. Refer to individual Division 15 piping Sections for special joining materials not listed below.

PUBLIC SAFETY BUILDING

SCRANTON, PA

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness, unless thickness or specific material is indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.

b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

2.4 DIELECTRIC FITTINGS

A. General: Assembly or fitting with insulating material isolating joined dissimilar metals, to prevent galvanic action and stop corrosion.

B. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld-neck end types and matching piping system materials.

C. Insulating Material: Suitable for system fluid, pressure, and temperature.

D. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig (1725-kPa) minimum working pressure at 180 deg F (82 deg C).

E. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure as required to suit system pressures.

F. Dielectric-Flange Insulation Kits: Field-assembled, companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

PUBLIC SAFETY BUILDING

SCRANTON, PA

1. Provide separate companion flanges and steel bolts and nuts for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure as required to suit system pressures.

G. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

H. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

2.5 FLEXIBLE CONNECTORS

A. General: Fabricated from materials suitable for system fluid and that will provide flexible pipe connections. Include 125-psig (860-kPa) minimum working-pressure rating, unless higher working pressure is indicated, and ends according to the following:

1. 2-Inch NPS (DN50) and Smaller: Threaded.
2. 2-1/2-Inch NPS (DN65) and Larger: Flanged.
3. Option for 2-1/2-Inch NPS (DN65) and Larger: Grooved for use with keyed couplings.

B. Bronze-Hose, Flexible Connectors: Corrugated, bronze, inner tubing covered with bronze wire braid. Include copper-tube ends or bronze flanged ends, braze welded to hose.

C. Stainless-Steel-Hose/Steel Pipe, Flexible Connectors: Corrugated, stainless-steel, inner tubing covered with stainless-steel wire braid. Include steel nipples or flanges, welded to hose.

D. Stainless-Steel-Hose/Stainless-Steel Pipe, Flexible Connectors: Corrugated, stainless-steel, inner tubing covered with stainless-steel wire braid. Include stainless-steel nipples or flanges, welded to hose.

2.6 MECHANICAL SLEEVE SEALS

A. Description: Modular design, with interlocking rubber links shaped to continuously fill annular space between pipe and sleeve. Include connecting bolts and pressure plates.

2.7 PIPING SPECIALTIES

A. Sleeves: The following materials are for wall, floor, slab, and roof penetrations:

1. Steel Sheet Metal: 0.0239-inch (0.6-mm) minimum thickness, galvanized, round tube closed with welded longitudinal joint.
2. Steel Pipe: ASTM A 53, Type E, Grade A, Schedule 40, galvanized, plain ends.
3. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
4. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 - a. Underdeck Clamp: Clamping ring with set screws.

2.8 IDENTIFYING DEVICES AND LABELS

A. General: Manufacturer's standard products of categories and types required for each application as referenced in other Division 15 Sections. If more than one type is specified for application, selection is Installer's option, but provide one selection for each product category.

B. Equipment Nameplates: Metal nameplate with operational data engraved or stamped; permanently fastened to equipment.

1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data.
2. Location: Accessible and visible location.

C. Stencils: Standard stencils, prepared for required applications with letter sizes complying with recommendations of ASME A13.1 for piping and similar applications, but not less than 1-1/4-inch- (30-mm-) high letters for ductwork and not less than 3/4-inch- (19-mm-) high letters for access door signs and similar operational instructions.

PUBLIC SAFETY BUILDING

SCRANTON, PA

1. Material: Fiberboard.
2. Material: Brass.
3. Stencil Paint: Standard exterior-type stenciling enamel; black, unless otherwise indicated; either brushing grade or pressurized spray-can form and grade.
4. Identification Paint: Standard identification enamel of colors indicated or, if not otherwise indicated for piping systems, comply with ASME A13.1 for colors.

D. Snap-on Plastic Pipe Markers: Manufacturer's standard preprinted, semirigid, snap on, color-coded, complying with ASME A13.1.

E. Pressure-Sensitive Pipe Markers: Manufacturer's standard preprinted, permanent adhesive, color-coded, pressure-sensitive vinyl, complying with ASME A13.1.

F. Plastic Duct Markers: Manufacturer's standard color-coded, laminated plastic. Comply with the following color code:

1. Green: Cold air.
2. Yellow: Hot air.
3. Yellow/Green or Green: Supply air.
4. Blue: Exhaust, outside, return, and mixed air.
5. For hazardous exhausts, use colors and designs recommended by ASME A13.1.
6. Nomenclature: Include the following:
 - a. Direction of airflow.
 - b. Duct service.
 - c. Duct origin.
 - d. Duct destination.

G. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated.

1. Fabricate in sizes required for message.

PUBLIC SAFETY BUILDING

SCRANTON, PA

2. Engraved with engraver's standard letter style, of sizes and with wording to match equipment identification.
 3. Punch for mechanical fastening.
 4. Thickness: 1/8 inch (3.2 mm), unless otherwise indicated.
 5. Fasteners: Self-tapping stainless-steel screws or contact-type permanent adhesive.
- H. Plastic Equipment Markers: Color-coded, laminated plastic. Comply with the following color code:
1. Green: Cooling equipment and components.
 2. Yellow: Heating equipment and components.
 3. Yellow/Green: Combination cooling and heating equipment and components.
 4. Brown: Energy reclamation equipment and components.
 5. Blue: Equipment and components that do not meet any criteria above.
 6. For hazardous equipment, use colors and designs recommended by ASME A13.1.
 7. Nomenclature: Include the following, matching terminology on schedules as closely as possible:
 - a. Name and plan number.
 - b. Equipment service.
 - c. Design capacity.
 - d. Other design parameters such as pressure drop, entering and leaving conditions, and rpm.
8. Size: Approximate 2-1/2 by 4 inches (65 by 100 mm) for control devices, dampers, and valves; and 4-1/2 by 6 inches (115 by 150 mm) for equipment.
- I. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in mechanical identification, with corresponding designations indicated. Use numbers, lettering, and wording indicated for proper identification and operation/maintenance of mechanical systems and equipment.
1. Multiple Systems: If multiple systems of same generic name are indicated, provide identification that indicates individual system number and service such as "Boiler No. 3," "Air Supply No. 1H," or "Standpipe F12."

PUBLIC SAFETY BUILDING

SCRANTON, PA

2.9 GROUT

A. Nonshrink, Nonmetallic Grout: ASTM C 1107, Grade B.

1. Characteristics: Post-hardening, volume-adjusting, dry, hydraulic-cement grout, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psig (34.5-MPa), 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

A. General: Install piping as described below, unless piping Sections specify otherwise. Individual Division 15 piping Sections specify unique piping installation requirements.

B. General Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, unless deviations to layout are approved on Coordination Drawings.

C. Install piping at indicated slope.

D. Install components with pressure rating equal to or greater than system operating pressure.

E. Install piping in concealed interior and exterior locations, except in equipment rooms and service areas.

F. Install piping free of sags and bends.

PUBLIC SAFETY BUILDING

SCRANTON, PA

- G. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.
- H. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.
- I. Install piping to allow application of insulation plus 1-inch (25-mm) clearance around insulation.
- J. Locate groups of pipes parallel to each other, spaced to permit valve servicing.
- K. Install fittings for changes in direction and branch connections.
- L. Install couplings according to manufacturer's written instructions.
- M. Install pipe escutcheons for pipe penetrations of concrete and masonry walls, wall board partitions, and suspended ceilings according to the following:
1. Chrome-Plated Piping: Cast brass, one piece, with set screw, and polished chrome-plated finish. Use split-casting escutcheons if required, for existing piping.
 2. Uninsulated Piping Wall Escutcheons: Cast brass or stamped steel, with set screw.
 3. Uninsulated Piping Floor Plates in Utility Areas: Cast-iron floor plates.
 4. Insulated Piping: Cast brass or stamped steel; with concealed hinge, spring clips, and chrome-plated finish.
 5. Piping in Utility Areas: Cast brass or stamped steel, with set-screw or spring clips.
- N. Sleeves are not required for core drilled holes.
- O. Permanent sleeves are not required for holes formed by PE removable sleeves.
- P. Install sleeves for pipes passing through concrete and masonry walls, and concrete floor and roof slabs.
- Q. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

PUBLIC SAFETY BUILDING

SCRANTON, PA

1. Cut sleeves to length for mounting flush with both surfaces.

2. Install sleeves large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - b. Steel Pipe Sleeves: For pipes smaller than 6-inch NPS (DN150).
 - 1) Seal space outside of sleeve fittings with nonshrink, nonmetallic grout.

 4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using elastomeric joint sealants. Refer to Division 7 Section "Joint Sealants" for materials.
 5. Use Type S, Grade NS, Class 25, Use O, neutral-curing silicone sealant, unless otherwise indicated.

- R. Aboveground, Exterior-Wall, Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeve for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 1. Install steel pipe for sleeves smaller than 6 inches (150 mm) in diameter.
 2. Assemble and install mechanical sleeve seals according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.

- S. Underground, Exterior-Wall, Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Size sleeve for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 1. Assemble and install mechanical sleeve seals according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.

- T. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestopping materials. Refer to Division 7 Section "Firestopping" for materials.

- U. Verify final equipment locations for roughing-in.

PUBLIC SAFETY BUILDING

SCRANTON, PA

V. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

W. Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping specification Sections:

1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
3. 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:

- a. Note internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
- b. Apply appropriate tape or thread compound to external pipe threads, unless dry seal threading is specified.
- c. Align threads at point of assembly.
- d. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
- e. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

4. Welded Joints: Construct joints according to AWS D10.12, "Recommended Practices and Procedures for Welding Low Carbon Steel Pipe," using qualified processes and welding operators according to "Quality Assurance" Article.

5. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.

X. Piping Connections: Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping 2-inch NPS (DN50) and smaller, adjacent to each valve and at final connection to each piece of equipment with 2-inch NPS (DN50) or smaller threaded pipe connection.

PUBLIC SAFETY BUILDING

SCRANTON, PA

2. Install flanges, in piping 2-1/2-inch NPS (DN65) and larger, adjacent to flanged valves and at final connection to each piece of equipment with flanged pipe connection.

3.2 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to provide maximum possible headroom, if mounting heights are not indicated.

B. Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to Architect.

C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

D. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

E. Install equipment giving right of way to piping installed at required slope.

F. Install flexible connectors on equipment side of shutoff valves, horizontally and parallel to equipment shafts if possible.

3.3 LABELING AND IDENTIFYING

A. Equipment: Install engraved plastic-laminate sign or equipment marker on or near each major item of mechanical equipment.

1. Lettering Size: Minimum 1/4-inch- (6.4-mm-) high lettering for name of unit if viewing distance is less than 24 inches (610 mm), 1/2-inch- (12.7-mm-) high lettering for distances up to 72 inches (1800 mm), and proportionately larger lettering for greater distances. Provide secondary lettering two-thirds to three-fourths of size of principal lettering.

PUBLIC SAFETY BUILDING

SCRANTON, PA

2. Text of Signs: Provide name of identified unit. Include text to distinguish between multiple units, inform user of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.

B. Duct Systems: Identify air supply, return, exhaust, intake, and relief ducts with duct markers; or provide stenciled signs and arrows, showing duct system service and direction of flow.

1. Location: In each space, if ducts are exposed or concealed by removable ceiling system, locate signs near points where ducts enter into space and at maximum intervals of 50 feet (15 m).

C. Adjusting: Relocate identifying devices as necessary for unobstructed view in finished construction.

3.4 PAINTING AND FINISHING

A. Apply paint to exposed piping according to the following, unless otherwise indicated:

1. Interior, Ferrous Piping: Use semigloss, acrylic-enamel finish. Include finish coat over enamel undercoat and primer.

2. Interior, Galvanized-Steel Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over galvanized metal primer.

3. Interior, Ferrous Supports: Use semigloss, acrylic-enamel finish. Include finish coat over enamel undercoat and primer.

4. Exterior, Ferrous Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over rust-inhibitive metal primer.

5. Exterior, Galvanized-Steel Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over galvanized metal primer.

6. Exterior, Ferrous Supports: Use semigloss, acrylic-enamel finish. Include two finish coats over rust-inhibitive metal primer.

C. Do not paint piping specialties with factory-applied finish.

D. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

PUBLIC SAFETY BUILDING

SCRANTON, PA

- E. Paint interior and exterior fuel gas piping with (2) coats of safety yellow.

3.5 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit. Follow supported equipment manufacturer's setting templates for anchor bolt and tie locations. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete and reinforcement as specified in Division 3 Section "Cast-in-Place Concrete."

3.6 ERECTION OF METAL SUPPORTS AND ANCHORAGE

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.
- B. Field Welding: Comply with AWS D1.1, "Structural Welding Code--Steel."

3.7 ERECTION OF WOOD SUPPORTS AND ANCHORAGE

- A. Cut, fit, and place wood grounds, nailers, blocking, and anchorage to support and anchor mechanical materials and equipment.
- B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.
- C. Attach to substrates as required to support applied loads.

3.8 DEMOLITION

PUBLIC SAFETY BUILDING

SCRANTON, PA

- A. Disconnect, demolish, and remove Work specified in Division 15 Sections.
- B. If pipe, ductwork, insulation, or equipment to remain is damaged or disturbed, remove damaged portions and install new products of equal capacity and quality.
- C. Accessible Work: Remove indicated exposed pipe and ductwork in its entirety.
- D. Removal: Remove indicated equipment from Project site.
- E. Temporary Disconnection: Remove, store, clean, reinstall, reconnect, and make operational equipment indicated for relocation.

3.9 CUTTING AND PATCHING

- A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for mechanical installations. Perform cutting by skilled mechanics of trades involved.
- B. Repair cut surfaces to match adjacent surfaces.

3.10 GROUTING

- A. Install nonmetallic, nonshrink, grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors. Mix grout according to manufacturer's written instructions.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placing of grout.
- E. Place grout, completely filling equipment bases.

PUBLIC SAFETY BUILDING

SCRANTON, PA

F. Place grout on concrete bases to provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout according to manufacturer's written instructions.

END OF SECTION 230050

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. The systems to be balanced are the fan coil air inlets and exhaust fans.
- 2. Balancing Hydronic Piping Systems:
 - a. Constant-flow hydronic systems.
- 3. Testing, adjusting, and balancing existing systems and equipment.
- 4. Sound tests.
- 5. Vibration tests.
- 6. Control system verification.

1.3 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. BAS: Building automation systems.
- C. NEBB: National Environmental Balancing Bureau.
- D. TAB: Testing, adjusting, and balancing.
- E. TABB: Testing, Adjusting, and Balancing Bureau.
- F. TAB Specialist: An independent entity meeting qualifications to perform TAB work.
- G. TDH: Total dynamic head.

1.4 PREINSTALLATION MEETINGS

- A. TAB Conference: If requested by the Owner, conduct a TAB conference at **Project site** after approval of the TAB strategies and procedures plan to develop a mutual understanding of the details. Provide a minimum of **14** days' advance notice of scheduled meeting time and location.
 - 1. Minimum Agenda Items:
 - a. The Contract Documents examination report.
 - b. The TAB plan.
 - c. Needs for coordination and cooperation of trades and subcontractors.
 - d. Proposed procedures for documentation and communication flow.

1.5 ACTION SUBMITTALS

- A. N/A

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: Within **30** days of Contractor's Notice to Proceed, submit documentation that the TAB specialist and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
- B. Contract Documents Examination Report: Within **30** days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.
- C. Strategies and Procedures Plan: Within **30** days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.
- D. System Readiness Checklists: Within **30**days of Contractor's Notice to Proceed, submit system readiness checklists as specified in "Preparation" Article.
- E. Examination Report: Submit a summary report of the examination review required in "Examination" Article.
- F. Certified TAB reports.
- G. Sample report forms.
- H. 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.

1.7 QUALITY ASSURANCE

- A. TAB Specialists Qualifications: Certified by **AABC** or **NEBB**
 - 1. TAB Field Supervisor: Employee of the TAB specialist and certified by **AABC** or **NEBB**
 - 2. TAB Technician: Employee of the TAB specialist and certified by **AABC** or **NEBB** as a TAB technician.
- B. Instrumentation Type, Quantity, Accuracy, and Calibration: Comply with requirements in ASHRAE 111, Section 4, "Instrumentation."
- C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
- D. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

1.8 FIELD CONDITIONS

- A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 TAB SPECIALISTS

- A. Subject to compliance with requirements,
 - 1. **Submit Name & Qualifications to Engineer**

3.2 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.
- B. Examine installed systems for balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine 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 ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.
- F. Examine equipment performance data including fan and pump curves.
 - 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
 - 2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.
- G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- H. Examine test reports specified in individual system and equipment Sections.
- I. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, filters are clean, and equipment with functioning controls is ready for operation.
- J. Examine terminal units, such as fan coil units, and verify that they are accessible and their controls are connected and functioning.
- K. Examine strainers. Verify that startup screens have been replaced by permanent screens with indicated perforations.
- L. Examine control valves for proper installation for their intended function of throttling, diverting, or mixing fluid flows.
- M. Examine system pumps to ensure absence of entrained air in the suction piping.
- N. Examine operating safety interlocks and controls on HVAC equipment.
- O. 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.

3.3 PREPARATION

- A. Prepare a TAB plan that includes the following:
 - 1. Equipment and systems to be tested.
 - 2. Strategies and step-by-step procedures for balancing the systems.
 - 3. Instrumentation to be used.
 - 4. Sample forms with specific identification for all equipment.
- B. Perform system-readiness checks of HVAC systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:

1. Hydronics:
 - a. Verify leakage and pressure tests on water distribution systems have been satisfactorily completed.
 - b. Piping is complete with terminals installed.
 - c. Water treatment is complete.
 - d. Systems are flushed, filled, and air purged.
 - e. Strainers are pulled and cleaned.
 - f. Control valves are functioning per the sequence of operation.
 - g. Shutoff and balance valves have been verified to be 100 percent open.
 - h. Pumps are started and proper rotation is verified.
 - i. Pump gage connections are installed directly at pump inlet and outlet flanges or in discharge and suction pipe prior to valves or strainers.
 - j. Suitable access to balancing devices and equipment is provided.

3.4 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "**National Standards for Total System Balance**", and in this Section.
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
 2. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to" Section 230716 "HVAC Equipment Insulation," and Section 230719 "HVAC Piping 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.

3.5 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets..
- B. 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.
- C. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- D. Verify that motor starters are equipped with properly sized thermal protection.
- E. Check dampers for proper position to achieve desired airflow path.
- F. Check for airflow blockages.

- G. Check condensate drains for proper connections and functioning.
- H. Check for proper sealing of air-handling-unit components.
- I. Verify that air duct system is sealed.

3.6 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

- A. Prepare test reports for pumps, coils, and heat exchangers. Obtain approved submittals and manufacturer-recommended testing procedures. Crosscheck the summation of required coil and heat exchanger flow rates with pump design flow rate.
- B. Prepare schematic diagrams of systems' "as-built" piping layouts.
- C. In addition to requirements in "Preparation" Article, prepare hydronic systems for testing and balancing as follows:
 - 1. Check liquid level in expansion tank.
 - 2. Check highest vent for adequate pressure.
 - 3. Check flow-control valves for proper position.
 - 4. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
 - 5. Verify that motor starters are equipped with properly sized thermal protection.
 - 6. Check that air has been purged from the system.

3.7 PROCEDURES FOR CONSTANT-FLOW HYDRONIC SYSTEMS

- A. Adjust pumps to deliver total design gpm.
 - 1. Measure total water flow.
 - a. Position valves for full flow through coils.
 - b. Measure flow by main flow meter, if installed.
 - c. If main flow meter is not installed, determine flow by pump TDH or exchanger pressure drop.
 - 2. Measure pump TDH as follows:
 - a. Measure discharge pressure directly at the pump outlet flange or in discharge pipe prior to any valves.
 - b. Measure inlet pressure directly at the pump inlet flange or in suction pipe prior to any valves or strainers.
 - c. Convert pressure to head and correct for differences in gage heights.
 - d. Verify pump impeller size by measuring the TDH with the discharge valve closed. Note the point on manufacturer's pump curve at zero flow, and verify that the pump has the intended impeller size.
 - e. With valves open, read pump TDH. Adjust pump discharge valve until design water flow is achieved.
 - 3. Monitor motor performance during procedures and do not operate motor in an overloaded condition.

- B. Adjust flow-measuring devices installed in mains and branches to design water flows.
 - 1. Measure flow in main and branch pipes.
 - 2. Adjust main and branch balance valves for design flow.
 - 3. Re-measure each main and branch after all have been adjusted.

- C. Adjust flow-measuring devices installed at terminals for each space to design water flows.
 - 1. Measure flow at terminals.
 - 2. Adjust each terminal to design flow.
 - 3. Re-measure each terminal after it is adjusted.
 - 4. Position control valves to bypass the coil, and adjust the bypass valve to maintain design flow.
 - 5. Perform temperature tests after flows have been balanced.

- D. For systems with pressure-independent valves at terminals:
 - 1. Measure differential pressure and verify that it is within manufacturer's specified range.
 - 2. Perform temperature tests after flows have been verified.

- E. For systems without pressure-independent valves or flow-measuring devices at terminals:
 - 1. Measure and balance coils by either coil pressure drop or temperature method.
 - 2. If balanced by coil pressure drop, perform temperature tests after flows have been verified.

- F. Verify final system conditions as follows:
 - 1. Re-measure and confirm that total water flow is within design.
 - 2. Re-measure final pumps' operating data, TDH, volts, amps, and static profile.
 - 3. Mark final settings.

- G. Verify that memory stops have been set.

3.8 PROCEDURES FOR HEAT EXCHANGERS

- A. Adjust water flow to within specified tolerances.
- B. Measure inlet and outlet water temperatures.
- C. Check settings and operation of safety and relief valves. Record settings.

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. Phase and hertz.

5. Nameplate and measured voltage, each phase.
6. Nameplate and measured amperage, each phase.
7. Starter size and thermal-protection-element rating.
8. Service factor and frame size.

3.10 PROCEDURES FOR CHILLERS

- A. Balance water flow through each evaporator to within specified tolerances of indicated flow with all pumps operating.
 1. Evaporator-water entering and leaving temperatures, pressure drop, and water flow.
 2. For water-cooled chillers, condenser-water entering and leaving temperatures, pressure drop, and water flow.
 3. Evaporator and condenser refrigerant temperatures and pressures, using instruments furnished by chiller manufacturer.
 4. Power factor if factory-installed instrumentation is furnished for measuring kilowatts.
 5. Kilowatt input if factory-installed instrumentation is furnished for measuring kilowatts.
 6. Capacity: Calculate in tons of cooling.
 7. For air-cooled chillers, verify condenser-fan rotation and record fan and motor data including number of fans and entering- and leaving-air temperatures.

3.11 PROCEDURES FOR CONDENSING UNITS

- A. Verify proper rotation of fans.
- B. Measure entering- and leaving-air temperatures.
- C. Record fan and motor operating data.

3.12 PROCEDURES FOR BOILERS

- A. Hydronic Boilers:
 1. Measure and record entering- and leaving-water temperatures.
 2. Measure and record water flow.
 3. Record relief valve pressure setting.

3.13 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 for major (more than 20 gpm) equipment coils, excluding unitary equipment such as reheat coils, unit heaters, and fan-coil units.
 4. Dry-bulb temperature of entering and leaving air.
 5. Wet-bulb temperature of entering and leaving air for cooling coils.
 6. Airflow.

3.14 SOUND TESTS

- A. After the systems are balanced and construction is Substantially Complete, measure and record sound levels at [5] [10] [15] <Insert number> locations as designated by the Architect.
- B. Instrumentation:
1. The sound-testing meter shall be a portable, general-purpose testing meter consisting of a microphone, processing unit, and readout.
 2. The sound-testing meter shall be capable of showing fluctuations at minimum and maximum levels, and measuring the equivalent continuous sound pressure level (LEQ).
 3. The sound-testing meter must be capable of using 1/3 octave band filters to measure mid-frequencies from 31.5 Hz to 8000 Hz.
 4. The accuracy of the sound-testing meter shall be plus or minus one decibel.
- C. Test Procedures:
1. Perform test at quietest background noise period. Note cause of unpreventable sound that affects test outcome.
 2. Equipment should be operating at design values.
 3. Calibrate the sound-testing meter prior to taking measurements.
 4. Use a microphone suitable for the type of noise levels measured that is compatible with meter. Provide a windshield for outside or in-duct measurements.
 5. Record a set of background measurements in dBA and sound pressure levels in the eight un-weighted octave bands [63 Hz to 8000 Hz (NC)] [31.5 Hz to 4000 Hz (RC)] with the equipment off.
 6. Take sound readings in dBA and sound pressure levels in the eight un-weighted octave bands [63 Hz to 8000 Hz (NC)] [31.5 Hz to 4000 Hz (RC)] with the equipment operating.
 7. Take readings no closer than 36 inches (900 mm) from a wall or from the operating equipment and approximately 60 inches (1500 mm) from the floor, with the meter held or mounted on a tripod.
 8. For outdoor measurements, move sound-testing meter slowly and scan area that has the most exposure to noise source being tested. Use A-weighted scale for this type of reading.
- D. Reporting:
1. Report shall record the following:
 - a. Location.
 - b. System tested.
 - c. dBA reading.
 - d. Sound pressure level in each octave band with equipment on and off.
 2. Plot sound pressure levels on **NC** worksheet with equipment on and off.

3.15 CONTROLS VERIFICATION

- A. In conjunction with system balancing, perform the following:
 - 1. Verify temperature control system is operating within the design limitations.
 - 2. Confirm that the sequences of operation are in compliance with Contract Documents.
 - 3. Verify that controllers are calibrated and function as intended.
 - 4. Verify that controller set points are as indicated.
 - 5. Verify the operation of lockout or interlock systems.
 - 6. Verify the operation of valve and damper actuators.
 - 7. Verify that controlled devices are properly installed and connected to correct controller.
 - 8. Verify that controlled devices travel freely and are in position indicated by controller: open, closed, or modulating.
 - 9. Verify location and installation of sensors to ensure that they sense only intended temperature, humidity, or pressure.
- B. Reporting: Include a summary of verifications performed, remaining deficiencies, and variations from indicated conditions.

3.16 TOLERANCES

- A. Set HVAC system's airflow rates and water flow rates within the following tolerances:
 - 1. Supply, Return, and Exhaust Fans and Equipment with Fans: **Plus or minus 5 percent**
 - 2. Air Outlets and Inlets: **Plus or minus 5 percent**
 - 3. Heating-Water Flow Rate: **Plus or minus 5 percent**
 - 4. Cooling-Water Flow Rate: **Plus or minus 5 percent**
- B. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.

3.17 PROGRESS 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 **biweekly** 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.

3.18 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
 2. Include a list of instruments used for procedures, along with proof of calibration.
 3. Certify validity and accuracy of field data.
- B. Final Report Contents: In addition to certified field-report data, include the following:
1. Pump curves.
 2. Fan curves.
 3. Manufacturers' test data.
 4. Field test reports prepared by system and equipment installers.
 5. Other information relative to equipment performance; do not include Shop Drawings and Product Data.
- C. General Report Data: In addition to form titles and entries, include the following data:
1. Title page.
 2. Name and address of the TAB specialist.
 3. Project name.
 4. Project location.
 5. Architect's name and address.
 6. Engineer's name and address.
 7. Contractor's name and address.
 8. Report date.
 9. Signature of TAB supervisor who certifies the report.
 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
 11. Summary of contents including the following:
 - a. Indicated versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
 12. Nomenclature sheets for each item of equipment.
 13. Data for terminal units, including manufacturer's name, type, size, and fittings.
 14. Notes to explain why certain final data in the body of reports vary from indicated values.
 15. Test conditions for fans and pump performance forms including the following:
 - a. Settings for outdoor-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Face and bypass damper settings at coils.
 - e. Fan drive settings including settings and percentage of maximum pitch diameter.
 - f. Inlet vane settings for variable-air-volume systems.
 - g. Settings for supply-air, static-pressure controller.

- h. Other system operating conditions that affect performance.
- D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of outdoor, supply, return, and exhaust airflows.
 2. Water flow rates.
 3. Duct, outlet, and inlet sizes.
 4. Pipe and valve sizes and locations.
 5. Terminal units.
 6. Balancing stations.
 7. Position of balancing devices.
- E. Gas--Fired Heat Apparatus Test Reports: In addition to manufacturer's factory startup equipment reports, include the following:
1. Unit Data:
 - a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and unit size.
 - e. Manufacturer's serial number.
 - f. Fuel type in input data.
 - g. Output capacity in Btu/h (kW).
 - h. Ignition type.
 - i. Burner-control types.
 - j. Motor horsepower and rpm.
 - k. Motor volts, phase, and hertz.
 - l. Motor full-load amperage and service factor.
 - m. Sheave make, size in inches (mm), and bore.
 - n. Center-to-center dimensions of sheave and amount of adjustments in inches (mm).
 2. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm (L/s).
 - b. Entering-air temperature in deg F (deg C).
 - c. Leaving-air temperature in deg F (deg C).
 - d. Air temperature differential in deg F (deg C).
 - e. Entering-air static pressure in inches wg (Pa).
 - f. Leaving-air static pressure in inches wg (Pa).
 - g. Air static-pressure differential in inches wg (Pa).
 - h. Low-fire fuel input in Btu/h (kW).
 - i. High-fire fuel input in Btu/h (kW).
 - j. Manifold pressure in psig (kPa).
 - k. High-temperature-limit setting in deg F (deg C).
 - l. Operating set point in Btu/h (kW).
 - m. Motor voltage at each connection.
 - n. Motor amperage for each phase.
 - o. Heating value of fuel in Btu/h (kW).

- F. 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. Airflow rate in cfm (L/s).
 - b. Entering-water temperature in deg F (deg C).
 - c. Leaving-water temperature in deg F (deg C).
 - d. Water pressure drop in feet of head or psig (kPa).
 - e. Entering-air temperature in deg F (deg C).
 - f. Leaving-air temperature in deg F (deg C).
- G. Pump Test Reports: Calculate impeller size by plotting the shutoff head on pump curves and include the following:
1. Unit Data:
 - a. Unit identification.
 - b. Location.
 - c. Service.
 - d. Make and size.
 - e. Model number and serial number.
 - f. Water flow rate in gpm (L/s).
 - g. Water pressure differential in feet of head or psig (kPa).
 - h. Required net positive suction head in feet of head or psig (kPa).
 - i. Pump rpm.
 - j. Impeller diameter in inches (mm).
 - k. Motor make and frame size.
 - l. Motor horsepower and rpm.
 - m. Voltage at each connection.
 - n. Amperage for each phase.
 - o. Full-load amperage and service factor.
 - p. Seal type.
 2. Test Data (Indicated and Actual Values):
 - a. Static head in feet of head or psig (kPa).
 - b. Pump shutoff pressure in feet of head or psig (kPa).
 - c. Actual impeller size in inches (mm).
 - d. Full-open flow rate in gpm (L/s).
 - e. Full-open pressure in feet of head or psig (kPa).
 - f. Final discharge pressure in feet of head or psig (kPa).
 - g. Final suction pressure in feet of head or psig (kPa).
 - h. Final total pressure in feet of head or psig (kPa).

- i. Final water flow rate in gpm (L/s).
- j. Voltage at each connection.
- k. Amperage for each phase.

H. Instrument Calibration Reports:

1. Report Data:

- a. Instrument type and make.
- b. Serial number.
- c. Application.
- d. Dates of use.
- e. Dates of calibration.

3.19 VERIFICATION OF TAB REPORT

- A. The TAB specialist's test and balance engineer shall conduct the inspection in the presence of Engineer.].
- B. Engineer 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.
- C. 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."
- D. 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.
- E. If TAB work fails, proceed as follows:
 1. TAB specialists shall 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 specialist to complete TAB work according to the Contract Documents and deduct the cost of the services from the original TAB specialist's final payment.
 3. If the second verification also fails, **[Owner]** **[design professional]** **[Architect]** may contact AABC Headquarters regarding the AABC National Performance Guaranty.
- F. Prepare test and inspection reports.

3.20 ADDITIONAL TESTS

- A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
- B. 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.

Public Safety Building
Scranton Pa

END OF SECTION 230593

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 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes piping, special-duty valves, and hydronic specialties for hot-water heating, chilled-water cooling, and condenser water systems; makeup water for these systems; blow-down drain lines; and condensate drain piping.
- B. Related Sections include the following:
 - 1. Division 7 Section "Through-Penetration Firestop Systems" for materials and methods for sealing pipe penetrations through fire and smoke barriers.
 - 2. Division 7 Section "Joint Sealants" for materials and methods for sealing pipe penetrations through exterior walls.
 - 3. Division 15 Section "Basic Mechanical Materials and Methods" for general piping materials and installation requirements.
 - 4. Division 15 Section "Hangers and Supports" for pipe supports, product descriptions, and installation requirements. Hanger and support spacing is specified in this Section.
 - 5. Division 15 Section "Valves" for general-duty gate, globe, ball, butterfly, and check valves.
 - 6. Division 15 Section "Meters and Gages" for thermometers, flow meters, and pressure gages.
 - 7. Division 15 Section "Mechanical Identification" for labeling and identifying hydronic piping.
 - 8. Division 15 Section "Hydronic Pumps" for pumps, motors, and accessories for hydronic piping.
 - 9. Division 15 Section "HVAC Instrumentation and Controls" for temperature-control valves and sensors.

1.3 DEFINITIONS

- A. CPVC: Chlorinated polyvinyl chloride.
- B. PVC: Polyvinyl chloride.

1.4 SUBMITTALS

- A. Product Data: For each type of special-duty valve indicated. Include flow and pressure drop curves based on manufacturer's testing for diverting fittings, calibrated balancing valves, and automatic flow-control valves.
- B. Shop Drawings: Detail fabrication of pipe anchors, hangers, special pipe support assemblies, alignment guides, expansion joints and loops, and their attachment to the building structure. Detail location of anchors, alignment guides, and expansion joints and loops.
- C. Welding Certificates: Copies of certificates for welding procedures and personnel.
- D. Field Test Reports: Written reports of tests specified in Part 3 of this Section. Include the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Failed test results and corrective action taken to achieve requirements.
- E. Maintenance Data: For hydronic specialties and special-duty valves to include in maintenance manuals specified in Division 1.
- F. Water Analysis: Submit a copy of the water analysis to illustrate water quality available at Project site.

1.5 QUALITY ASSURANCE

- A. Welding: Qualify processes and operators according to the ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
- 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 the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.

1.6 COORDINATION

- A. Coordinate layout and installation of hydronic piping and suspension system components with other construction, including light fixtures, HVAC equipment, fire-suppression-system components, and partition assemblies.
- B. Coordinate pipe sleeve installations for foundation wall penetrations.
- C. Coordinate piping installation with equipment supports.
- D. Coordinate pipe fitting pressure classes with products specified in related Sections.
- E. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into base. Concrete, reinforcement, and formwork requirements are specified in Division 3 Sections.
- F. Coordinate installation of pipe sleeves for penetrations through exterior walls and floor assemblies. Coordinate with requirements for firestopping specified in Division 7 Section "Through-Penetration Firestop Systems" for fire and smoke wall and floor assemblies.

1.7 EXTRA MATERIALS

- A. Water Treatment Chemicals: Furnish sufficient chemicals for initial system startup and for preventive maintenance for one year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Grooved Mechanical-Joint Fittings and Couplings:

- a. Central Sprinkler Company; Central Grooved Piping Products.
 - b. Grinnell Corporation.
 - c. Victaulic Company of America.
2. Calibrated Balancing Valves:
- a. Armstrong Pumps, Inc.
 - b. Flow Design, Inc.
 - c. Gerand Engineering Company.
 - d. Griswold Controls.
 - e. ITT Bell & Gossett; ITT Fluid Technology Corp.
 - f. Taco, Inc.
3. Pressure-Reducing Valves:
- a. Amtrol, Inc.
 - b. Armstrong Pumps, Inc.
 - c. Conbraco Industries, Inc.
 - d. ITT Bell & Gossett; ITT Fluid Technology Corp.
 - e. Spence Engineering Company, Inc.
 - f. Watts Industries, Inc.; Watts Regulators.
4. Safety Valves:
- a. Amtrol, Inc.
 - b. Armstrong Pumps, Inc.
 - c. Conbraco Industries, Inc.
 - d. ITT McDonnell & Miller Div.; ITT Fluid Technology Corp.
 - e. Kunkle Valve Division.
 - f. Spence Engineering Company, Inc.
5. Automatic Flow-Control Valves:
- a. Flow Design, Inc.
 - b. Griswold Controls.
6. Expansion Tanks:
- a. Amtrol, Inc.
 - b. Armstrong Pumps, Inc.
 - c. ITT Bell & Gossett; ITT Fluid Technology Corp.
 - d. Taco, Inc.

7. Air Separators and Air Purgers:

- a. Amtrol, Inc.
- b. Armstrong Pumps, Inc.
- c. ITT Bell & Gossett; ITT Fluid Technology Corp.
- d. Taco, Inc.

2.2 PIPING MATERIALS

- A. General: Refer to Part 3 "Piping Applications" Article for applications of pipe and fitting materials.

2.3 COPPER TUBE AND FITTINGS

- A. Drawn-Temper Copper Tubing: [ASTM B 88, Type L (ASTM B 88M, Type B)] [ASTM B 88, Type M (ASTM B 88M Type C)].
- B. Annealed-Temper Copper Tubing: ASTM B 88, Type K (ASTM B 88M, Type A).
- C. DWV Copper Tubing: ASTM B 306, Type DWV.
- D. Wrought-Copper Fittings: ASME B16.22.
- E. Wrought-Copper Unions: ASME B16.22.
- F. Solder Filler Metals: ASTM B 32, 95-5 tin antimony.
- G. Brazing Filler Metals: AWS A5.8, Classification BAg-1 (silver).

2.4 STEEL PIPE AND FITTINGS

- A. Steel Pipe, NPS 2 (DN 50) and Smaller: ASTM A 53, Type S (seamless) or Type F (furnace-butt welded), Grade A, Schedule 40, black steel, plain ends.
- B. Steel Pipe, NPS 2-1/2 through NPS 12 (DN 65 through DN 300): ASTM A 53, Type E (electric-resistance welded), Grade A, Schedule 40, black steel, plain ends.
- C. Steel Pipe, NPS 14 through NPS 18 (DN 350 through DN 450): ASTM A 53, Type E (electric-resistance welded) or Type S (seamless), Grade B, Schedule 30, black steel,

plain ends.

- D. Steel Pipe, NPS 20 (DN 500): ASTM A 53, Type E (electric-resistance welded) or Type S (seamless), Grade B, Schedule 20, black steel, plain ends.
 - 1. Steel Pipe Nipples: ASTM A 733, made of ASTM A 53, Schedule 40, black steel; seamless for NPS 2 (DN 50) and smaller and electric-resistance welded for NPS 2-1/2 (DN 65) and larger.
- E. Cast-Iron Threaded Fittings: ASME B16.4; Classes 125 and 250.
- F. Malleable-Iron Threaded Fittings: ASME B16.3, Classes 150 and 300.
- G. Malleable-Iron Unions: ASME B16.39; Classes 150, 250, and 300.
- H. Cast-Iron Pipe Flanges and Flanged Fittings: ASME B16.1, Classes 25, 125, and 250; raised ground face, and bolt holes spot faced.
- I. Wrought-Steel Fittings: ASTM A 234/A 234M, wall thickness to match adjoining pipe.
- J. Wrought Cast- and Forged-Steel Flanges and Flanged Fittings: ASME B16.5, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
 - 1. Material Group: 1.1.
 - 2. End Connections: Butt welding.
 - 3. Facings: Raised face.
- K. Grooved Mechanical-Joint Fittings: ASTM A 536, Grade 65-45-12 ductile iron; ASTM A 47 (ASTM A 47M), Grade 32510 malleable iron; ASTM A 53, Type F, E, or S, Grade B fabricated steel; or ASTM A 106, Grade B steel fittings with grooves or shoulders designed to accept grooved end couplings.
- L. Grooved Mechanical-Joint Couplings: Ductile- or malleable-iron housing and synthetic rubber gasket of central cavity pressure-responsive design; with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.
- M. Flexible Connectors: Stainless-steel bellows with woven, flexible, bronze, wire-reinforcing protective jacket; 150-psig (1035-kPa) minimum working pressure and 250 deg F (121 deg C) maximum operating temperature. Connectors shall have flanged or threaded-end connections to match equipment connected and shall be capable of 3/4-inch (20-mm) misalignment.
- N. Spherical, Rubber, Flexible Connectors: Fiber-reinforced rubber body with steel flanges

drilled to align with Classes 150 and 300 steel flanges; operating temperatures up to 250 deg F (121 deg C) and pressures up to 150 psig (1035 kPa).

- O. Packed, Slip, Expansion Joints: 150-psig (1035-kPa) minimum working pressure, steel pipe fitting consisting of telescoping body and slip-pipe sections, packing ring, packing, limit rods, flanged ends, and chrome-plated finish on slip-pipe telescoping section.
- P. Welding Materials: Comply with Section II, Part C, of the ASME Boiler and Pressure Vessel Code for welding materials appropriate for wall thickness and for chemical analysis of pipe being welded.
- Q. Gasket Material: Thickness, material, and type suitable for fluid to be handled; and design temperatures and pressures.

2.5 PLASTIC PIPE AND FITTINGS

NOT APPLICABLE

2.6 VALVES

- A. Gate, globe, check, ball, and butterfly valves are specified in Division 15 Section "Valves."
- B. Refer to Part 3 "Valve Applications" Article for applications of each valve.
- C. Calibrated Balancing Valves, NPS 2 (DN 50) and Smaller: Bronze body, ball type, 125-psig (860-kPa) working pressure, 250 deg F (121 deg C) maximum operating temperature, and having threaded ends. Valves shall have calibrated orifice or venturi, connections for portable differential pressure meter with integral seals, and be equipped with a memory stop to retain set position.
- D. Calibrated Balancing Valves, NPS 2-1/2 (DN 65) and Larger: Cast-iron or steel body, ball type, 125-psig (860-kPa) working pressure, 250 deg F (121 deg C) maximum operating temperature, and having flanged or grooved connections. Valves shall have calibrated orifice or venturi, connections for portable differential pressure meter with integral seals, and be equipped with a memory stop to retain set position.
- E. Pressure-Reducing Valves: Diaphragm-operated, bronze or brass body with low inlet pressure check valve, inlet strainer removable without system shutdown, and noncorrosive valve seat and stem. Select valve size, capacity, and operating pressure to

suit system. Valve shall be factory set at operating pressure and have capability for field adjustment.

- F. Safety Valves: Diaphragm-operated, bronze or brass body with brass and rubber, wetted, internal working parts; shall suit system pressure and heat capacity and shall comply with the ASME Boiler and Pressure Vessel Code, Section IV.
- G. Automatic Flow-Control Valves: Gray-iron body, factory set to maintain constant flow with plus or minus 5 percent over system pressure fluctuations, and equipped with a readout kit including flow meter, probes, hoses, flow charts, and carrying case. Each valve shall have an identification tag attached by chain, and be factory marked with the zone identification, valve number, and flow rate. Valve shall be line size and one of the following designs:
 - 1. Gray-iron or brass body, designed for 175 psig (1206 kPa) at 200 deg F (93 deg C) with stainless-steel piston and spring.
 - 2. Brass or ferrous-metal body, designed for 300 psig (2068 kPa) at 250 deg F (121 deg C) with corrosion-resistant, tamperproof, self-cleaning, piston-spring assembly easily removable for inspection or replacement.
 - 3. Combination assemblies, including bronze ball valve and brass alloy control valve, with stainless-steel piston and spring, fitted with pressure and temperature test valves, and designed for 300 psig (2067 kPa) at 250 deg F (121 deg C).

2.7 HYDRONIC SPECIALTIES

- A. Manual Air Vent: Bronze body and nonferrous internal parts; 150-psig (1035-kPa) working pressure; 225 deg F (107 deg C) operating temperature; manually operated with screwdriver or thumbscrew; with NPS 1/8 (DN 6) discharge connection and NPS 1/2 (DN 15) inlet connection.
- B. Automatic Air Vent: Designed to vent automatically with float principle; bronze body and nonferrous internal parts; 150-psig (1035-kPa) working pressure; 240 deg F (116 deg C) operating temperature; with NPS 1/4 (DN 8) discharge connection and NPS 1/2 (DN 15) inlet connection.
- C. Expansion Tanks: Welded carbon steel, rated for 125-psig (860-kPa) working pressure and 375 deg F (191 deg C) maximum operating temperature. Separate air charge from system water to maintain design expansion capacity by a flexible bladder securely sealed into tank. Include drain fitting and taps for pressure gage and air-charging fitting. Support vertical tanks with steel legs or base; support horizontal tanks with steel

saddles. Factory fabricate and test tank with taps and supports installed and labeled according to the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.

- D. Tangential-Type Air Separators: Welded black steel; ASME constructed and labeled for 125-psig (860-kPa) minimum working pressure and 375 deg F (191 deg C) maximum operating temperature; perforated stainless-steel air collector tube designed to direct released air into expansion tank; tangential inlet and outlet connections; threaded connections for NPS 2 (DN 50) and smaller; flanged connections for NPS 2-1/2 (DN 65) and larger; threaded blowdown connection. Provide units in sizes for full-system flow capacity.
- E. In-Line Air Separators: One-piece cast iron with an integral weir designed to decelerate system flow to maximize air separation at a working pressure up to 175 psig (1206 kPa) and liquid temperature up to 300 deg F (149 deg C).
- F. Air Purgers: Cast-iron body with internal baffles that slow the water velocity to separate the air from solution and divert it to the vent for quick removal. Maximum working pressure of 150 psig (1035 kPa) and temperature of 250 deg F (121 deg C).
- G. Bypass Chemical Feeder: Welded steel construction; 125-psig (860-kPa) working pressure; 5-gal. (19-L) capacity; with fill funnel and inlet, outlet, and drain valves.
 - 1. Chemicals: Specially formulated, based on analysis of makeup water, to prevent accumulation of scale and corrosion in piping and connected equipment.
- H. Diverting Fittings: 125-psig (860-kPa) working pressure; 250 deg F (121 deg C) maximum operating temperature; cast-iron body with threaded ends, or wrought copper with soldered ends. Indicate flow direction on fitting.
- I. Y-Pattern Strainers: 125-psig (860-kPa) working pressure; cast-iron body (ASTM A 126, Class B), flanged ends for NPS 2-1/2 (DN 65) and larger, threaded connections for NPS 2 (DN 50) and smaller, bolted cover, perforated stainless-steel basket, and bottom drain connection.
- J. Basket Strainers: 125-psig (860-kPa) working pressure; high-tensile cast-iron body (ASTM A 126, Class B), flanged-end connections, bolted cover, perforated stainless-steel basket, and bottom drain connection.
- K. T-Pattern Strainers: 750-psig (5170-kPa) working pressure; ductile-iron or malleable-iron body, grooved-end connections, stainless-steel basket with 57 percent free area; removable access coupling and end cap for strainer maintenance.
- L. Flexible Connectors: Stainless-steel bellows with woven, flexible, bronze, wire-

reinforcing protective jacket; 150-psig (1035-kPa) minimum working pressure and 250 deg F (121 deg C) maximum operating temperature. Connectors shall have flanged- or threaded-end connections to match equipment connected and shall be capable of 3/4-inch (20-mm) misalignment.

- M. Spherical, Rubber, Flexible Connectors: Fiber-reinforced rubber body with steel flanges drilled to align with Classes 150 and 300 steel flanges; operating temperatures up to 250 deg F (121 deg C) and pressures up to 150 psig (1035 kPa).
- N. Packed, Slip, Expansion Joints: 150-psig (1035-kPa) minimum working pressure, steel pipe fitting consisting of telescoping body and slip-pipe sections, packing ring, packing, limit rods, flanged ends, and chrome-plated finish on slip-pipe telescoping section.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

- A. Hot and Chilled Water, NPS 2 (DN 50) and Smaller: Aboveground, use Type L (Type B) drawn-temper copper tubing with soldered joints or Schedule 40 steel pipe with threaded joints. Belowground or within slabs, use Type K (Type A) annealed-temper copper tubing with soldered joints. Use the fewest possible joints belowground and within floor slabs.
- B. Hot and Chilled Water: Aboveground, use Type L (Type B) drawn-temper copper tubing with soldered joints. Belowground or within slabs, use Type K (Type A) annealed-temper copper tubing with soldered joints. Use the fewest possible joints below ground and within slabs.
- C. Hot and Chilled Water, NPS 2-1/2 (DN 65) and Larger: Schedule 40 steel pipe with welded and flanged joints or grooved mechanical-joint couplings.

3.2 VALVE APPLICATIONS

- A. General-Duty Valve Applications: Unless otherwise indicated, use the following valve types:
 - 1. Shutoff Duty: Ball valves.
 - 2. Throttling Duty: Globe, ball, and butterfly valves.

- B. Install shutoff duty valves at each branch connection to supply mains, at supply connection to each piece of equipment, unless only one piece of equipment is connected in the branch line. Install throttling duty valves at each branch connection to return mains, at return connections to each piece of equipment, and elsewhere as indicated.
- C. Install calibrated balancing valves in the return water line of each heating or cooling element and elsewhere as required to facilitate system balancing.
- D. Install check valves at each pump discharge and elsewhere as required to control flow direction.
- E. Install safety valves on hot-water generators and elsewhere as required by the ASME Boiler and Pressure Vessel Code. Install safety-valve discharge piping, without valves, to floor. Comply with the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1, for installation requirements.
- F. Install pressure-reducing valves on hot-water generators and elsewhere as required to regulate system pressure.

3.3 PIPING INSTALLATIONS

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation requirements.
- B. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.
- C. Install drains, consisting of a tee fitting, NPS 3/4 ball valve, and short NPS 3/4 (DN 20) threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.
- D. Install piping at a uniform grade of 0.2 percent upward in direction of flow.
- E. Reduce pipe sizes using eccentric reducer fitting installed with level side up.
- F. Unless otherwise indicated, install branch connections to mains using tee fittings in main pipe, with the takeoff coming out the bottom of the main pipe. For up-feed risers, install the takeoff coming out the top of the main pipe.
- G. Install strainers on supply side of each control valve, pressure-reducing valve, solenoid valve, in-line pump, and elsewhere as indicated. Install NPS 3/4 (DN 20) nipple and

ball valve in blow-down connection of strainers NPS 2 (DN 50) and larger. Match size of strainer blow-off connection for strainers smaller than NPS 2 (DN 50).

- H. Anchor piping for proper direction of expansion and contraction.

3.4 HANGERS AND SUPPORTS

- A. Hanger, support, and anchor devices are specified in Division 15 Section "Hangers and Supports." Comply with requirements below for maximum spacing of supports.
- B. Install the following pipe attachments:
 - 1. Adjustable steel clevis hangers for individual horizontal piping less than 20 feet (6 m) long.
 - 2. Adjustable roller hangers and spring hangers for individual horizontal piping 20 feet (6 m) or longer.
 - 3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet (6 m) or longer, supported on a trapeze.
 - 4. Spring hangers to support vertical runs.
 - 5. On plastic pipe, install pads or cushions on bearing surfaces to prevent hanger from scratching pipe.
- C. Install hangers for steel piping with the following maximum spacing and minimum rod sizes:
 - 1. NPS 3/4 (DN 20): Maximum span, 7 feet (2.1 m); minimum rod size, 1/4 inch (6.4 mm).
 - 2. NPS 1 (DN 25): Maximum span, 7 feet (2.1 m); minimum rod size, 1/4 inch (6.4 mm).
 - 3. NPS 1-1/2 (DN 40): Maximum span, 9 feet (2.7 m); minimum rod size, 3/8 inch (10 mm).
 - 4. NPS 2 (DN 50): Maximum span, 10 feet (3 m); minimum rod size, 3/8 inch (10 mm).
 - 5. NPS 2-1/2 (DN 65): Maximum span, 11 feet (3.4 m); minimum rod size, 3/8 inch (10 mm).
 - 6. NPS 3 (DN 80): Maximum span, 12 feet (3.7 m); minimum rod size, 3/8 inch (10 mm).
- D. Install hangers for drawn-temper copper piping with the following maximum spacing and minimum rod sizes:

1. NPS 3/4 (DN 20): Maximum span, 5 feet (1.5 m); minimum rod size, 1/4 inch (6.4 mm).
 2. NPS 1 (DN 25): Maximum span, 6 feet (1.8 m); minimum rod size, 1/4 inch (6.4 mm).
 3. NPS 1-1/2 (DN 40): Maximum span, 8 feet (2.4 m); minimum rod size, 3/8 inch (10 mm).
 4. NPS 2 (DN 50): Maximum span, 8 feet (2.4 m); minimum rod size, 3/8 inch (10 mm).
 5. NPS 2-1/2 (DN 65): Maximum span, 9 feet (2.7 m); minimum rod size, 3/8 inch (10 mm).
 6. NPS 3 (DN 80): Maximum span, 10 feet (3 m); minimum rod size, 3/8 inch (10 mm).
- E. Plastic Piping Hanger Spacing: Space hangers according to pipe manufacturer's written instructions for service conditions. Avoid point loading. Space and install hangers with the fewest practical rigid anchor points.
- F. Support vertical runs at roof, at each floor, and at 10-foot (3-m) intervals between floors.

3.5 PIPE JOINT CONSTRUCTION

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for joint construction requirements for soldered and brazed joints in copper tubing; threaded, welded, and flanged joints in steel piping; and solvent-welded joints for PVC and CPVC piping.

3.6 HYDRONIC SPECIALTIES INSTALLATION

- A. Install manual air vents at high points in piping, at heat-transfer coils, and elsewhere as required for system air venting.
- B. Install automatic air vents in mechanical equipment rooms only at high points of system piping, at heat-transfer coils, and elsewhere as required for system air venting.
- C. Install dip-tube fittings in boiler outlet. Install piping to expansion tank with a 2 percent upward slope toward tank. Connect boiler-outlet piping.
- D. Install in-line air separators in pump suction lines. Install piping to compression tank with a 2 percent upward slope toward tank. Install drain valve on units NPS 2 (DN 50) and larger.

- E. Install combination air separator and strainer in pump suction lines. Install piping to compression tank with a 2 percent upward slope toward tank. Install blowdown piping with gate valve; extend to nearest drain.
- F. Install bypass chemical feeders in each hydronic system where indicated, in upright position with top of funnel not more than 48 inches (1200 mm) above floor. Install feeder in bypass line, off main, using globe valves on each side of feeder and in the main between bypass connections. Pipe drain, with ball valve, to nearest equipment drain.
- G. Install expansion tanks above air separator. Install gage glass and cocks on end of tank. Install tank fitting in tank bottom and charge tank. Use manual vent for initial fill to establish proper water level in tank.
 - 1. Support tank from floor or structure above with sufficient strength to carry weight of tank, piping connections, and fittings, plus weight of a full tank of water. Do not overload building components and structural members.
- H. Install expansion tanks on floor. Vent and purge air from hydronic system, and ensure tank is properly charged with air to suit system design requirements.

3.7 TERMINAL EQUIPMENT CONNECTIONS

- A. Size for supply and return piping connections shall be same as for equipment connections.
- B. Install control valves in accessible locations close to connected equipment.
- C. Install bypass piping with globe valve around control valve. If multiple, parallel control valves are installed, only one bypass is required.
- D. Install ports for pressure and temperature gages at coil inlet connections.
- E. Install balancing valves at each fan coil unit to balance and achieve the design flow.

3.8 CHEMICAL TREATMENT

- A. Perform an analysis of supply water to determine the type and quantities of chemical treatment needed to keep system free of scale, corrosion, and fouling.

- B. Fill system and perform initial chemical treatment.

3.9 FIELD QUALITY CONTROL

- A. Prepare hydronic piping according to ASME B31.9 and as follows:

1. Leave joints, including welds, 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 system with clean water. Clean strainers.
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. Install blinds in flanged joints to isolate equipment.
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. 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 trapped air. Use drains installed at low points for complete draining of liquid.
3. Check expansion tanks to determine that they are not air bound and that system is full of water.
4. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the design pressure. 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 either 90 percent of specified minimum yield strength or 1.7 times "SE" value in Appendix A of ASME B31.9, "Building Services Piping."
5. After hydrostatic test pressure has been applied for at least 10 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.

3.10 ADJUSTING

- A. Mark calibrated nameplates of pump discharge valves after hydronic system balancing has been completed, to permanently indicate final balanced position.
- B. Perform these adjustments before operating the system:
 - 1. Open valves to fully open position. Close coil bypass valves.
 - 2. Check pump for proper direction of rotation.
 - 3. Set automatic fill valves for required system pressure.
 - 4. Check 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. Set temperature controls so all coils are calling for full flow.
 - 6. Check operation of automatic bypass valves.
 - 7. Check and set operating temperatures of boilers, chillers, and cooling towers to design requirements.
 - 8. Lubricate motors and bearings.

3.11 CLEANING

- A. Flush hydronic piping systems with clean water. Remove and clean or replace strainer screens. After cleaning and flushing hydronic piping systems, but before balancing, remove disposable fine-mesh strainers in pump suction diffusers.

END OF SECTION 232113

PUBLIC SAFETY BUILDING

SCRANTON, PA

SECTION 232500 - HVAC WATER TREATMENT

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 the following HVAC water-treatment systems:

1. Manual and automatic chemical-feed equipment and controls.
2. Chemical treatment test equipment.
3. Chemicals.

1.3 DEFINITIONS

- A. EEPROM: Electrically erasable, programmable read-only memory.
- B. RO: Reverse osmosis.
- C. TSS: Total suspended solids are solid materials, including organic and inorganic, that are suspended in the water. These solids may include silt, plankton, and industrial wastes.

1.4 ACTION SUBMITTALS

- A. Product Data: Include rated capacities, operating characteristics, and furnished specialties and accessories for the following products:
1. Bypass feeders.
 2. Water meters.
 3. pH controllers.
 4. TSS controllers.
 5. Biocide feeder timers.
 6. Chemical solution tanks.
 7. Chemical test equipment.
 8. Chemical material safety data sheets.
- B. Shop Drawings: Pretreatment and chemical treatment equipment showing tanks, maintenance space required, and piping connections to HVAC systems.

C. 1. Include plans, elevations, sections, and attachment details.

1.5 INFORMATIONAL SUBMITTALS

A. Water Analysis Provider Qualifications: Verification of experience and capability of HVAC water-treatment service provider.

B. Field quality-control reports.

C. Other Informational Submittals:

1. Water-Treatment Program: Written sequence of operation on an annual basis for the application equipment required to achieve water quality defined in "Performance Requirements" Article.
2. Water Analysis: Illustrate water quality available at Project site.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For sensors, injection pumps, **water filtration units**, and controllers to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

A. HVAC Water-Treatment Service Provider Qualifications: An experienced HVAC water-treatment service provider capable of analyzing water qualities, installing water-treatment equipment, and applying water treatment as specified in this Section.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. SUBMIT LIST OF QUALIFIED SUPPLIERS TO ENGINEER

2.2 PERFORMANCE REQUIREMENTS

A. Water quality for HVAC systems shall minimize corrosion, scale buildup, and biological growth for optimum efficiency of HVAC equipment without creating a hazard to operating personnel or to the environment.

B. Base HVAC water treatment on quality of water available at Project site, HVAC system equipment material characteristics and functional performance characteristics, operating personnel capabilities, and requirements and guidelines of authorities having jurisdiction.

C. Closed hydronic systems, including **hot-water heating, chilled water and glycol cooling**, shall have the following water qualities:

1. pH: Maintain a value within **9.0 to 10.5**
2. "P" Alkalinity: Maintain a value within **100 to 500** ppm.
3. Boron: Maintain a value within **100 to 200** ppm.
4. Chemical Oxygen Demand: Maintain a maximum value of **100** ppm.
5. Soluble Copper: Maintain a maximum value of **0.20** ppm.
6. TSS: Maintain a maximum value of **10** ppm.
7. Ammonia: Maintain a maximum value of **20** ppm.
8. Free Caustic Alkalinity: Maintain a maximum value of **20** ppm.

2.3 MANUAL CHEMICAL-FEED EQUIPMENT

A. Bypass Feeders: Steel, with corrosion-resistant exterior coating, minimum bottom inlet and top side outlet. Quarter turn or threaded fill cap with gasket seal and diaphragm to lock the top on the feeder when exposed to system pressure in the vessel.

1. Capacity: **5 gal. (19 L**
2. Minimum Working Pressure: **125 psig (860 kPa)]**

2.4 CHEMICAL TREATMENT TEST EQUIPMENT

A. Test Kit: Manufacturer-recommended equipment and chemicals in a wall-mounting cabinet for testing pH, TSS, inhibitor, chloride, alkalinity, and hardness; and sulfite.

B. Corrosion Test-Coupon Assembly: Constructed of corrosive-resistant material, complete with piping, valves, and mild steel and copper coupons. Locate copper coupon downstream from mild steel coupon in the test-coupon assembly.

1. [**Two**] -station rack for closed-loop systems.

2.5 CHEMICALS

A. Chemicals shall be as recommended by water-treatment system manufacturer that are compatible with piping system components and connected equipment and that can attain water quality specified in "Performance Requirements" Article.

B. Water Softener Chemicals:

1. Mineral: High-capacity, sulfonated-polystyrene ion-exchange resin that is stable over entire pH range with good resistance to bead fracture from attrition or shock. Resin exchange capacity minimum **30,000 grains/cu. ft. (69 kg/cu. m)** of calcium carbonate of resin when regenerated with **15 lb (6.8 kg)** of salt.
2. Salt for Brine Tanks: High-purity sodium chloride, free of dirt and foreign material. Rock and granulated forms are unacceptable.

PART 3 - EXECUTION

3.1 WATER ANALYSIS

- A. Perform an analysis of supply water to determine quality of water available at Project site.

3.2 INSTALLATION

- A. Install chemical application equipment on concrete bases level and plumb. Maintain manufacturer's recommended clearances. Arrange units so controls and devices that require servicing are accessible. Anchor chemical tanks and floor-mounting accessories to substrate.
- B. Install water-testing equipment on wall near water-chemical-application equipment.
- C. Bypass Feeders: Install in closed hydronic systems, including **hot-water heating chilled water**, and equipped with the following:
 - 1. Install bypass feeder in a bypass circuit around circulating pumps unless otherwise indicated on Drawings.
 - 2. Install a gate or full-port ball isolation valves on inlet, outlet, and drain below feeder inlet.
 - 3. Install a swing check on inlet after the isolation valve.
 - 4. Install test equipment and furnish test-kit to Owner.

3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Where installing piping adjacent to equipment, allow space for service and maintenance.
- C. Make piping connections between HVAC water-treatment equipment and dissimilar-metal piping with dielectric fittings. Dielectric fittings are specified in Section 232113 "Hydronic Piping."
- D. Install shutoff valves on HVAC water-treatment equipment inlet and outlet. Metal general-duty valves are specified in Section 230523.11 "Globe Valves for HVAC Piping," Section 230523.12 "Ball Valves for HVAC Piping," Section 230523.13 "Butterfly Valves for HVAC Piping," and Section 230523.15 "Gate Valves for HVAC Piping."
- E. See Section 221119 "Domestic Water Piping Specialties" for backflow preventers required in makeup-water connections to potable-water systems.

3.4 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 the following tests and inspections[**with the assistance of a factory-authorized service representative**]:

1. Inspect field-assembled components and equipment installation, including piping and electrical connections.
2. Inspect piping and equipment to determine that systems and equipment have been cleaned, flushed, and filled with water, and are fully operational before introducing chemicals for water-treatment system.
3. Place HVAC water-treatment system into operation and calibrate controls during the preliminary phase of HVAC system's startup procedures.
4. Do not enclose, cover, or put piping into operation until it is tested and satisfactory test results are achieved.
5. Test for leaks and defects. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
6. Leave uncovered and unconcealed new, altered, extended, and replaced water piping until it has been tested and approved. Expose work that has been covered or concealed before it has been tested and approved.
7. Cap and subject piping to static water pressure of 50 psig (345 kPa) above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow test pressure to stand for four hours. Leaks and loss in test pressure constitute defects.
8. Repair leaks and defects with new materials and retest piping until no leaks exist.

C. Equipment will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

E. Sample boiler water at one-week intervals after boiler startup for a period of five weeks, and prepare test report advising Owner of changes necessary to adhere to "Performance Requirements" Article for each required characteristic. Sample boiler water at **four** week intervals following the testing noted above to show that automatic chemical-feed systems are maintaining water quality within performance requirements specified in this Section.

F. At **four** week intervals following Substantial Completion, perform separate water analyses on hydronic systems to show that automatic chemical-feed systems are maintaining water quality within performance requirements specified in this Section. Submit written reports of water analysis advising Owner of changes necessary to adhere to "Performance Requirements" Article.

G. Comply with ASTM D 3370 and with the following standards:

1. Silica: ASTM D 859.
2. Steam System: ASTM D 1066.
3. Acidity and Alkalinity: ASTM D 1067.
4. Iron: ASTM D 1068.
5. Water Hardness: ASTM D 1126.

3.5 MAINTENANCE SERVICE

A. Scope of Maintenance Service: Provide chemicals and service program to maintain water conditions required above to inhibit corrosion, scale formation, and biological growth for **cooling, chilled-water piping heating, hot-water piping** and equipment. Services and chemicals shall be provided for a period of one year from date of Substantial Completion and shall include the following:

1. Initial water analysis and HVAC water-treatment recommendations.
2. Startup assistance for Contractor to flush the systems, clean with detergents, and initially fill systems with required chemical treatment prior to operation.
3. Periodic field service and consultation.
4. Customer report charts and log sheets.
5. Laboratory technical analysis.
6. Analyses and reports of all chemical items concerning safety and compliance with government regulations.

3.6 DEMONSTRATION

A. **Train** Owner's maintenance personnel to adjust, operate, and maintain HVAC water-treatment systems and equipment.

END OF SECTION 232500

SECTION 235200 – CAST IRON BOILERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes packaged, and assembled, combination gas- and oil fired, cast-iron boilers, trim, and accessories for generating hot water.

1.3 SUBMITTALS

- A. Product Data: Include performance data, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings: For boilers, boiler trim, and accessories. Include plans, elevations, sections, details, and attachments to other Work. Shop Drawings shall be signed and sealed by a qualified professional engineer.
 - 1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 2. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
 - 3. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, and base weights.
 - 4. Wiring Diagrams: Detail power, signal, and control wiring.
- C. Manufacturer Seismic Qualification Certification: Submit certification that cast-iron boiler, accessories, and components will withstand seismic forces defined in Division 15 Section "Mechanical Vibration and Seismic Controls" when anchored to a concrete base. Include the following:

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
 - b. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- D. Source quality-control test reports.
- E. Startup service reports.
- F. Operation and Maintenance Data: For cast-iron boilers to include in emergency, operation, and maintenance manuals.
- G. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of cast-iron boilers and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
- B. 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.
- C. ASME Compliance: Fabricate and label cast-iron boilers to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
- D. ASHRAE/IESNA 90.1 Compliance: Cast-iron boilers shall have minimum efficiency according to Table 10-8.
- E. DOE Compliance: Minimum efficiency shall comply with 10 CFR 430, Appendix N, "Uniform Test Method for Measuring the Energy Consumption of Furnaces and

Boilers."

- F. I=B=R Compliance: Cast-iron boilers shall be tested and rated according to HI's "Testing and Rating Standard for Heating Boilers," with I=B=R emblem on a nameplate affixed to boiler.
- G. UL Compliance: Test cast-iron boilers to comply with UL 795, "Commercial-Industrial Gas Heating Equipment."

1.5 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace controls and heat exchangers of cast-iron boilers that fail in materials or workmanship within specified warranty period.
- B. Warranty Period for Controls: Three years from date of Substantial Completion.
- C. Warranty Period for Heat Exchangers: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Burnham Corporation.
 - 2. Crown Boiler Co.
 - 3. Peerless Heater Company (The).
 - 6. Slant/Fin Corporation.

7. Smith Cast Iron Boilers.
8. Weil-McLain; a United Dominion Company.

2.2 PACKAGED CAST-IRON BOILERS

- A. Description: Factory-fabricated assembled, and tested cast-iron boiler with cast-iron sections sealed pressure-tight, set on an insulated steel base, and held together with tie rods; including insulated jacket and flue-gas vent connection.
- B. Maximum Pressure Rating: Water, 30 psig
- D. Fabricate base and attachment to pressure vessel with reinforcement strong enough to resist boiler movement during a seismic event when boiler base is anchored to building structure.
- E. Boiler Characteristics and Capacities:
 1. Heating Medium: Hot water
 2. Maximum Pressure and Temperature Rating: 80psig and deg F
 3. Operating Pressure: 30 psig
 4. Entering-Water Temperature: 40 deg F
 6. Leaving-Water Temperature: 200 deg F
 7. Water Flow Rate: 25 gpm
 8. Maximum Pressure Drop: 1.0 psig (kPa).>
 9. Minimum Efficiency: 80% AFUE.
 10. Number of Passes: One
 11. Water Capacity: 60.5 gal.
 12. Net I=B=R Output Capacity: 448 MBh
 13. Gross I=B=R Output Capacity: 515MBh

2.3 COMPONENTS

- A. Cast-Iron Section Design: [Wet base] [Wet back] [Wet leg], [single] [multiple] pass, joined using high-temperature sealant to seal flue-gas passages not in contact with heating medium, [tapered cast-iron push nipples] [O-ring gaskets] [fiber roping], and held together with tie rods. Drain and blowdown tappings.
 1. Return injection tube to equalize water flow to all sections.
 2. Crown inspection tappings with brass plugs.
 3. Built-in air separator.
- B. Combustion Chamber: Equipped with refractory insulation and flame observation

ports, front and back. Seal flue-gas passages between cast-iron sections with fiber rope and high-temperature sealant.

1. Combustion Chamber Access: Refractory lined, hinged, front.

C. Casing:

1. Jacket: Sheet metal, with snap-in or interlocking closures and [baked-enamel] [powder-coated] protective finish.
2. Insulation: Minimum [1-inch- (25-mm-)] [2-inch- (50-mm-)] thick [fiberglass] [mineral-fiber] insulation surrounding the heat exchanger.
3. Access: For cleaning between cast-iron sections.
4. Draft Hood: Flue canopy and top flue connection shall be constructed of stainless steel containing adjustable outlet damper assembly.
5. Insulated base constructed of aluminized steel to permit boiler to be installed on combustible floor.
6. Steel rails to mount boiler on concrete base.
7. Mounting base to secure boiler to concrete base.
8. Control Cabinet: Sheet metal casing shall cover all controls, gas train, and burner.

D. Draft Diverter: [Steel assembly integral with boiler casing] [Separate galvanized-steel assembly].

2.6 FORCED-DRAFT GAS BURNER

A. Burner: Welded construction with multivane, stainless-steel, flame-retention diffuser for [natural] [propane] gas.

- 1.. I=B=R Input: 639 MBh

B. Blower: Forward-curved, centrifugal fan integral to burner, directly driven by motor; with adjustable, dual-blade damper assembly and locking quadrant to set air-fuel ratio.

1. Refer to Division 15 Section "Motors" for general requirements.
2. Minimum Motor Sizes: 1/3 HP
3. RPM: 3450.
4. Electrical Characteristics: 120 V, single phase 60 Hz.
5. Full-Load Amperes: 7.2
6. Minimum Circuit Ampacity: 7.2
7. Maximum Overcurrent Protection: 15

- C. Gas Train: Control devices and [modulating] [on-off] [low-high-low] control sequence shall comply with requirements in [IRI] [FMG] [ASME CSD-1] [UL].
- D. Pilot: [Intermittent] [Interrupted]-electric-spark pilot ignition with 100 percent main-valve and pilot-safety shutoff with electronic supervision of burner flame.
- E. Flue-Gas Recirculation: Burner connections shall be equipped for recirculating flue gas.
 - 1. Maximum Oxides of Nitrogen: 20 ppm.
- D. Gas Train: Control devices and [modulating] [on-off] [low-high-low] control sequence shall comply with requirements in [IRI] [FMG] [ASME CSD-1] [UL].
- E. Gas Pilot: [Intermittent] [Interrupted]-electric-spark pilot ignition with 100 percent main-valve and pilot-safety shutoff with electronic supervision of burner flame.
- G. Flue-Gas Recirculation: Burner connections shall be equipped for recirculating flue gas.
 - 1. Maximum Oxides of Nitrogen: 20 ppm.

2.9 HOT-WATER BOILER TRIM

- A. Include devices sized to comply with ANSI B31.9, "Building Services Piping."
- B. Aquastat Controllers: Operating[, firing rate, and high limit.
- C. Safety Relief Valve: ASME rated. 30 psig (210 kPa)
- D. Altitude and Temperature Gage: Minimum 3-1/2-inch- (89-mm-) diameter, combination water-pressure and -temperature gage. Gages shall have operating-pressure and -temperature ranges so normal operating range is at approximately 50 percent of full range.
- E. Boiler Air Vent: [Automatic] [Manual].
- F. Drain Valve: Minimum NPS 3/4 (DN 20) hose-end gate valve.
- G. Circulation Pumps: Non-overloading, horizontal, in-line pump with[rubber-mounted,]

split- capacitor motor having thermal-overload protection and [oil] [system]-lubricated bearings; designed to operate at specified boiler pressures and temperatures.

H. Expansion Tank: See Drawings for Tank Schedule.

2.11 BURNER OPERATING CONTROLS

A. Description: To maintain safe operating conditions, burner safety controls limit the operation of burner.

1. High Cutoff: Automatic reset stops burner if operating conditions rise above maximum boiler design pressure and/or temperature].
2. Low-Water Cutoff Switch: Electronic probe shall prevent burner operation on low water. Cutoff switch shall be automatic-reset type.
3. Alarm Bell: Factory mounted on control panel with silence switch; shall sound alarm for above conditions.

2.12 BOILER OPERATING CONTROLS

A. Refer to Division 15 Section "HVAC Instrumentation and Controls."

B. Boiler operating controls shall include the following devices and features:

1. Control Transformer: 115 V.
2. Motorized Vent Damper: Interlocked with burner to open before burner is operating. If damper fails to open, stop burner operation.
3. Operating Pressure Control: Factory wired and mounted to cycle burner.
4. Low-Water Cutoff and Pump Control: Cycle feedwater pump(s) for makeup water control.
5. Sequence of Operation: Electric, factory-fabricated, and field-installed panel to control burner firing rate to maintain space temperature in response to thermostat with heat anticipator located in heated space..

a. Include automatic, alternating-firing sequence for multiple boilers.

C. Building Management System Interface: Factory-installed hardware and software to enable building management system to monitor and control hot-water set point and display boiler status and alarms.

2.13 VENTING KITS

- A. Vent Damper: Motorized, 24-V ac, UL listed for use with standing pilot or intermittent ignition on atmospheric burner boiler equipped with draft hood. Interlock with burner.
- B. Kit: [ASTM A 959, Type 29-4C, stainless-steel] [Stainless-steel], [horizontal] [vertical] vent terminal, [wall] [roof] passage thimble, indoor wall plate, vent adapter, condensate trap, and sealant.
- C. Combustion-Air Intake: Stainless-steel, [horizontal] [vertical] vent terminal with screen, inlet air coupling, and sealant.
- D. Chimney and Type B Vent Adapter: Vent adapter and sealant.

2.14 SOURCE QUALITY CONTROL

- A. Test and inspect factory-assembled boilers, before shipping, according to ASME Boiler and Pressure Vessel Code: Section IV.
- B. Burner and Hydrostatic Test: Factory adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen, and carbon monoxide in flue gas and to achieve combustion efficiency; perform hydrostatic test.
- C. Allow Owner access to source quality-control testing of cast-iron boilers. Notify Architect 14 days in advance of testing.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Before boiler installation, examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations, and piping and electrical connections to verify actual locations, sizes, and other conditions affecting boiler performance, maintenance, and operations.
 - 1. Final boiler locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.
- B. Examine mechanical spaces for suitable conditions where boilers will be installed. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 BOILER INSTALLATION

- A. Install boilers level on concrete base. Concrete base is specified in Division 15 Section "Basic Mechanical Materials and Methods," and concrete materials and installation requirements are specified in Division 3.
- B. Concrete Bases: Anchor boilers to 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 full perimeter of 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.
 - 5. Cast-in-place concrete materials and placement requirements are specified in Division 3.
- C. Vibration Isolation: Rubber pads with a minimum static deflection of [0.25 inch (6.35 mm)] <Insert deflection>. Vibration isolation devices and installation requirements are specified in Division 15 Section "Mechanical Vibration and Seismic Controls."
- D. Install gas-fired boilers according to NFPA 54.
- E. Install oil-fired boilers according to NFPA 31.
- F. Assemble boiler sections in sequence and seal between each section.
- G. Assemble and install boiler trim.
- H. Install electrical devices furnished with boiler but not specified to be factory mounted.

3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect gas piping full size to boiler gas-train inlet with union.

- C. Connect oil piping full size to burner inlet with shutoff valve and union.
- D. Connect hot-water piping to supply- and return-boiler tapings with shutoff valve and union or flange at each connection.
- E. Connect steam and condensate piping to supply-, return-, and blowdown-boiler tapings with shutoff valve and union or flange at each connection.
- F. Install piping from safety relief valves to nearest floor drain.
- G. Install piping from safety valves to drip-pan elbow and to nearest floor drain.
- H. Connect breeching full size to boiler outlet.[Refer to Division 15 Section "Breechings, Chimneys, and Stacks" for venting materials.]
- I. Install flue-gas recirculation duct from vent to burner. Refer to Division 15 Section "Breechings, Chimneys, and Stacks" for recirculation duct materials.
- J. Install piping adjacent to boiler to allow service and maintenance.
- K. Ground equipment according to Division 16 Section "Grounding and Bonding."
- L. Connect wiring according to Division 16 Section "Conductors and Cables."
- M. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 STARTUP SERVICE

- A. Engage a factory-authorized service representative to test, inspect, and adjust boiler components and equipment installation and to perform startup service.
- B. Perform installation and startup checks according to manufacturer's written instructions.
- C. Leak Test: Hydrostatic test. Repair leaks and retest until no leaks exist.
- D. Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.
- E. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

- F. Burner Test: Adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen, and carbon monoxide in flue gas and to achieve combustion efficiency.
- G. Adjust initial temperature set points.
- H. Set field-adjustable switches and circuit-breaker trip ranges as indicated.
- I. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to site outside normal occupancy hours for this purpose, without additional cost.
- J. Prepare written report that documents testing procedures and results.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain cast-iron boilers. Refer to Division 1 Section "Demonstration and Training."

END OF SECTION 235200

SECTION 238219 - FAN-COIL UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes fan-coil units and accessories.

1.3 SUBMITTALS

- A. Product Data: Include specialties and accessories for each unit type and configuration.
- B. Shop Drawings: Submit the following for each fan-coil unit type and configuration:
 - 1. Plans, elevations, sections, and details.
 - 2. Details of anchorages and attachments to structure and to supported equipment.
 - 3. Power, signal, and control wiring diagrams. Differentiate between manufacturer-installed and field-installed wiring.
 - 4. Equipment schedules to include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories.
- C. Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items. Show the following:
 - 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. Size and location of access panels in hard ceilings to provide access to concealed units.
 - 5. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
- D. Samples for Initial Selection: Manufacturer's color charts showing the full range of

colors available for units with factory-applied color finishes.

- E. Field Test Reports: Written reports of tests specified in Part 3 of this Section.
- F. Maintenance Data: For fan-coil units to include in maintenance manuals specified in Division 1. Include the following:
 - 1. Maintenance schedules and repair parts lists for motors, coils, integral controls, and filters.

1.4 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.

1.5 COORDINATION

- A. Coordinate layout and installation of fan-coil units and suspension system components with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression-system components, and partition assemblies.

1.6 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fan-Coil Unit Filters: Furnish (3) spare filter[s] for each filter installed.
 - 2. Fan Belts: Furnish (2) spare fan belt[s] for each unit installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Carrier Corp.
2. Trane Company (The); North American Commercial Group.
3. York International Corp.

2.2 CONFIGURATION

- A. Vertical Units: An assembly including **cabinet, filter**, chassis, coil, drain pan, fan, and motor in blow-through configuration with **hydronic** coil for heating and cooling.
- B. Horizontal Units: An assembly including **cabinet, filter**, chassis, coil, drain pan, fan, and motor in blow-through configuration with **hydronic** coil for heating and cooling.

2.3 MATERIALS

- A. Chassis: Galvanized steel, with flanged edges.
- B. Coil Section Insulation: 1-inch (25-mm) duct liner complying with ASTM C 1071 and attached with adhesive complying with ASTM C 916.
 1. Fire-Hazard Classification: Duct liner and adhesive shall have a maximum flame-spread rating of 25 and smoke-developed rating of 50 when tested according to ASTM E 84.
- C. Drain Pans: Galvanized steel, with connection for drain. Drain pan shall [**have a removable plastic liner and**] be insulated with polystyrene or polyurethane insulation. Drain pan [**and liner**] shall be formed to slope from all directions to drain connection.
- D. Cabinet: Galvanized steel, with removable panels.
 1. Vertical Unit Front Panels: Removable, galvanized steel, with **integral stamped grilles**, and channel-formed edges and with insulation on back of panel.
 2. Horizontal Unit Bottom Panels: Fastened to unit with cam fasteners and hinge and attached with safety chain; with **integral stamped grilles**.
- E. Cabinet Finish: Bonderize, phosphatize, and flow-coat with baked-on primer **with manufacturer's standard paint, in color selected by Architect, applied to factory-assembled and -tested fan-coil unit before shipping.**

2.4 WATER COILS

- A. Primary Coil: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch (2.5 mm) and with manual air vent. Coils shall be rated for a minimum working pressure of 300 psig (2068 kPa) and a maximum entering water temperature of 275 deg F (135 deg C).

2.8 FAN

- A. Centrifugal, with forward-curved, double-width wheels and fan scrolls made of galvanized steel or thermoplastic material; directly connected to or V-belt driven from motor.

2.9 FAN MOTORS

- A. Motors for Direct-Drive Units: Multispeed motor with integral thermal-overload protection and resilient mounts.
- B. Motors for Belt-Drive Units: Open dripproof with hinged mount and adjustable motor pulley.
- C. Wiring Terminations: Match conductor materials and sizes of connecting power circuit. Connect motor to chassis wiring with plug connection.

2.10 ACCESSORIES

- A. Aluminum wall boxes with integral eliminators and insect screen.
- B. Steel subbase, height as indicated.
- C. Plastic motor-oiler tubes extending to beneath top of discharge grille.
- D. Steel recessing flanges for recessing fan-coil units into ceiling or wall.
- E. Filters: **1-inch- (25-mm-)** thick, throwaway filters in fiberboard frames.
- F. Dampers: Steel damper blades with polyurethane stop across entire blade length and having factory-mounted electric operators for 25 percent open cycle.

2.11 CONTROL SYSTEMS

- A. Two-Pipe, Fan Cycle: **Wall**-mounted thermostat cycles fan from manually set speed to off.
- B. Two-Pipe, Valve Cycle: **Wall**-mounted thermostat, with manual fan-speed switch, cycles normally closed **electric** valve.

2.12 SOURCE QUALITY CONTROL

- A. Test and rate units according to ARI 440.
- B. Test unit coils according to ASHRAE 33.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive fan-coil units for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine roughing-in for piping and electrical connections to verify actual locations before fan-coil unit installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install fan-coil units level and plumb.
- B. Install fan-coil units to comply with NFPA 90A.
- C. Suspend fan-coil units from structure with rubber-in-shear vibration isolators (rubber hangers). Vibration isolators are specified in Division 15 Section "Mechanical Vibration Controls and Seismic Restraints."
- D. Install wall-mounting thermostats and switch controls in electrical outlet boxes at heights to match lighting controls.

3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Unless otherwise indicated, install shutoff valve and union or flange at each connection.
- C. Install piping adjacent to machine to allow service and maintenance.
- D. Ground equipment.
- E. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 FIELD QUALITY CONTROL

- A. Testing: Perform the following field quality-control testing and report results in writing:
 - 1. After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 2. Operate electric heating elements through each stage to verify proper operation and electrical connections.
 - 3. Test and adjust controls and safeties.
- B. Repair or replace malfunctioning units. Retest as specified above after repairs or replacements are made.

3.5 CLEANING

- A. After installing units, inspect unit cabinet for damage to finish. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.
- B. After installing units, clean fan-coil units internally according to manufacturer's written instructions.
- C. Install new filters in each fan-coil unit within two weeks after Substantial Completion.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fan-coil units.
 - 1. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment.
 - 2. Review data in maintenance manuals. Refer to Division 1 Section "Closeout Procedures."
 - 3. Review data in maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data."
 - 4. Schedule training with Owner, through Engineer, with at least seven days' advance notice.

END OF SECTION 238219

PUBLIC SAFETY BUILDING

SCRANTON, PA

SECTION 238225

AIR COOLED CONDENSING UNITS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Condensing unit package.
- B. Charge of refrigerant and oil.
- C. Controls and control connections.
- D. Refrigerant piping connections.
- E. Motor starters.
- F. Electrical power connections.

1.2 RELATED SECTIONS

- A. Section 03300 - Cast-in-Place Concrete: Equipment bases.
- B. Section 15242 - Vibration Isolation: Placement of vibration isolators.
- C. Section 15260 - Piping Insulation.
- D. Section 15280 - Equipment Insulation.
- E. Section 15535 - Refrigeration Piping and Specialties.
- F. Section 15952 - Controls and Instrumentation.
- G. Section 16180 - Equipment Wiring Systems.

1.3 REFERENCES

- A. ANSI/ASHRAE 15 - Safety Code for Mechanical Refrigeration.
- B. ANSI/ASHRAE 90A - Energy Conservation in new Building

SCRANTON, PA

Design.

C. AHRI 370 - Sound Rating of Large Refrigeration and Air-conditioning Equipment.

D. AHRI 360 - Unitary Air-Conditioning Equipment.

1.4 SUBMITTALS

A. Submit shop drawings indicating components, dimensions, weights and loadings, required clearances, and location and size of field connections. Include schematic layouts showing condensing units, cooling coils, refrigerant piping, and accessories required for complete system.

B. Submit product data indicating rated capacities, weights, specialties and accessories, electrical nameplate data, and wiring diagrams.

C. Submit design data indicating refrigeration and chilled water pipe sizing.

D. Submit manufacturer's installation instructions.

1.5 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data.

B. Include manufacturer's descriptive literature, start-up instructions, installation instructions, and maintenance procedures.

1.6 HANDLING

A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.

B. Protect units on site from physical damage.

1.7 WARRANTY

A. Provide a full parts warranty for one year from start-up or 18 months from shipment, whichever occurs first.

SCRANTON, PA

B. Provide 3 Years extended warranty for compressors.

1.8 ACOUSTICS

A. Manufacturer of condensing unit shall provide outdoor sound power level data across all major octave band center frequencies for cataloged operating range of unit at gross cooling capacity range. Data shall be obtained in conformance with ANSI S1.32-1980, American National Standard Methods for the Determination of Sound Power Levels of Discrete Frequency and Narrow Band Noise Sources in Reverberation Rooms and per AMCA Standard 300-85 test code "Sound Rating Air Moving Devices".

1.9 REGULATORY REQUIREMENTS

A. Unit shall conform to UL 1995, CAN/CSA C22.2 NO. 236-95 for construction of condensing units and shall have cULus label affixed to unit.

1. In the event the unit is not UL/CSA approved, the manufacturer shall, at his expense, provide for a field inspection by a UL representative to verify conformance to cULus standards. If necessary, contractor shall perform required modifications to the unit to comply with UL, as directed by the UL representative, at no additional expense to the Owner.

1.10 SUMMARY

A. The contractor shall furnish and install air-cooled condensing unit(s) as shown as scheduled on the contract documents. The unit(s) shall be installed in accordance with this specification and perform at the specified conditions as scheduled.

PART 2 PRODUCTS

1.11 GENERAL UNIT DESCRIPTION

A. Provide self-contained, packaged, factory-assembled and pre-wired units suitable for outdoor use consisting of cabinet, compressors, condensing coil and fans, subcooling circuits, and controls.

SCRANTON, PA

B. Performance: Heat Rejection Capacity: 115.65 MBH, with a saturated suction temperature of [45] degrees F and air entering condenser at [95] degrees F. Condenser Air Flow: [20700] cfm with [3] condenser fan motors at [1.0] hp. Compressor input 31.18 Kw.

1.12 CASING

A. Cabinet: Galvanized steel, phosphatized, and finished with an air-dry paint coating durable enough to withstand 672 consecutive-hour salt spray application in accordance with standard ASTM B 117. Units are constructed of 14-gauge welded galvanized steel frame with 14 and 16-gauge galvanized steel panels and access doors.

1.13 CONDENSER SECTION

A. Condenser coils shall have all Aluminum Microchannel coils. All coils shall be leak tested at the factory to ensure pressure integrity. The condenser coil shall be pressure tested to 650 psig.

B. Provide Corrosion Protected Condenser Coil which consists of a corrosion resistant coating that shall withstand ASTM B117 Salt Spray test for 6000 hours and ASTM G85 A2 Cyclic Acidified Salt Fog test for 2400 hours. This coating shall be added after coil construction covering all tubes, headers and fin edges, therefore providing optimal protection in more corrosive environments.

C. Provide factory mounted, louvered, full-length steel grilles to protect the condenser coils and piping.

1.14 REFRIGERANT CIRCUIT(S)

A. Provide single circuit on 20 through 30 tons units and two circuits on 40 through 120 ton units.

B. Provide Bleed Thermal Expansion Valves. Installation shall require use of 30% or 15% bleed, Thermal Expansion Valves. Valves shall be field supplied and field installed. Quantity and size shall be determined by the application.

SCRANTON, PA

Note: Liquid line solenoids are required for all applications. Trim solenoids cannot be used.

- C. Provide Suction Service Valve. Unit shall include a refrigerant shut off valve to isolate the compressor for servicing.
- D. Provide Pressure gauges. Gauges shall be provided for monitoring suction and discharge pressure. One set shall be provided for each circuit.

1.15 FANS AND MOTORS

- A. Condenser Fans shall have Vertical discharge, direct drive fans with aluminum blades and zinc plated steel hubs guard on discharge. Fans shall be statically and dynamically balanced.
- B. Condenser fan motors shall be three-phase motors with permanently lubricated ball bearings, built in current and thermal overload protection and weather-tight slingers over motor bearings.

1.16 COMPRESSORS

- A. Compressors shall be industrial grade, energy-efficient direct-drive 3600 RPM maximum speed reciprocating, scroll type. The motor shall be of a suction gas cooled hermetic design. Compressor shall have centrifugal oil pump with dirt separator, oil sight glass, and oil charging valve. A solid state temperature sensor shall be embedded in the motor windings to protect against excessive winding temperatures.

Below: semi hermetic reciprocating and unloaders no longer used.

- 1. If semi-hermetic reciprocating industrial grade compressors are utilized provide single piece crankshafts, connecting rods, aluminum pistons, rings to prevent gas leakage, high strength non-flexing ring type suction and discharge valves, spring loaded heads, replaceable cylinder liners, and sealing surface immersed in oil. Provide removable discharge heads and hand hole

SCRANTON, PA

covers, and discharge service valves.

2. Provide compressor with automatic capacity reduction equipment consisting of suction valve unloaders. Use electric solenoid actuated lifting mechanism operated by <<LIFTING_MECHANISM_TYPE2>>. Provide for unloaded compressor start.

B. Motor shall be designed for across-the-line starting and suitable for a voltage utilization range of +/- 10 percent from nameplate voltage.

1.17 SYSTEM CONTROLS

A. Unit Control: Provide 115 volt control circuit with fusing and control power transformer. Unit wired with contactors for compressor and condenser motors, compressor overload protection, high/low cutouts, differential oil pressure control, reset relay, and anti-cycle compressor timer.

B. EVP Control shall consist of an interface panel in the main unit control box and a remote mounted control box with factory controller that is customer installed. This water chiller controller shall have built in fixed-off timers and chiller freeze protection. No provision for periodic pump-out or lead-lag is provided. Multiple chiller control shall not be provided.

1.18 MISCELLANEOUS FEATURES

A. Provide a Low ambient option that shall allow unit operation down to 0 F through the use of fan cycling and head pressure control dampers. The control shall consist of a heavy gauge damper assembly that is modulated by an actuator. The actuator shall be controlled by a low ambient control module. All components are factory-mounted. Field installed or 80-120T units shall utilize an external damper assembly for head pressure control.

B. Provide a non-fused disconnect switch. Disconnect shall be mounted in the control box and provides for interruption of power for servicing the unit. Lugs

SCRANTON, PA

shall be suitable for copper wires only. No overcurrent or short circuit protection is provided for unit by this switch.

C. Provide powered convenience outlet. 115v/15amp ground fault interrupter convenience outlet shall be factory installed with a single point power entry from a factory mounted transformer. It shall meet NEC 210-63 requirements. This outlet shall include a separate disconnect switch so that the outlet is powered when the unit disconnect switch is off.

D. Provide **spring** vibration isolators. Installation of isolators shall be under the unit base to minimize transmission of unit vibrations. Isolators shall consist of a cast, spring loaded, telescoping housing as the isolation medium. Mountings shall include built-in leveling bolts, resilient inserts that act as centering guides, and ribbed neoprene acoustical pads bonded to the bottom of the isolator.

E. Provide Remote Chiller Evaporator. Braze plate evaporator shall be constructed of stainless steel plates with copper braze material and designed to withstand a refrigerant side working pressure of 430 psig and waterside working pressure of 150 psig. The evaporator shall be pressure tested at 1.1 times the maximum allowable refrigerant side working pressure and 1.5 times maximum allowable water side working pressure, and has one water pass.

An installation kit shall consist of; water piping stubs, Y strainer, water flow switch, evaporator mounting legs, and insulation are provided for field installation. Two field provided <<0.50~ln>>- 14 NPTE plug, stainless steel or PVC, must be installed in the <<0.50~ln>>-14 NPTI threaded holes located on the refrigerant connection face of the evaporator.

Water piping stubs for 20 - 60 ton evaporators are NPT threaded to grooved Victaulic.

F. Provide Hot Gas Bypass Valves. The valve shall modulate hot gas to the inlet of the evaporator when suction pressure falls below the valve adjustable set point. Electronic versions shall be available with

SCRANTON, PA

control through temperature or pressure.

PART 4 EXECUTION

1.19 INSTALLATION

- A.** Install in accordance with manufacturer's instructions.
- B.** Provide for connection to electrical service.
- C.** Install units on vibration isolation.
- D.** Install units on concrete base as indicated.
- E.** Provide connection to refrigeration piping system and evaporators.

1.20 END OF SECTION 238225