

INVITATION FOR BID

POLICE DEPARTMENT AC UNIT REPLACEMENT PROJECT



TOWN OF LONGMEADOW, MASSACHUSETTS

February 23, 2017



RDK Project No. 20150527

380 Russell Street ■ Hadley, MA 01035 ■ 413.387.4640

THIS PAGE INTENTIONALLY LEFT BLANK

TOWN OF LONGMEADOW, MASSACHUSETTS

INVITATION FOR BID (IFB)

POLICE DEPARTMENT AC UNIT REPLACEMENT PROJECT

TABLE OF CONTENTS

DIVISION 00 - PROCUREMENT AND CONTRACT REQUIREMENTS

Legal Notice

Invitation for Bid

Instructions to Bidders

Form for General Bid

 Certification of Non-Collusion

 Certificate of Non-Debarment

 Tax Compliance Certification

 Conflict of Interest Certification/Statement

 Certificate of Corporate Authority

 Certificate of Foreign Corporation

 Certificate of Compliance with M.G.L. c.151B

 Occupational Safety and Health Administration Certification

Town Contract

Bid Bond

Payment Bond

Performance Bond

Prevailing Wage Rates

DIVISION 23 - HEATING, VENTILATING AND AIR CONDITIONING

(Specifications on Drawing)

DIVISION 26 - ELECTRICAL

(Specifications on Drawing)

CONSTRUCTION DOCUMENTS, PLANS-

H-0.0 HVAC Legend, Notes and Abbreviations

HD-2.0 HVAC Demolition Plan

H-2.0 HVAC New Work Plan

H-7.0 HVAC Detail

H-8.0 HVAC Schedule

E-0.0 Electrical Legend Notes, Details and Schedules

E-0.1 Electrical Panelboard and Load Center Schedules

E-3.0 Electrical 2nd Floor Power Plan

******NOTE** : PLANS WILL NOT BE POSTED ONLINE, THEY WILL BE SUPPLIED UPON REQUESTED. EMAIL: CTHOMPSON@LONGMEADOW.ORG

LEGAL NOTICE:

**INVITATION FOR BID (IFB)
POLICE DEPARTMENT AC UNIT REPLACEMENT PROJECT**

The Town is soliciting bids for the Police Department AC Unit Replacement Project. The consulting engineer is RDK Engineers, Hadley, MA. Sealed bids for the bidders will be received at the Town of Longmeadow, Purchasing Department, Attn: Chad Thompson, Procurement Manager, 735 Longmeadow Street, Suite 101, Longmeadow, MA 01106. Sealed bids will be received until the **bid deadline of Tuesday, March 14, 2017 at 11:00am**, after which time all bids will be opened and read aloud in the auditorium. Late bids will be rejected. Bidding procedures shall be in accordance with the provisions of Massachusetts General Laws, Chapter 149, Section 44A through Section 44I, inclusive, and Chapter 30, Section 39M, as amended.

Every General Bid shall be accompanied by a bid bond, or cash, or certified check on, or treasurer's or cashier's check issued by a responsible bank or trust company, payable to the "Town of Longmeadow", in the amount of five percent (5%) of the bid amount. Bid documents are only available from the Town of Longmeadow, Purchasing Department, Attn: Chad Thompson, Procurement Manager, 735 Longmeadow Street, Suite 101, Longmeadow, MA 01106. Bid documents can also be accessed through the Purchasing Department page of the town website, www.longmeadow.org. Bidders are encouraged to register with the Longmeadow Purchasing Department in order to receive updates and additional addenda. Those that do not register with the Longmeadow Purchasing Department will be required to independently monitor the Longmeadow bid listing service for issued updates and addenda. Failure to acknowledge addenda may result in a bid rejection.

Sealed bids should be delivered to the Longmeadow Purchasing Department no later than the bid deadline and should include the name and contact information of the bidder and the bid title 'IFB- Police Department AC Unit Replacement Project' on the outside of the envelope. Late bids will be returned unopened.

A MANDATORY Pre-Bid Conference is scheduled for Friday, March 3, 2017 beginning at 11:00am. Gather in the auditorium at the address of the Purchasing Department. Those that attend the Mandatory Pre-Bid Conference should register on the Registration Form available during the Mandatory Pre-Bid Conference. Just before the Mandatory Pre-Bid Conference is over the Longmeadow Procurement Manager, will read the names of all that signed in and registered on the Mandatory Pre-Bid Conference Registration Form. The Longmeadow Procurement Manager will then make a final plea for unregistered conference attendees to register on the Mandatory Pre-Bid Conference Registration Form. Once the Procurement Manager declares that the Mandatory Pre-Bid Conference is 'Complete and Closed', then no others will be allowed to register their attendance for the Mandatory Pre-Bid Conference. Additional site inspection requests will not be accommodated. Bids received from those that have not registered during the Mandatory Pre-Bid Conference will have their bid rejected.

The successful General Bidder will be required to furnish a 100% performance bond, and 100% labor and materials payment bond as set forth in the specifications; each bond executed in the full amount of the Contract Price. Prevailing Wage Rates to be paid on the work of the project are established by a Schedule issued by the Division of Occupational Safety under the Executive Office of Labor and Workforce development, a copy of which is contained in the bid specifications, and will be made a part of the Contract. No bid shall be withdrawn for a period of thirty (30) days, Saturdays, Sundays and legal holidays excluded, after receipt of award, without written consent by the Town of Longmeadow.

The Town of Longmeadow acting through the Town Manager, the Awarding Authority, reserves the right to reject any or all bids, waive minor informalities and to award a contract in the best interest of the Town of Longmeadow.

TOWN OF LONGMEADOW, MASSACHUSETT
POLICE DEPARTMENT AC UNIT REPLACEMENT PROJECT
INVITATION FOR BID

1. The Town of Longmeadow, the Awarding Authority, will receive sealed bids for the Police Department AC Unit Replacement Project at the Longmeadow Purchasing Department, in accordance with the bid documents prepared by RDK Engineers, 380 Russell Street, Hadley, MA 01035.
2. Sealed bids for the bidders should be delivered only to the Town of Longmeadow, Purchasing Department, Attn: Chad Thompson, Procurement Manager, 735 Longmeadow Street, Suite 101, Longmeadow, MA 01106. Sealed bids will be received until the bid deadline of **Tuesday, March 14, 2017 at 11:00am**, after which time all bids will be opened and read aloud in the auditorium. Late bids will be rejected.
3. Bidding procedures shall be in accordance with the provisions of Massachusetts General Laws, Chapter 149, Section 44A through Section 44I, inclusive, and Chapter 30, Section 39M, as amended.
4. Every General Bid shall be accompanied by a bid bond, or cash, or certified check on, or treasurer's or cashier's check issued by a responsible bank or trust company, payable to the "Town of Longmeadow", in the amount of five percent (5%) of the bid amount.
5. Bid documents are only available from the Town of Longmeadow, Purchasing Department, Attn: Chad Thompson, Procurement Manager, 735 Longmeadow Street, Suite 101, Longmeadow, MA 01106. Bid documents can also be accessed through the Purchasing Department page of the town website, www.longmeadow.org. From the Purchasing Department page select the 'Bids & RFPs' link, then select the link 'Bid & RFP Finder' to access the bid documents. Bidders are encouraged to register with the Longmeadow Purchasing Department in order to receive updates and additional addenda. Those that do not register with the Longmeadow Purchasing Department will be required to independently monitor the Longmeadow bid listing service for issued updates and addenda. Failure to acknowledge addenda may result in a bid rejection.
6. **A MANDATORY Pre-Bid Conference is scheduled for Friday, March 3, 2017 beginning at 11:00am. Gather in the auditorium at the address of the Purchasing Department, 735 Longmeadow Street, Longmeadow, MA 01106 (the Community House).** Bidders are encouraged to arrive on time so the opportunity to register on the Mandatory Pre-Bid Conference Registration Forms is not missed by an interested bidder. The conference will begin in the Community House Auditorium and then the group will walk to the Police Station for group entry into the Police Station. Those that attend the Mandatory Pre-Bid Conference should register on the Registration Form during the Mandatory Pre-Bid Conference. Just before the Mandatory Pre-Bid Conference is over, the Longmeadow Procurement Manager will read the names of all that signed and registered on the Mandatory Pre-Bid Conference Registration Form. The Longmeadow Procurement Manager will then make a final plea for unregistered conference attendees to register on the Mandatory Pre-Bid Conference Registration Form. Once the Procurement Manager declares that the Mandatory Pre-Bid Conference is 'Complete and Closed', then no others will be allowed to register their attendance for the Mandatory Pre-Bid Conference. Additional site inspection requests will not be accommodated. Bids received from those that have not registered during the Mandatory Pre-Bid Conference will have their bid rejected.
7. Sealed bids should be delivered to the Longmeadow Purchasing Department no later than the bid deadline and should include the name and contact information of the bidder and the bid title 'IFB-Police Department AC Unit Replacement Project', in order to guard against premature opening of the Bid. Late bids will be returned unopened.

8. The successful General Bidder will be required to furnish a 100% performance bond, and 100% labor and materials payment bond as set forth in the specifications; each bond executed in the full amount of the Contract Price.
9. Prevailing Wage Rates to be paid on the work of the project are established by a Schedule issued by the Division of Occupational Safety under the Executive Office of Labor and Workforce development, a copy of which is contained in the Contract Documents, and will be made a part of the Contract.
10. No bid shall be withdrawn for a period of thirty (30) days, Saturdays, Sundays and legal holidays excluded, after receipt of award, without written consent by the Town of Longmeadow.
11. A CORI check of all Contractor employees will be required of the successful contractor. The contractor will be responsible for all expenses associated with CORI checks.
12. The Town of Longmeadow is exempt from sales tax, for which reason, bidders should not include sales tax in figuring or in reference to any bid.
13. The Town of Longmeadow acting through the Town Manager, the Awarding Authority, reserves the right to reject any or all bids, waive minor informalities and to award a contract in the best interest of the Town of Longmeadow.

END OF INVITATION FOR BID

INSTRUCTIONS TO BIDDERS

1. PREPARATION OF GENERAL BIDS

- A. Bidding procedures shall be in accordance with the provisions of Massachusetts General Laws, Chapter 149, Section 44A through Section 44I, inclusive and Chapter 30, Section 39M as amended. Said statutes are hereby made a part of these INSTRUCTIONS TO BIDDERS to the same extent as though herein reproduced in full. In the event of any inconsistency between any of the provisions of these Contract Documents and of cited statute, anything herein to the contrary notwithstanding, the provisions of said statute shall govern.

2. ADDENDA AND INTERPRETATIONS

- A. Bidders shall promptly raise the issue of any ambiguity, inconsistency or error, which they may discover upon examination of the bid documents, the worksite or any other conditions which apply to the work. Bidders must note that statements made orally are not binding on the Town and only written responses by the Town will be considered. **All questions must be sent in writing to:** Town of Longmeadow, Purchasing Department, Attn: Chad Thompson, Procurement Manager, 735 Longmeadow Street, Suite 101, Longmeadow, MA 01106, cthompson@longmeadow.org. To identify questions coming in, please write in the subject area the following: **“Police Department AC Unit Replacement Project – Questions”**. Requests properly presented, that in the opinion of the Town, require interpretation, correction, or change in the Bid Documents will result in an issuance of an Addendum to the Bid Documents. Such Addendum shall subsequently become part of the contract. If any changes are made to this bid, an addendum will be issued. Any addendum will be e-mailed to all bidders on record as having requested bid list registration for the specific named bid with the Town of Longmeadow Purchasing Department. If no e-mail is provided by a bidder on record, then the addendum will be faxed or mailed by USPS. All issued addenda should be acknowledged on the bid submission forms submitted by the bidder. Bid documents including issued addenda are posted online through the bid listing service that can be accessed through the Purchasing Department page of the town website, www.longmeadow.org. Bidders are encouraged to register with the Longmeadow Purchasing Department in order to receive updates and additional addenda. Those that do not register with the Longmeadow Purchasing Department will be required to independently monitor the Longmeadow bid listing service for issued updates and addenda.
- B. Failure of any bidder to receive any such Addenda shall not relieve such bidder from any obligation under his bid as submitted. All addenda so issued shall become part of the Contract Documents. At the same time of the opening of the bids, each bidder will be presumed to have inspected the site and to have read and to be thoroughly familiar with the Contract Documents (including all Addenda). The failure or omission of any bidder to examine any form, instrument, or document shall in no way relieve any bidder from any obligation in respect to his bid. Failure to acknowledge an issued addendum may result in a bid rejection.

3. ALTERNATES

- A. All bidders are required to bid on the Base Bid and all numbered Alternates set forth on the BID FORMS. Failure of a bidder to not supply pricing for the Base Bid and all listed bid Alternates will result in a bid rejection. Bidders should document bid pricing in both numeric and words. The amounts indicated for the Alternates shall include overhead and profit and cover the furnishing and installing all the materials, including labor, equipment, transportation and incidentals necessary for the performance of all work set forth in the Contract Documents.

4. FORM AND AMOUNT OF BID DEPOSITS

- A. Every general bid shall be accompanied by a bid bond, or certified check, or a treasurer's or cashier's check issued by a responsible bank or trust company, payable to the "Town of Longmeadow", in the amount of five (5%) of the bid amount.
- B. The return of such bid deposits will be in accordance with GL Chapter 149, Section 44B. Special attention is called to the provisions of GL Chapter 149, Secs. 44E and 44F that every general bid which is not accompanied by the prescribed bid deposit shall be rejected.

5. REQUIREMENTS FOR FOREIGN CORPORATIONS

- A. The attention of all bidders is called to the provisions of General Laws, Chapter 30, Section 39L, added by Chapter 446 of the Acts of 1963 which provided that the Awarding Authority may not enter into a Contract for construction work and may not approve as a Subcontractor furnishing labor and materials for a part of any work a foreign corporation which has not complied with the requirements of Section 3 and 5 of Chapter 181 of the General Laws. The term "foreign corporation" means a corporation not incorporated under the laws of the Commonwealth of Massachusetts.

6. SUBMISSION OF BIDS

- A. Each General Bid shall be submitted on the FORM FOR GENERAL BID furnished by the Awarding Authority. Do not use the form contained in the bound PROJECT MANUAL. All blank spaces shall be filled in, in ink or typewritten, in words and figures only where no space is provided for words, and signed by the General Bidders. The FORM FOR GENERAL BID, including Bid Deposit, shall be enclosed in a sealed envelope with the following plainly marked on the outside:

GENERAL BID FOR: IFB – Police Department AC Unit Replacement Project

If the bid is mailed, the General Bidder shall enclose his sealed bid in an outer envelope and address it as follows:

FROM: (General Bidder's Name and Business Address)
re: IFB – Police Department AC Unit Replacement Project

TO: Town of Longmeadow
Purchasing Department
Attn: Chad Thompson, Procurement Manager
735 Longmeadow Street, Suite 101
Longmeadow, MA 01106

- B. All bidders are cautioned to allow ample time for transmittal of bids. Bids received after the specified times will not be accepted or recognized. Note that the times of receipt will determine the acceptability of mailed bids regardless of postmark.
- C. The Awarding Authority will not be held responsible for premature opening of bid envelopes which are not properly filled out in accordance with the instructions set forth herein.

7. BID MODIFICATIONS

- A. No modification of any bid will be considered by the Awarding Authority, unless same is in writing, sealed, and received by the Awarding Authority prior to the times respectively established herein for the receipt of General Bids.

8. WITHDRAWAL OF BIDS

- A. A bid may be withdrawn by written request subsequently confirmed in writing, provided that such request is received prior to times respectively established herein for the receipt of General Bids. The Awarding Authority will not be responsible, however, for the timely receipt

of any request for withdrawal in ample time for delivery before the bid opening hour.

9. BIDDER'S QUALIFICATIONS

- A. Each General Bidder must be on an approved list of prequalified bidders, in accordance with the provisions of Chapter 579 of the Acts of 1980, which amended M.G.L.c. 30, 39f, 39q and 39r, before consideration for such bid is given.

10. RIGHT TO REJECT BIDS RECEIVED

- A. The Awarding Authority reserves the right to reject any or all general bids if it be in the public interest so to do. All bids will remain subject to acceptance for thirty days after the day of the Bid opening, but the Owner may, in its sole discretion, release any Bid and return Bid security before that date.

11. INSPECTION OF EXISTING BUILDING

- A. All bidders are required to inspect the existing building at the Mandatory Pre-Bid Conference and to familiarize themselves with conditions as they exist, prior to submitting their bids. **A MANDATORY Pre-Bid Conference is scheduled for Friday, March 3, 2017 at 11:00am Gather in the auditorium at the address of the Purchasing Department (the Community House, 735 Longmeadow Street, Longmeadow, MA.** The mandatory pre-bid conference attendees will then walk to the Police department for an inspection of the facility. Bidders are encouraged arrive on time so the opportunity to register on the Mandatory Pre-Bid Conference Registration Forms is not missed by an interested bidder. Those that attend the Mandatory Pre-Bid Conference should register on the Registration Form during the Mandatory Pre-Bid Conference. Just before the Mandatory Pre-Bid Conference is over the Longmeadow Procurement Manager, will read the names of all that signed in a registered on the Mandatory Pre-Bid Conference Registration Form. The Longmeadow Procurement Manager will then make a final plea for unregistered conference attendees to register on the Mandatory Pre-Bid Conference Registration Form. Once the Procurement Manager declares that the Mandatory Pre-Bid Conference is 'Complete and Closed', then no others will be allowed to register their attendance for the Mandatory Pre-Bid Conference. Additional site inspection requests will not be accommodated. Bids received from those that have not registered during the Mandatory Pre-Bid Conference will have their bid rejected.

12. SUBSTITUTIONS – EQUAL AND COMPARABLE

- A. Any reference in the specifications to any article, device, product, material, fixture, form, or type of construction by name, make, or catalog number, shall be interpreted as establishing a standard of quality being equal and comparable, and shall not be construed as limiting competition. The contractor, in such cases, may, at their option, use any article, device, product, material, fixture forms or type of construction which, in the judgment of the Owner is equal to that specified.

Every request for approval of a substitution should be addressed to the Procurement Manager of the Town of Longmeadow. Details regarding the supplies and services required under this contract are presented in the drawings and specifications for the project. Should a Bidder know of some component or aspect of their Bid that does not meet the Specifications, the bidder must list such items as exceptions. Failure to list any such exceptions may lead the Town to deem a bid non-responsive, and under these conditions, the bid may be rejected. The Town of Longmeadow reserves the right to review any and all exceptions to the Specifications and can accept or reject any bid if the exception(s) noted are not in the best interest of the Town. The Town will consider specifications that are 'equal' to those specified in the IFB. The Town considers an 'equal' as: An item equal to that named or described in the specifications, may be furnished by the vendor and the naming of any commercial name, trademark, or other identification shall not be construed to exclude any item or manufacturer not mentioned by name or as limiting competition shall establish a standard of equality only.

An item shall be considered equal to the item so named or described if (1) it is at least equal in quality, durability, appearance, strength, and design; (2) it will perform at least equally the function imposed by the general design of the work being contracted for or the material being purchased; (3) it conforms substantially, even with deviations, to the detailed requirements for the items in the specifications; (4) it will perform in conjunction and will successfully interface with pre-existing equipment that is currently stocked and is currently installed and in use. The naming and identification of all materials other than the one specifically named shall be submitted to the Town in writing for approval at time of bid submission. It is the bidder's responsibility to provide information and evidence for the Town to evaluate products and services that are proposed as 'equal'. This includes evidence and references from other Massachusetts communities utilizing similar applications, installation, and retrofitting systems.

If, in the judgment of the Town, the article, device, product, material, fixture, form or type of construction is acceptable, approval will be given.

If a proposed substitution is not approved in writing by the Town, the contractor shall use the specified article, device, product, material, fixture, form or type of construction.

When a substitute article, device, product, material, fixture, form or type of construction is approved, any modification(s) to the work necessary as a result of the use of such substitute shall be made, complete by the contractor and at no additional expense to the Owner. No substitutions will be considered otherwise unless specifically provided in the contract documents.

13. METHOD OF AWARD

- A. The Contract will be awarded to the lowest responsible and eligible general bidder on the basis of the proposed Contract Price. Special attention is called to the provisions of GL Chapter 149, Sec. 44A defining the term "lowest responsible and eligible bidder". The Town of Longmeadow reserves the right to solicit references for similar categories of previously completed. Any unfavorable or negative feedback obtained from a reference check may be grounds for the rejection of a bid at the sole discretion of the Town of Longmeadow.

14. EXECUTION OF GENERAL CONTRACT AND SECURITY FOR FAITHFUL PERFORMANCE

- A. Special attention is directed to the requirements of the G.L. Chapter 149, Section 44E and the FORM FOR GENERAL BID that the general bidder who is selected as General Contractor promptly confer with the Awarding Authority within five (5) days, Saturdays, Sundays, and legal holidays excluded, after presentation thereof, in accordance with the general bid; and furnish with the executed Contract, a Performance Bond, and also a Labor and Material Payment Bond, each of which shall be in the sum of 100 percent (100%) of the Contract Price, the premiums for which are to be paid by the General Contractor and are included in the Contract Price. If the General Contractor is a partnership, the bond shall be signed in the correct corporate name by duly authorized officer, agent, or attorney-in-fact. The executed bond shall be accompanied by (a) appropriate acknowledgment of the respective parties; (b) appropriate certified copy of power-of-attorney or other certifications of authority where bond is executed by an agent, officer or representative of the General Contractor or Surety; (c) a duly certified extract from the by-laws or resolutions of the Surety under which power-of-attorney or other certificate of authority of its agent, officer, or representative was issued; and (d) a duly certified copy of the latest published financial statement of assets and liabilities of the Surety. Certificates of insurance, required under the Contract Documents, shall be submitted with bonds.

15. SALES TAX EXEMPTION

- A. All materials and items which will be incorporated into the project, and which will become the property of the Owner upon completion of said project, will be exempt from the

Massachusetts Sales Tax. The General Contractor shall obtain from the Owner the Sales Tax exemption number, applicable for the project, and shall include said number when ordering materials for the project.

16. POST-BID CONFERENCE

- A. A post-bid conference will be held at the project prior to the execution of the General Contract, with the successful General Bidder to discuss phasing and other operations of the Contract. The date of such conference will be established by the Awarding Authority.

17. BUILDING PERMIT

- A. The successful bidder is required to obtain all permits required to complete the Contract. All permits issued by the Town of Longmeadow Building Department will be supplied at no charge. To obtain required building permits from the Town Building Department, contact the Building Department at 413-565-4153 at 20 Williams Street, 2nd Floor, Longmeadow, MA 01106.

18. COMMENCEMENT AND COMPLETION

- A. The Contractor shall commence work no later than five (5) calendar days after execution of the General Contract, or receipt of Notice to Proceed from the Owner, whichever is earlier. Contractor shall bring each phase of the work required under the contract to final completion, as defined in the GENERAL CONDITIONS, no later than that which is specified.

END OF INSTRUCTIONS TO BIDDERS

FORM FOR GENERAL BID

Town of Longmeadow
Purchasing Department
Attn: Chad Thompson, Procurement Manager
735 Longmeadow Street, Suite 101
Longmeadow, MA 01106

- A. The undersigned proposes to furnish all labor and materials required for the Police Department AC Unit Replacement Project for the Town of Longmeadow in Longmeadow, Massachusetts, in accordance with the accompanying Documents, Drawings, and Specifications, prepared by RDK Engineers, 380 Russell Street, Hadley, MA 01035, for the contract prices specified below, subject to additions and deductions according to the terms of the Contract Documents and Specifications.
- B. BIDDER accepts all of the terms and conditions of the Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid Security. BIDDER promises and agrees that this Bid will remain subject to acceptance for thirty days after the day of Bid opening.
- C. In submitting this Bid, BIDDER represents, as more fully set forth in the Agreement, that:
1. BIDDER has examined copies of all the Bidding Documents.
 2. BIDDER has familiarized itself with the nature and extent of the Contract Documents, Work, site, locality, and all local conditions and laws and regulations that in any manner may affect cost, progress, performance or furnishing of the work.
 3. BIDDER has studied carefully all reports and drawings of physical conditions included with these specifications, and accepts that all measurements and technical data included herein is ENGINEER'S estimates and BIDDER has made such investigations of his own as necessary and has based his bid on those investigations.
 4. BIDDER has obtained and carefully studied (or assumes responsibility for obtaining and carefully studying) all such examinations, investigations, explorations, tests and studies (in addition to or which pertain to the physical conditions at the site or otherwise may affect the cost, progress, performance or furnishing of the Work) as BIDDER considers necessary for the performance or furnishing of the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents, and no additional examinations, investigations, explorations, tests, reports, or similar information or data are or will be required by BIDDER for such purposes.
 5. BIDDER has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Contract Documents.
 6. BIDDER has given the TOWN written notice of all conflicts, errors or discrepancies that it has discovered in the Contract Documents and the written resolution thereof by the TOWN is acceptable to BIDDER.
 7. This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; BIDDER has not directly or indirectly induced or solicited any other BIDDER to submit a false or sham bid; BIDDER has not solicited or induced any person, firm or corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for itself any advantage over any other bidder or over OWNER.
- D. BIDDER agrees that the work shall be completed in the specified number of working days from the date of the Notice to Proceed.

- E. The terms used in this Bid which are defined in the Town of Longmeadow Contract and include the General Conditions of the Construction Contract (AIA Document A201) included as part of the Contract Documents have the meanings assigned to them in the General Conditions. In the event of a discrepancy or contradiction between the AIA Document and the Town Contract, the Town Contract shall prevail.
- F. The undersigned agrees that, if he is selected as General Contractor, he will within five (5) days, Saturdays, Sundays, and legal holidays excluded, after presentation thereof by the Awarding Authority, execute a Contract in accordance with the terms of his general bid and furnish a performance bond, also a labor and materials or payment bond, each of a surety company qualified to do business under the laws of the Commonwealth and satisfactory to the Awarding Authority and each in the sum of one hundred percent (100%) of the Contract Price, the premiums for which are to be paid by the General Contractor and are included in the Contract Price.
- G. The undersigned hereby certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work and that he will comply fully with all laws and regulations applicable to awards made subject to Section 44A.
- H. The undersigned further certifies under penalties of perjury that the said undersigned is not presently debarred from doing public construction work in the Commonwealth under the provisions of section twenty-nine F of chapter twenty-nine, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or regulation promulgated thereunder.
- I. The undersigned hereby certifies, under the penalties of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this subsection, the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity.
- J. The undersigned proposes to furnish all necessary and required work and materials to provide the Police Department AC Unit Replacement Project in accordance with the accompanying and specifications at the Unit Prices bid.

Bids will be compared on the basis of the aggregate sums of the products of the various unit prices or lump sum items multiplied by the quantities given in the Bid Form for such items. In case of discrepancy in any Bid between unit price and amount, or between words and figures, the listed unit price in words will govern in comparing BIDS.

This bid includes addenda number # _____

THE PROPOSED TOTAL BASE BID PRICE:

_____ **DOLLARS and** _____ **cents** **\$** _____

Date _____

Name of General Bidder

Name of Person Signing Bid and Title

Business Address

City, State, ZIP

Telephone Number

E-mail

Is your firm a Minority or Woman Business Enterprise? Yes____ No____

If a Corporation: Bidder Company Information

Name of Corporation:_____

Business Address:_____

Telephone Number:_____

Incorporated under the Laws of the State of:_____

President:_____

(Name)

(Title)

Secretary:_____

(Name)

(Title)

Treasurer:_____

(Name)

(Title)

Dated:_____

AFFIX CORPORATE
SEAL HERE

If a foreign corporation (incorporated or organized under laws other than laws of the Commonwealth of Massachusetts), is the corporation registered with the Secretary of State of Massachusetts?

Yes _____ No _____.

If the bidder is a foreign corporation and is selected for the work referred to above, it is required under MGL c.30 Sec. 39L to furnish to the awarding authority a certificate of the Secretary of State stating that the corporation has corporation has compiled with MGL c. 181 Sec 3,5 and that date of such compliance.

If a Partnership, Individual, or Non - Incorporated Organization:

Name of Company: _____

Name and Address of Members of Company, if different from Company address:

Telephone Number: _____

CERTIFICATE OF NON-COLLUSION

The undersigned certifies under penalties of perjury that this bid or proposal has been made and submitted in good faith and without collusion or fraud with any other person. As used in this certification, the word "person" shall mean any natural person, business, partnership, corporation, union, committee, club, or other organization, entity, or group of individuals.

Signature of Bidder

Printed Name of Bidder

Name of Business

CERTIFICATE OF NON-DEBARMENT

The undersigned further certifies under penalty of perjury that the said undersigned is not presently debarred from doing public construction work in the commonwealth under the provisions of section twenty-nine F of chapter twenty-nine or any other applicable debarment provisions of any other chapter of the General Laws or any rule or regulation promulgated thereunder.

Signature of Bidder

Printed Name of Bidder

Name of Business

TAX COMPLIANCE CERTIFICATION

Pursuant to M.G.L. c. 62C, §49A, I certify under the penalties of perjury that, to the best of my knowledge and belief, I am in compliance with all laws of the Commonwealth relating to taxes, reporting of employees and contractors, and withholding and remitting child support.

Signature of Bidder

Printed Name of Bidder

Name of Business

CONFLICT OF INTEREST CERTIFICATION/STATEMENT

The Bidder named below hereby certifies that:

1. The Bidder has not given, offered, or agreed to give any gift, contribution, or offer of employment as an inducement for, or in connection with, the award of a contract for these services.
2. No consultant to, or, subcontractor for the Bidder has given, offered, or agreed to give any gift, contribution, or offer of employment to the Bidder, or , to any other person, corporation, or entity as an inducement for, or, in connection with, the award to the consultant or subcontractor of a contract by the Bidder.
3. No person, corporation, or, other entity, other than a bona fide full time employee of the Bidder has been retained or hired to solicit for or in any way assist the Bidder in obtaining the contract for service upon an agreement or understanding that such person, corporation, or entity be paid a fee or other compensation contingent upon the award of the contract to the Bidder.

I also hereby certify that the Bidder named below understands that the Massachusetts Conflict of Interest Law, Chapter 268A of the Massachusetts General Laws, applies to the Bidder with respect to the services outlined in the Project Manual. I also certify that the Bidder understands that the Bidder, its officers, employees, agents, subcontractors and affiliated agencies, shall not participate in any activity which constitutes a violation of the Massachusetts Conflict of Interest Law or which creates an appearance of a violation of the Massachusetts Conflict of Interest Law.

Signature of Bidder

Printed Name of Bidder

Name of Business

CERTIFICATE OF CORPORATE AUTHORITY

1. I hereby certify that I am the Clerk/Secretary of

(insert full name of corporation)

2. corporation, and that

(insert the name of officer who signed the contract and bonds)

3. is the duly elected

(insert the title of the officer in line 2)

4. of said corporation, and that on

*(the date must be **ON OR BEFORE** the date the officer signed the contract or bonds)*

at a duly authorized meeting of the Board of Directors of said corporation, at which all the directors were present or waived notice, it was voted that

5. _____ the _____
(insert name from line 2) (insert title from line 3)

of this corporation be and hereby is authorized to execute contracts and bonds in the name and on behalf of said corporation, and affix its Corporate Seal thereto, and such execution of any contract of obligation in this corporation's name and on its behalf, with or without the Corporate Seal, shall be valid and binding upon this corporation; and that the above vote has not been amended or rescinded and remains in full force and effect as of the date set forth below.

AFFIX CORPORATE SEAL
HERE

6. ATTEST: _____
*(signature **must be** that of Clerk or Secretary of the corporation)*

7. Name: _____
(print name of signee in line 6)

8. Date: _____
*(insert a date that is **ON OR AFTER** the date the officer signed the contract and bonds)*

CERTIFICATE OF FOREIGN CORPORATION

If the Bidder is a foreign corporation, by affixing his/her signature, the Bidder certifies that the corporation is qualified under provisions of M.G.L. Chapter 181, Section 4 to do business in the Commonwealth of Massachusetts.

Signature of Bidder

Printed Name of Bidder

Name of Business

If awarded the Contract, the Contractor shall provide with his agreement package, a certificate from the Secretary of the Commonwealth of Massachusetts that the corporation is qualified under provisions of M.G.L. Chapter 181, Section 4, to do business in the Commonwealth.

CERTIFICATE OF COMPLIANCE WITH M.G.L. c.151B

Unlawful Discrimination Because of Race, Color, Religious Creed,
National Origin, Ancestry or Sex

The Bidder hereby certifies that it is in compliance and shall remain in compliance with Massachusetts General Laws Chapter 151B and shall not discriminate on any prohibited basis outlines therein. The Bidder also hereby certifies that it shall comply with any and all State Office of Minority and Women Business Enterprise Assistance (SOMWBA) thresholds, as applicable, if they have been established in conjunction with this Contract solicitation.

NOTE: ALL STATE OFFICE OF MINORITY AND WOMEN BUSINESS ENTERPRISE ASSISTANCE (SOMWBA) GOALS ARE WAIVED FOR THIS PROJECT

Signature of Bidder

Printed Name of Bidder

Name of Business

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION CERTIFICATION

The undersigned agrees that if he is selected as the contractor, he shall comply with the provisions of M.G.L. Chapter 30, Section 39S.

The undersigned certifies, under penalties of perjury, that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed in the work; that all employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration that is at least ten (10) hours in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first certified payroll report for each employee.

Signature of Bidder

Printed Name of Bidder

Name of Business

**OWNER-CONTRACTOR AGREEMENT
FOR PUBLIC BUILDING CONSTRUCTION OR RENOVATION**

THIS AGREEMENT made this _____ day of March in the year Two Thousand and Seventeen, between VENDOR, with a usual place of business at ADDRESS, hereinafter called the CONTRACTOR, and the Town of Longmeadow, Massachusetts acting by its Town Manager and/or Select Board, with a usual place of business at 20 Williams Street, Longmeadow, MA 01106, hereinafter called the OWNER.

The CONTRACTOR and the OWNER, for the consideration hereinafter named, agree as follows:

1. Scope of Work

The Contractor shall furnish all labor, materials, equipment and insurance to perform all work required for the project known as Police Department AC Unit Replacement Project, in strict accordance with the Contract Documents and all related Drawings and Specifications per IFB packet, ATTACHMENT A: Town of Longmeadow, IFB: Police Department AC Unit Replacement Project, dated February 23, 2017; and Addendum No....(if any). The said Documents, Specifications, Drawings and any general supplementary conditions are incorporated herein by reference and are made a part of this Agreement.

2. Contract Price

The Owner shall pay the Contractor for the performance of this Agreement, subject to additions and deductions provided herein, in current funds, the sum of \$ TBD per bid price proposal specifications, ATTACHMENT B, Bid Submission Forms submitted by _____, signed and dated by _____.

3. Commencement and Completion of Work and Liquidated Damages

It is agreed that time is of the essence of this Agreement. The Contractor shall commence and prosecute the work under this Agreement upon execution hereof and shall complete the work on or before June 30, 2017.

A. Definition of Term: The Term "Substantial completion" shall mean the date certified by the Owner when construction is sufficiently complete, in accordance with the Contract Documents, so the Owner may occupy the project, or designated portion(s) thereof, for the use for which it is intended.

- B. Time as Essential Condition: It is understood and agreed that the commencement of and substantial completion of the work are essential conditions of this Agreement. It is further agreed that time is of the essence for each and every portion of the Contract Documents wherein a definite and certain length of time is fixed for the performance of any act whatsoever; and where under the Contract Documents any additional time is allowed for the completion of any work, the new time fixed by such extension shall be of the essence of this Agreement. It is understood and agreed that the times for the completion of the work are reasonable, taking into consideration the average climatic range and usual industrial conditions prevailing in this locality.
- C. Progress and Completion: Contractor shall commence work promptly upon execution of this Agreement and shall prosecute and complete the work regularly, diligently and uninterruptedly at such a rate of progress as will insure Substantial Completion within the stipulated number of calendar days.
- D. Liquidated Damages: It is expressly agreed between the Contractor and the Owner that the Contractor will be responsible for all damages which may arise due to the Contractor's failure to substantially complete the work within the above specified time. If the Contractor shall neglect, fail or refuse to complete the work within the specified number of days, or any extension thereof authorized by the Owner, Contractor agrees, as a part of the consideration for the execution of this Contract by the Owner, to pay the Owner the amount specified herein, not as a penalty, but as liquidated damages for such breach of contract as hereinafter set forth, for each and every calendar day, excluding Saturdays, Sundays and legal Holidays, that the Contractor shall be in default of Substantial completion after the date specified in the Agreement. Due to the impracticability and extreme difficulty of fixing and ascertaining the actual damages the Owner would in such event sustain, said amount is agreed to be the amount of damages which the Owner would sustain, and said amount shall be retained from time to time by the Owner from current periodic estimates. The amount of liquidated damages shall \$100.00 per day per,.

4. Performance of the Work

- A. Direction of the Work: The Contractor shall supervise and direct the Work, using his best skills and attention which shall not be less than such state of skill and attention generally rendered by the contracting profession for projects similar to the Project in scope, difficulty and location. The Contractor shall maintain adequate supervisory personnel at the project site during the performance of the Work. He shall be solely responsible for all construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Agreement.
- B. Responsibility for the Work: (1) The Contractor shall be responsible to the Owner for the acts and omissions of his employees, Subcontractors and their agents and employees, and other persons performing any of the Work under a contract with the Contractor. This obligation shall also extend to the presence on the Site of suppliers of materials or equipment, their employees, contractors, and agents engaged in the work.

- (2) The Contractor shall not be relieved from his obligations to perform the Work in accordance with the Contract Documents either by the activities or duties of the Owner in its administration of the Agreement, or by inspections, tests or approvals required or performed by persons other than the Contractor.
- C. Permits and Fees: Unless otherwise expressly provided, the Contractor shall secure and pay for all permits and fees, licenses and inspections necessary for the proper execution and completion of the Work which are customarily secured after execution of the Agreement and which are legally required at the time the bids are received, and the same shall at all times be the property of the Owner and shall be delivered to the Owner upon completion of the Project. Permits that would be obtained from the Town of Longmeadow Building Department shall be provided at no charge to the Contractor.
- D. Notices, Compliance With Laws: (1) The Contractor shall give all notices and comply with all federal, state and local laws, ordinances, rules, regulations and lawful orders of any public authority bearing on the performance of the Work. The Contractor shall provide the Owner with reproductions of all permits, licenses and receipts for any fees paid. The Owner represents that it has disclosed to the Contractor all orders and requirements known to the Owner of any public authority particular to this Agreement.
- (2) If the Contractor observes that any of the Contract Documents are at variance with applicable laws, statutes, codes and regulations in any respect, he shall promptly notify the Owner in writing, and any necessary changes shall be accomplished by appropriate modification.
- (3) If the Contractor performs any Work which he knows or should know is contrary to such laws, ordinances, rules and regulations, and without such notice to the Owner, he shall assume full responsibility therefor and shall bear all costs attributable thereto.
- (4) In the performance of the Work, the Contractor shall comply with all applicable federal, state and local laws and regulations including those relating to workplace and employee safety. The Contractor shall notify the Owner immediately of any conditions at the place of the work which violate said laws and regulations and shall take prompt action to correct and eliminate any such violations.
- E. Project Superintendent: The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site at all times during the progress of the Work. The superintendent shall represent the Contractor and all communications given to the superintendent shall be as binding as if given to the Contractor. Important communications shall be confirmed in writing. Other communications shall be so confirmed on written request in each case.
- F. Progress Schedule: The Contractor, immediately after being awarded the Contract, shall prepare and submit for the Owner's information an estimated progress schedule for the

Work. The progress schedule shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

G. Drawings, Specifications and Submittals:

(1) The Contractor shall maintain at the site for the Owner one record copy of all Drawings, Specifications, Addenda, Change Orders and other Modifications, and "As-Built" Drawings and Specifications in good order and marked currently to record all changes made during construction, and approved Shop Drawings, Product Data and Samples. These shall be delivered to the Owner upon completion of the Work.

(2) By approving and submitting Shop Drawings, Product Data and Samples, the Contractor represents that he has determined and verified all materials, field measurements, and field construction criteria related thereto, or will do so, and that he has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

(3) The Contractor shall not be relieved of responsibility for any deviation from the requirements of the Contract Documents by the Owner's approval of Shop Drawings, Product Data or Samples unless the Contractor has specifically informed the Owner in writing of such deviation at the time of submission and the Owner has given written approval to the specific deviation. The Contractor shall not be relieved from responsibility for errors or omissions in the Shop Drawings, Product Data or Samples by the Owner's approval thereof.

(4) The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data or Samples, to revisions other than those requested by the Owner on previous submittals.

(5) No portion of the Work requiring submission of a Shop Drawing, Product Data or Sample shall be commenced until the submittal has been approved by the Owner. All such portions of the Work shall be in accordance with approved submittals.

H. Protection of the Work and Owner's Property: The Contractor shall at all times safely guard the Owner's property from injury or loss in connection with this Agreement. He shall at all times safely guard and protect his own work, and that of adjacent property from damage. The Contractor shall replace or make good any such damage, loss or injury. The Contractor shall clean the work area and restore it to its original condition upon completion of the work.

(6) The Contractor shall comply with applicable OSHA, State and municipal regulations and requirements for services and facilities in the performance of all requirements of this contract. OSHA safety requirements shall be adhered to for all

personnel performing construction, reconstruction, alteration, remodeling or repair of any building or public works project.

- I. **Quality of the Work:** The Contractor shall perform the work in a good, workmanlike manner. The Contractor hereby guarantees that the entire work constructed by him under the Agreement will meet fully all requirements thereof as to quality of workmanship and materials. The Contractor hereby agrees to make at his own expense any repairs or replacements made necessary by defects in materials or workmanship supplied to him that become evident within one (1) year after the date of the final payment, and to restore to full compliance with the requirements set forth herein any part of the work constructed hereunder, which during said one (1) year period is found to be deficient with respect to any provisions of the Contract Documents. The Contractor also agrees to hold the Owner harmless from claims of any kind arising from damage due to said defects. The Contractor shall make all repairs and replacements promptly upon receipt of written orders for same from the Owner. If the Contractor fails to make the repairs and replacements promptly, the Owner may do the work and the Contractor shall be liable to the Owner for the cost thereof.
- J. **Warranty:** The Contractor guarantees to Owner that all materials incorporated into the work will be new unless otherwise specified or agreed. Prior to final payment, the Contractor shall deliver to the Owner all manufacturers' warranties, together with such endorsements or assignments as are necessary to ensure to the Owner the full rights and benefits of such warranties.

5. Equal Employment Opportunity

The Contractor is directed to comply with all applicable State Laws, Ordinances, Bylaws, and rules and regulations regarding affirmative action/equal employment opportunity requirements. Failure of the Contractor to comply with any such law, rule or regulation shall constitute grounds for the Owner to terminate the Agreement.

6. Site Information Not Guaranteed; Contractor's Investigation

All information given in the Contract Documents relating to subsurface and other conditions, natural phenomena, existing pipes, and other structures is from the best sources at present available to the Owner. All such information is furnished only for the information and convenience of the Contractor and is not guaranteed.

It is agreed and understood that the Owner does not warrant or guarantee that the subsurface or other conditions, natural phenomena, existing pipes, or other structures encountered during construction will be the same as those indicated in the Contract Documents.

Contractor has familiarized himself with the nature and extent of the Contract Documents, work, locality, and with all local conditions and federal, state, and local laws, rules, ordinances, and regulations that in any manner may affect costs, progress, or performance of the

work. Contractor has made, or has caused to be made, examinations, investigations, and tests and studies of such reports and related data in addition to those referred to in the paragraph above as he deems necessary for the performance of the work at the Contract Price, within the Contract Time, and in accordance with the other Terms and Conditions of the Contract Documents; and no additional examinations, tests, investigations, reports, and similar data are or will be required by the Contractor for such purposes.

Contractor has correlated the results of all such observations, examinations, investigations, tests, reports, and data with the Contract Documents. Contractor has given the Owner written notice of all conflicts, errors, or discrepancies that he has discovered in the Contract Documents, and the resolution thereof by the Owner is acceptable to the Contractor.

It is further agreed and understood that the Contractor shall not use or be entitled to use any of the information made available to him or obtained in any examination made by him in any manner as a basis of or ground for any claim or demand against the Owner, arising from or by reason of any variance which may exist between the information made available and the actual subsurface conditions or other conditions or structures actually encountered during the construction work, except as may otherwise be expressly provided for in the Contract Documents.

7. Project Architect or Engineer

There is not X, There is _____ is a project architect-engineer for this project who is RDK Engineers. Except as otherwise indicated in the Contract Documents, the Architect/Engineer shall be a representative of the Owner and the Contractor shall direct all communications, questions and comments on the work and the performance thereof to the Architect/Engineer. Except as otherwise provided, the Architect/Engineer shall have all the authority of the Owner set forth in the Contract Documents. In general, the Architect/Engineer shall have the authority to review the performance of the work, reject work which is defective or otherwise does not comply with the Contract Documents and to order the Contractor to remedy defective work and take such actions which are necessary to make the work conform to the Contract Documents.

8. Wage Rates

Prevailing Wage Rates as determined by the Commissioner of the Department of Labor and Workforce Development under the provisions of Massachusetts General Laws, Chapter 149, Section 26 to 27H, as amended, apply to this project. It is the responsibility of the Contractor to provide the Town with certified payrolls and to comply with all requirements of the above-cited statutes.

The schedules of prevailing wage rates are included in the Contract Documents. Prevailing Wage Schedule: 20170217-012

9. Payments to the Contractor

Within fifteen (15) days after receipt from the Contractor of a periodic estimate requesting payment of the amount due for the preceding month, the Owner shall have fifteen (15) days to make payment for:

- A. The work performed during the preceding month.
- B. The materials not incorporated in the Work but delivered and suitably stored at the site (or at some location agreed upon in writing) to which the Contractor has title, or to which a Subcontractor has title and has authorized the Contractor to transfer title to the Owner.
- C. Less the following retention items:
 - 1. A retention based on an estimate of the fair value of the Owner's claims against the Contractor.
 - 2. A retention for direct payments to Subcontractors, if any, based on demands for same in accordance with the provisions of Section 39F of Chapter 30 of the General Laws.
 - 3. A retention not exceeding five percent (5%) of the approved amount of the periodic payment.
- D. After the receipt of a periodic estimate requesting final payment and within sixty-five (65) days after the Contractor fully completes the Work, or substantially completes the Work so that the value of the Work remaining to be done is, on the estimate of the Owner, less than 1% of the original Contract Price, or substantially completes the Work and the Owner takes possession or occupancy, whichever occurs first, the Owner shall pay the Contractor the entire balance due on the Contract less:
 - 1. A retention based on an estimate of the fair value of the Owner's claims against the Contractor and of the cost of completing the incomplete and unsatisfactory items of work.
 - 2. A retention for direct payments to Subcontractors, if any, based on demands of same in accordance with the provisions of Section 39F of Chapter 30 of the General Laws, or based on the record of payments by the Contractor to the Subcontractors under this Contract if such record of payment indicates that the Contractor has not paid Subcontractors as provided in Section 39F of Chapter 30 of the General Laws.

If the Owner fails to make payment as herein provided, there shall be added to each such payment, daily interest at the rate of 3 percentage points above the rediscount rate than charged

by the Federal Reserve Bank of Boston, commencing on the first day after said payment is due, and continuing until the payment is delivered or mailed to the Contractor; provided that no interest shall be due, in any event, on the amount of a periodic estimate for final payment until fifteen (15) days after receipt of such a periodic estimate by the Owner as provided in the first paragraph of this Article. The Contractor agrees to pay to each subcontractor a portion of any such interest paid in accordance with the amount due each subcontractor.

The Owner may make changes in any periodic estimate submitted by the Contractor and the payment due on said periodic estimate shall be computed in accordance with the changes so made, and such changes and any requirements for a corrected periodic estimate shall not affect the due date for the periodic payment or the date for the commencement of interest charges on the amount of the periodic payment computed in accordance with the changes made, as provided herein; provided further, that the Owner may, within seven (7) days after receipt, return to the Contractor for correction, any periodic estimate which is not in acceptable form or which contains computations not arithmetically correct, and in that event, the date of receipt of such periodic estimate shall be the date of receipt of the corrected periodic estimate in proper form and with arithmetically correct computations. The date of receipt of a periodic estimate received on a Saturday shall be the first working day thereafter.

- E. Changes in the Work: No changes in the work covered by the approved Contract Documents shall be made without prior written approval of the Owner. Charges or credits for the work covered by the approved change shall be determined by one or more, or a combination of the following methods:
- (a) Unit bid prices previously approved.
 - (b) An agreed lump sum.
 - (c) The actual cost of:
 - (1) Labor.
 - (2) Materials entering permanently into the work.
 - (3) The ownership or rental cost of construction equipment during the time of use on the extra work.
 - (4) Power and consumable supplies for the operation of power equipment.
 - (5) Wages to be paid.

To the cost under (c) there shall be added a fixed fee to be agreed upon but not to exceed fifteen percent (15%) of the actual cost of work. The fee shall be compensation to cover the cost of supervision, overhead, bond, profit and any other general expenses.

F. Claims for Additional Costs: If the Contractor wishes to make a claim for an increase in the Contract Sum, he shall give the Owner written notice thereof within twenty days after the occurrence of the event giving rise to such claim. This notice shall be given by the Contractor before proceeding to execute the Work, except in an emergency endangering life or property. No such claim shall be valid unless so made. Any change in the Contract Sum resulting from such claim shall be authorized by Change Order.

10. Final Payment, Effect

The acceptance of final payment by the Contractor shall constitute a waiver of all claims by the Contractor arising under the Agreement.

11. Contract Documents

The Contract Documents consist of the following, together with this Agreement:

Invitation to Bid
Instructions to Bidders
This Contract Form
Bid Form
100% Payment Bond
100% Performance Bond
Non-Collusion Certificate
Tax Compliance Certificate
Clerk's Certificate of Corporate Vote
Certificate of Insurance
General Conditions
Specifications and Addenda
Contract Drawings
Schedule of Prevailing Wages

12. Terms Required By Law

This Agreement shall be considered to include all terms required to be included in it by the Massachusetts General Laws, and all other laws, as though such terms were set forth in full herein.

13. Indemnification

The Contractor shall indemnify and hold harmless the Owner from and against any and all claims, damages, losses, and expenses, including attorney's fees, arising out of the performance of this Agreement when such claims, damages, losses, and expenses are caused, in

whole or in part, by the acts, errors, or omissions of the Contractor or his employees, agents, subcontractors or representatives.

14. Insurance

The Contractor shall purchase and maintain such insurance as will protect both the Owner and the Contractor from claims which may arise under the Agreement, including operations performed for the named insured by independent contractors and general inspection thereof by the named insured. In addition, the Contractor shall require its subcontractors to maintain such insurance. Coverage shall be 1,000,000.00 aggregate provided for:

- .1 claims under workers' or workmen's compensation, disability benefit and other applicable employee benefit acts;
- .2 claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
- .3 claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
- .4 claims for damages insured by usual personal injury liability coverage which are sustained (1) by any person as a result of an offense directly or indirectly related to the employment of such person by the Contractor, or (2) by any other person;
- .5 claims for damages, including damages to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom; and
- .6 claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.
- .7 claims involving contractual liability applicable to the Contractor's obligations

The limits of liability for coverage required under the preceding paragraph shall be as required by the Owner.

Except for Workmen's Compensation, all liability coverage shall name the Town of Longmeadow as an additional insured and shall provide for 30 days prior written notice to the Town of any modification or termination of coverage provided thereby. The Contractor shall provide the Owner with appropriate certificate(s) of insurance evidencing compliance with this provision prior to the commencement of any work under this Agreement.

15. Notice

All notices required to be given hereunder shall be in writing and delivered to, or mailed first class to, the parties' respective addresses stated above. In the event that immediate notice is

required, it may be given by telephone or facsimile, but shall, to the extent possible, be followed by notice in writing in the manner set forth above.

16. Termination

- A. Each party shall have the right to terminate this Agreement in the event of a failure of the other party to comply with the terms of the Agreement. Such termination shall be effective upon seven days' notice to the party in default and the failure within that time of said party to cure its default.
- B. The Owner shall have the right to terminate the Agreement without cause, upon ten (10) days' written notice to the Contractor. In the event that the Agreement is terminated pursuant to this subparagraph, the Contractor shall be reimbursed in accordance with the Contract Documents for all Work performed up to the termination date, and for all materials or equipment not incorporated in the Work, but delivered and suitably stored at the site. Payment for material or equipment stored at the site shall be conditioned upon submission by the Contractor of bills of sale or such other evidence as is satisfactory to Owner to establish the Owner's title to such material or equipment or otherwise protect the Owner's interests.

17. Miscellaneous

- A. **Royalties and Patents:** The Contractor shall pay all royalties and license fees. He shall defend all suits or claims for infringement of any patent rights and shall save the Owner harmless from loss on account thereof, except that the Owner shall be responsible for all such loss when a particular design, process or the product of a particular manufacturer or manufacturers is specified; but if the Contractor believes or has reason to believe that the design, process or product specified is an infringement of a patent, he shall be responsible for such loss unless he promptly gives such information to the Owner, and thereafter the Owner insists on the use of the design, process or products specified.
- B. **Assignment:** The Contractor shall not assign or transfer any of its rights, duties or obligations under this Agreement without the written approval of the Owner.
- C. **Governing Law:** This Agreement shall be governed by and construed in accordance with the law of the Commonwealth of Massachusetts.
- D. By its signature hereon, the Contractor certifies, under the pains and penalties of perjury, that it has complied with all laws of the Commonwealth of Massachusetts relating to taxes, reporting of employees and contractors, and withholding and remitting child support.

**CERTIFICATE OF INSURANCE
(PROVIDE AN INSURANCE CERTIFICATE NAMING LONGMEADOW AS INSURED)**

This is to certify that the _____ (Company) has issued the policies listed below, that these policies are written in accordance with the Company's standard policies and endorsements, except as indicated below or as noted in the attachments hereto, which policies and endorsements will be made available to OWNER upon request, that they provide coverage and limits of liability shown with respect to the insurance indicated, that they are in force on this date, that all deductible amounts are indicated below, and that this Certificate is furnished in accordance with and for the purpose of satisfying the requirements of OWNER in connection with the award and performance of a contract or agreement between the Town of _____ (OWNER) and

1. Name of Insured _____
2. Address of Insured _____
3. Location and Description of Work _____
_____ Project Contract No. _____

Coverage and Limits of Liability
(at least as shown below)

Bodily Injury Liability	Property Damage Liability
----------------------------	------------------------------

Policy Number	Effective Date	Expiration Date	Each Occurrence	Each Aggregate	Each Occurrence	Each Aggregate
---------------	----------------	-----------------	-----------------	----------------	-----------------	----------------

A. Owners Protective Liability has been issued at the expense of Above Insured to _____ (Owner)
_____ \$1,000,000 \$1,000,000 \$1,000,000 \$1,000,000

B. Comprehensive General Liability
_____ \$1,000,000 \$1,000,000 \$1,000,000 \$1,000,000
Including: 1. Operations/Premises 2. XCU 3. Products/Completed Operations
4. Contractual as Below 5. Independent Contractors
6. Broad Form Property Damage 7. Personal Injury

C. Auto Liability Each Each Each
Including: 1. All Owned Person Accident Accident
2. Hired \$1,000,000 \$1,000,000 \$1,000,000
3. Non-owned

D. Workman's Compensation
_____ Compensation Statutory State(s)
Coverage B Limit \$1,000,000 if Applicable

E. Umbrella Liability
_____ \$ _____ Aggregate

F. Builder's Risk Insurance - "All Risk" Completed Value Form
\$ _____
_____ As Specified in Contract or Agreement

BID BOND

KNOW ALL PERSONS BY THESE PRESENTS, that we, the undersigned

_____ as Principal, and

_____ as Surety, are hereby held and firmly bound unto

The Town of Longmeadow, Massachusetts as Owner, in the penal sum of \$ _____
(_____ dollars and _____ cents) for the
payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, heirs,
executors, administrators, successors and assigns.

Signed this _____ day of _____ 20____.

The Condition of the above obligation is such that whereas the Principal has submitted to **The Town of Longmeadow, Massachusetts** A certain BID, attached hereto and hereby made a part hereof, to enter into a contract in writing, for _____.

NOW, THEREFORE,

(a) If the said BID shall be rejected, or in the alternate,

(b) If said BID shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract contained in the Contract Document properly completed in accordance with said BID) and shall furnish a BOND for his/her faithful performance of said contract, and for a payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID. then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by an extension of the time within which the OWNER may accept such BID; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

Principal

(SEAL)

Surety

By

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State of Massachusetts.

PAYMENT BOND

Know all persons by these presents, that _____ as principal,
and _____ as surety are held and firmly bound
unto **The Town of Longmeadow, Massachusetts** the sum of _____ lawful
money of the United States of America, to be paid to **The Town of Longmeadow, Massachusetts** for
which payments, well and truly to be made, we bind ourselves, our respective heirs, executors,
administrators, successors, and assigns, jointly and severally, firmly by these presents. Whereas, the said
principal has made a contract with **The Town of Longmeadow, Massachusetts** bearing the date of
_____, 20 ____ for the construction of the Project entitled:

Police Department AC Unit Replacement Project

Now the condition of this obligation is such that if the principal shall pay for all labor performed or
furnished and for all materials used or employed in said contract and in any and all duly authorized
modifications, alterations, extensions of time, changes or additions to said contract that may hereafter be
made, notice to the surety of such modifications, alterations, extensions of time, changes or additional
being hereby waived, the foregoing to include any other purposes or items set out in, and to be subject to,
provisions of Massachusetts General Laws Chapter 149, Section 29, as amended, then this obligation
shall become null and void; otherwise, it shall remain in full force and effect.

In witness whereof we hereunto set outs hands and seals this _____ day of _____, 20 ____.

By _____

(Seal) Principal

By _____

(Seal) Surety

Surety Agent _____

Address _____

Telephone _____

PERFORMANCE BOND

Know all persons by these presents, that _____ as principal, and _____ as surety, are held and firmly bound unto **The Town of Longmeadow, Massachusetts** in the sum of _____ lawful money of the United States of America, to be paid to **The Town of Longmeadow, Massachusetts** for which payments, well and truly to be made, we find ourselves, or respective heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents. Whereas, the said principal has made a contract with **The Town of Longmeadow, Massachusetts** bearing the date of _____ 20__ for the construction of the Project entitled:

Police Department AC Unit Replacement Project

Now the condition of this obligation is such that if the principal shall well and truly keep and perform all the undertakings, covenants, agreements, terms, and conditions of said contract and any extensions thereof that may be granted by **The Town of Longmeadow, Massachusetts** and during the life of any guaranty required under the Contract, with or without notice to the surety, and shall also well and truly keep and perform all the undertakings, covenants, agreements, terms, and conditions of any and all duly authorized modifications, alterations, changes or additions to said contract that may hereafter be made, notice to the surety of such modifications, alterations, changes or additions being hereby waived, then this obligation shall become null and void; otherwise it shall remain in full force and effect.

In the event that the contract is abandoned by the Contractor, or is terminated by **The Town of Longmeadow, Massachusetts** said surety agrees that it shall, if requested in writing by **The Town of Longmeadow, Massachusetts** take such action as is necessary to complete the contract.

In witness whereof we hereunto set our hands and seals this _____ day of _____ 20__.

By _____
(Seal) Principal

By _____
(Seal) Surety

Countersigned Mass. Resident Agent
Surety Agent _____
Address _____

Telephone _____



CHARLES D. BAKER
Governor

KARYN E. POLITO
Lt. Governor

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DEPARTMENT OF LABOR STANDARDS

Prevailing Wage Rates

As determined by the Director under the provisions of the
Massachusetts General Laws, Chapter 149, Sections 26 to 27H

RONALD L. WALKER, II
Secretary

WILLIAM D MCKINNEY
Director

Awarding Authority: Town of Longmeadow
Contract Number: **City/Town:** LONGMEADOW
Description of Work: Police Department AC Unit Replacement Project - Removal and installation of new AC units, HVAC involving electrical, plumbing, construction
Job Location: 34 Williams St, Longmeadow, MA 01106

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

- This wage schedule applies only to the specific project referenced at the top of this page and uniquely identified by the “Wage Request Number” on all pages of this schedule.
- An Awarding Authority must request an updated wage schedule from the Department of Labor Standards (“DLS”) if it has not opened bids or selected a contractor within 90 days of the date of issuance of the wage schedule. For CM AT RISK projects (bid pursuant to G.L. c.149A), the earlier of: (a) the execution date of the GMP Amendment, or (b) the bid for the first construction scope of work must be within 90-days of the wage schedule issuance date.
- The wage schedule shall be incorporated in any advertisement or call for bids for the project as required by M.G.L. c. 149, § 27. The wage schedule shall be made a part of the contract awarded for the project. The wage schedule must be posted in a conspicuous place at the work site for the life of the project in accordance with M.G.L. c. 149 § 27. The wages listed on the wage schedule must be paid to employees performing construction work on the project whether they are employed by the prime contractor, a filed sub-bidder, or any sub-contractor.
- All apprentices working on the project are required to be registered with the Massachusetts Department of Labor Standards, Division of Apprentice Standards (DLS/DAS). Apprentice must keep his/her apprentice identification card on his/her person during all work hours on the project. An apprentice registered with DAS may be paid the lower apprentice wage rate at the applicable step as provided on the prevailing wage schedule. **Any apprentice not registered with DLS/DAS regardless of whether or not they are registered with any other federal, state, local, or private agency must be paid the journeyworker's rate for the trade.**
- The wage rates will remain in effect for the duration of the project, except in the case of multi-year public construction projects. For construction projects lasting longer than one year, awarding authorities must request an updated wage schedule. Awarding authorities are required to request these updates no later than two weeks before the anniversary of the date the contract was executed by the awarding authority and the general contractor. For multi-year CM AT RISK projects, awarding authority must request an annual update no later than two weeks before the anniversary date, determined as the earlier of: (a) the execution date of the GMP Amendment, or (b) the execution date of the first amendment to permit procurement of construction services. Contractors are required to obtain the wage schedules from awarding authorities, and to pay no less than these rates to covered workers. The annual update requirement is not applicable to 27F “rental of equipment” contracts.
- Every contractor or subcontractor which performs construction work on the project is required to submit weekly payroll reports and a Statement of Compliance directly to the awarding authority by mail or email and keep them on file for three years. Each weekly payroll report must contain: the employee’s name, address, occupational classification, hours worked, and wages paid. Do not submit weekly payroll reports to DLS. A sample of a payroll reporting form may be obtained at <http://www.mass.gov/dols/pw>.
- Contractors with questions about the wage rates or classifications included on the wage schedule have an affirmative obligation to inquire with DLS at (617) 626-6953.
- Employees not receiving the prevailing wage rate set forth on the wage schedule may report the violation to the Fair Labor Division of the office of the Attorney General at (617) 727-3465.
- Failure of a contractor or subcontractor to pay the prevailing wage rates listed on the wage schedule to all employees who perform construction work on the project is a violation of the law and subjects the contractor or subcontractor to civil and

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2016	\$32.15	\$10.91	\$10.89	\$0.00	\$53.95
(3 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2016	\$32.22	\$10.91	\$10.89	\$0.00	\$54.02
(4 & 5 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2016	\$32.34	\$10.91	\$10.89	\$0.00	\$54.14
ADS/SUBMERSIBLE PILOT <i>PILE DRIVER LOCAL 56 (ZONE 3)</i>	08/01/2015	\$90.51	\$9.80	\$18.17	\$0.00	\$118.48
For apprentice rates see "Apprentice- PILE DRIVER"						
AIR TRACK OPERATOR <i>LABORERS - ZONE 3 (BUILDING & SITE)</i>	12/05/2016	\$30.33	\$7.60	\$12.50	\$0.00	\$50.43
For apprentice rates see "Apprentice- LABORER"						
AIR TRACK OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 3 (HEAVY & HIGHWAY)</i>	12/01/2016	\$30.25	\$7.60	\$10.62	\$0.00	\$48.47
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
ASBESTOS WORKER (PIPES & TANKS) <i>HEAT & FROST INSULATORS LOCAL 6 (SPRINGFIELD)</i>	12/01/2016	\$30.51	\$11.50	\$6.60	\$0.00	\$48.61
	06/01/2017	\$31.41	\$11.50	\$6.60	\$0.00	\$49.51
	12/01/2017	\$32.31	\$11.50	\$6.60	\$0.00	\$50.41
	06/01/2018	\$33.21	\$11.50	\$6.60	\$0.00	\$51.31
	12/01/2018	\$34.11	\$11.50	\$6.60	\$0.00	\$52.21
	06/01/2019	\$35.01	\$11.50	\$6.60	\$0.00	\$53.11
	12/01/2019	\$35.91	\$11.50	\$6.60	\$0.00	\$54.01
	06/01/2020	\$36.81	\$11.50	\$6.60	\$0.00	\$54.91
	12/01/2020	\$37.71	\$11.50	\$6.60	\$0.00	\$55.81
ASPHALT RAKER <i>LABORERS - ZONE 3 (BUILDING & SITE)</i>	12/05/2016	\$29.83	\$7.60	\$12.50	\$0.00	\$49.93
For apprentice rates see "Apprentice- LABORER"						
ASPHALT RAKER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 3 (HEAVY & HIGHWAY)</i>	12/01/2016	\$29.75	\$7.60	\$10.62	\$0.00	\$47.97
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
AUTOMATIC GRADER-EXCAVATOR (RECLAIMER) <i>OPERATING ENGINEERS LOCAL 98</i>	12/01/2016	\$33.68	\$10.58	\$12.38	\$0.00	\$56.64
	06/01/2017	\$34.29	\$10.58	\$12.65	\$0.00	\$57.52
	12/01/2017	\$34.89	\$10.58	\$12.92	\$0.00	\$58.39
	06/01/2018	\$35.50	\$10.58	\$13.19	\$0.00	\$59.27
	12/01/2018	\$36.10	\$10.58	\$13.46	\$0.00	\$60.14
	06/01/2019	\$36.61	\$10.58	\$13.73	\$0.00	\$60.92
	12/01/2019	\$37.21	\$10.58	\$14.00	\$0.00	\$61.79
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER OPERATOR <i>OPERATING ENGINEERS LOCAL 98</i>	12/01/2016	\$33.68	\$10.58	\$12.38	\$0.00	\$56.64
	06/01/2017	\$34.29	\$10.58	\$12.65	\$0.00	\$57.52
	12/01/2017	\$34.89	\$10.58	\$12.92	\$0.00	\$58.39
	06/01/2018	\$35.50	\$10.58	\$13.19	\$0.00	\$59.27
	12/01/2018	\$36.10	\$10.58	\$13.46	\$0.00	\$60.14
	06/01/2019	\$36.61	\$10.58	\$13.73	\$0.00	\$60.92
	12/01/2019	\$37.21	\$10.58	\$14.00	\$0.00	\$61.79
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER <i>LABORERS - ZONE 3 (BUILDING & SITE)</i>	12/05/2016	\$29.83	\$7.60	\$12.50	\$0.00	\$49.93

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
BATCH/CEMENT PLANT - ON SITE <i>OPERATING ENGINEERS LOCAL 98</i>	12/01/2016	\$33.15	\$10.58	\$12.38	\$0.00	\$56.11
	06/01/2017	\$33.76	\$10.58	\$12.65	\$0.00	\$56.99
	12/01/2017	\$34.36	\$10.58	\$12.92	\$0.00	\$57.86
	06/01/2018	\$34.97	\$10.58	\$13.19	\$0.00	\$58.74
	12/01/2018	\$35.57	\$10.58	\$13.46	\$0.00	\$59.61
	06/01/2019	\$36.08	\$10.58	\$13.73	\$0.00	\$60.39
	12/01/2019	\$36.68	\$10.58	\$14.00	\$0.00	\$61.26
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BLOCK PAVER, RAMMER / CURB SETTER <i>LABORERS - ZONE 3 (BUILDING & SITE)</i>	12/05/2016	\$30.33	\$7.60	\$12.50	\$0.00	\$50.43
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 3 (HEAVY & HIGHWAY)</i>	12/01/2016	\$30.25	\$7.60	\$10.62	\$0.00	\$48.47
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
BOILER MAKER <i>BOILERMAKERS LOCAL 29</i>	01/01/2017	\$42.92	\$6.97	\$16.21	\$0.00	\$66.10

Apprentice - BOILERMAKER - Local 29

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	\$27.90	\$6.97	\$10.54	\$0.00	\$45.41
2	65	\$27.90	\$6.97	\$10.54	\$0.00	\$45.41
3	70	\$30.04	\$6.97	\$11.35	\$0.00	\$48.36
4	75	\$32.19	\$6.97	\$12.16	\$0.00	\$51.32
5	80	\$34.34	\$6.97	\$12.97	\$0.00	\$54.28
6	85	\$36.48	\$6.97	\$13.78	\$0.00	\$57.23
7	90	\$38.63	\$6.97	\$14.59	\$0.00	\$60.19
8	95	\$40.77	\$6.97	\$15.40	\$0.00	\$63.14

Notes:

Apprentice to Journeyworker Ratio:1:5

BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING) <i>BRICKLAYERS LOCAL 3 (SPRINGFIELD/PITTSFIELD)</i>	09/05/2016	\$39.26	\$10.18	\$17.38	\$0.00	\$66.82
	02/27/2017	\$39.26	\$10.75	\$17.38	\$0.00	\$67.39

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - BRICK/PLASTER/CEMENT MASON - Local 3 Springfield/Pittsfield

Effective Date - 09/05/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.63	\$10.18	\$17.38	\$0.00	\$47.19
2	60	\$23.56	\$10.18	\$17.38	\$0.00	\$51.12
3	70	\$27.48	\$10.18	\$17.38	\$0.00	\$55.04
4	80	\$31.41	\$10.18	\$17.38	\$0.00	\$58.97
5	90	\$35.33	\$10.18	\$17.38	\$0.00	\$62.89

Effective Date - 02/27/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.63	\$10.75	\$17.38	\$0.00	\$47.76
2	60	\$23.56	\$10.75	\$17.38	\$0.00	\$51.69
3	70	\$27.48	\$10.75	\$17.38	\$0.00	\$55.61
4	80	\$31.41	\$10.75	\$17.38	\$0.00	\$59.54
5	90	\$35.33	\$10.75	\$17.38	\$0.00	\$63.46

Notes:

Apprentice to Journeyworker Ratio:1:5

BULLDOZER/POWER SHOVEL/TREE SHREDDER /CLAM SHELL OPERATING	12/01/2016	\$33.68	\$10.58	\$12.38	\$0.00	\$56.64
ENGINEERS LOCAL 98	06/01/2017	\$34.29	\$10.58	\$12.65	\$0.00	\$57.52
	12/01/2017	\$34.89	\$10.58	\$12.92	\$0.00	\$58.39
	06/01/2018	\$35.50	\$10.58	\$13.19	\$0.00	\$59.27
	12/01/2018	\$36.10	\$10.58	\$13.46	\$0.00	\$60.14
	06/01/2019	\$36.61	\$10.58	\$13.73	\$0.00	\$60.92
	12/01/2019	\$37.21	\$10.58	\$14.00	\$0.00	\$61.79
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
CAISSON & UNDERPINNING BOTTOM MAN LABORERS - FOUNDATION AND MARINE	12/01/2016	\$37.45	\$7.60	\$14.35	\$0.00	\$59.40
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING LABORER LABORERS - FOUNDATION AND MARINE	12/01/2016	\$36.30	\$7.60	\$14.35	\$0.00	\$58.25
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN LABORERS - FOUNDATION AND MARINE	12/01/2016	\$36.30	\$7.60	\$14.35	\$0.00	\$58.25
For apprentice rates see "Apprentice- LABORER"						
CARBIDE CORE DRILL OPERATOR LABORERS - ZONE 3 (BUILDING & SITE)	12/05/2016	\$29.83	\$7.60	\$12.50	\$0.00	\$49.93
For apprentice rates see "Apprentice- LABORER"						
CARPENTER CARPENTERS LOCAL 108 - HAMPDEN HAMPSHIRE FRANKLIN	09/05/2016	\$33.56	\$8.26	\$15.00	\$0.00	\$56.82
	02/27/2017	\$34.56	\$8.26	\$15.00	\$0.00	\$57.82
	09/04/2017	\$35.56	\$8.26	\$15.00	\$0.00	\$58.82
	03/05/2018	\$36.56	\$8.26	\$15.00	\$0.00	\$59.82
	09/05/2018	\$37.60	\$8.26	\$15.00	\$0.00	\$60.86
	03/04/2019	\$38.64	\$8.26	\$15.00	\$0.00	\$61.90

Apprentice - CARPENTER - Local 108 Hampden Hampshire Franklin

Effective Date - 09/05/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$16.78	\$8.26	\$1.22	\$0.00	\$26.26
2	60	\$20.14	\$8.26	\$1.22	\$0.00	\$29.62
3	70	\$23.49	\$8.26	\$11.34	\$0.00	\$43.09
4	75	\$25.17	\$8.26	\$11.34	\$0.00	\$44.77
5	80	\$26.85	\$8.26	\$12.56	\$0.00	\$47.67
6	80	\$26.85	\$8.26	\$12.56	\$0.00	\$47.67
7	90	\$30.20	\$8.26	\$13.78	\$0.00	\$52.24
8	90	\$30.20	\$8.26	\$13.78	\$0.00	\$52.24

Effective Date - 02/27/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$17.28	\$8.26	\$1.22	\$0.00	\$26.76
2	60	\$20.74	\$8.26	\$1.22	\$0.00	\$30.22
3	70	\$24.19	\$8.26	\$11.34	\$0.00	\$43.79
4	75	\$25.92	\$8.26	\$11.34	\$0.00	\$45.52
5	80	\$27.65	\$8.26	\$12.56	\$0.00	\$48.47
6	80	\$27.65	\$8.26	\$12.56	\$0.00	\$48.47
7	90	\$31.10	\$8.26	\$13.78	\$0.00	\$53.14
8	90	\$31.10	\$8.26	\$13.78	\$0.00	\$53.14

Notes:

** 1: 1-5/2: 6-8/3:9-11/Steps: 6 mos (600 hrs)/rates by step

Apprentice to Journeyworker Ratio:**

CEMENT MASONRY/PLASTERING	01/01/2017	\$38.72	\$12.15	\$14.56	\$1.30	\$66.73
BRICKLAYERS LOCAL 3 (SPRINGFIELD/PITTSFIELD)	07/01/2017	\$39.31	\$12.15	\$14.56	\$1.30	\$67.32
	01/01/2018	\$39.34	\$12.15	\$14.56	\$1.30	\$67.35
	07/01/2018	\$39.37	\$12.15	\$14.56	\$1.30	\$67.38
	01/01/2019	\$39.41	\$12.15	\$14.56	\$1.30	\$67.42
	07/01/2019	\$39.44	\$12.15	\$14.56	\$1.30	\$67.45
	01/01/2020	\$39.48	\$12.15	\$14.56	\$1.30	\$67.49

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - CEMENT MASONRY/PLASTERING - Springfield/Pittsfield

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.36	\$12.15	\$12.33	\$0.00	\$43.84
2	60	\$23.23	\$12.15	\$14.56	\$1.30	\$51.24
3	65	\$25.17	\$12.15	\$14.56	\$1.30	\$53.18
4	70	\$27.10	\$12.15	\$14.56	\$1.30	\$55.11
5	75	\$29.04	\$12.15	\$14.56	\$1.30	\$57.05
6	80	\$30.98	\$12.15	\$14.56	\$1.30	\$58.99
7	90	\$34.85	\$12.15	\$14.56	\$1.30	\$62.86

Effective Date - 07/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.66	\$12.15	\$12.33	\$0.00	\$44.14
2	60	\$23.59	\$12.15	\$14.56	\$1.30	\$51.60
3	65	\$25.55	\$12.15	\$14.56	\$1.30	\$53.56
4	70	\$27.52	\$12.15	\$14.56	\$1.30	\$55.53
5	75	\$29.48	\$12.15	\$14.56	\$1.30	\$57.49
6	80	\$31.45	\$12.15	\$14.56	\$1.30	\$59.46
7	90	\$35.38	\$12.15	\$14.56	\$1.30	\$63.39

Notes:

Steps 3,4 are 500 hrs. All other steps are 1,000 hrs.

Apprentice to Journeyworker Ratio:1:3

CHAIN SAW OPERATOR
LABORERS - ZONE 3 (BUILDING & SITE) 12/05/2016 \$29.83 \$7.60 \$12.50 \$0.00 \$49.93

For apprentice rates see "Apprentice- LABORER"

COMPRESSOR OPERATOR
OPERATING ENGINEERS LOCAL 98

	12/01/2016	\$33.15	\$10.58	\$12.38	\$0.00	\$56.11
	06/01/2017	\$33.76	\$10.58	\$12.65	\$0.00	\$56.99
	12/01/2017	\$34.36	\$10.58	\$12.92	\$0.00	\$57.86
	06/01/2018	\$34.97	\$10.58	\$13.19	\$0.00	\$58.74
	12/01/2018	\$35.57	\$10.58	\$13.46	\$0.00	\$59.61
	06/01/2019	\$36.08	\$10.58	\$13.73	\$0.00	\$60.39
	12/01/2019	\$36.68	\$10.58	\$14.00	\$0.00	\$61.26

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

CRANE OPERATOR
OPERATING ENGINEERS LOCAL 98

	12/01/2016	\$37.18	\$10.58	\$12.38	\$0.00	\$60.14
	06/01/2017	\$37.79	\$10.58	\$12.65	\$0.00	\$61.02
	12/01/2017	\$38.39	\$10.58	\$12.92	\$0.00	\$61.89
	06/01/2018	\$39.00	\$10.58	\$13.19	\$0.00	\$62.77
	12/01/2018	\$39.60	\$10.58	\$13.46	\$0.00	\$63.64
	06/01/2019	\$40.11	\$10.58	\$13.73	\$0.00	\$64.42
	12/01/2019	\$40.71	\$10.58	\$14.00	\$0.00	\$65.29

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

DELEADER (BRIDGE)
PAINTERS LOCAL 35 - ZONE 3 01/01/2017 \$51.41 \$7.85 \$16.10 \$0.00 \$75.36

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PAINTER Local 35 - BRIDGES/TANKS

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.71	\$7.85	\$0.00	\$0.00	\$33.56
2	55	\$28.28	\$7.85	\$3.66	\$0.00	\$39.79
3	60	\$30.85	\$7.85	\$3.99	\$0.00	\$42.69
4	65	\$33.42	\$7.85	\$4.32	\$0.00	\$45.59
5	70	\$35.99	\$7.85	\$14.11	\$0.00	\$57.95
6	75	\$38.56	\$7.85	\$14.44	\$0.00	\$60.85
7	80	\$41.13	\$7.85	\$14.77	\$0.00	\$63.75
8	90	\$46.27	\$7.85	\$15.44	\$0.00	\$69.56

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

DEMO: ADZEMAN LABORERS - ZONE 3 (BUILDING & SITE)	12/01/2016	\$36.50	\$7.60	\$14.15	\$0.00	\$58.25
	06/01/2017	\$37.50	\$7.60	\$14.15	\$0.00	\$59.25
	12/01/2017	\$38.35	\$7.60	\$14.15	\$0.00	\$60.10
	06/01/2018	\$39.30	\$7.60	\$14.15	\$0.00	\$61.05
	12/01/2018	\$40.25	\$7.60	\$14.15	\$0.00	\$62.00
	06/01/2019	\$41.25	\$7.60	\$14.15	\$0.00	\$63.00
	12/01/2019	\$42.25	\$7.60	\$14.15	\$0.00	\$64.00

For apprentice rates see "Apprentice- LABORER"

DEMO: BACKHOE/LOADER/HAMMER OPERATOR LABORERS - ZONE 3 (BUILDING & SITE)	12/01/2016	\$37.50	\$7.60	\$14.15	\$0.00	\$59.25
	06/01/2017	\$38.50	\$7.60	\$14.15	\$0.00	\$60.25
	12/01/2017	\$39.35	\$7.60	\$14.15	\$0.00	\$61.10
	06/01/2018	\$40.30	\$7.60	\$14.15	\$0.00	\$62.05
	12/01/2018	\$41.25	\$7.60	\$14.15	\$0.00	\$63.00
	06/01/2019	\$42.25	\$7.60	\$14.15	\$0.00	\$64.00
	12/01/2019	\$43.25	\$7.60	\$14.15	\$0.00	\$65.00

For apprentice rates see "Apprentice- LABORER"

DEMO: BURNERS LABORERS - ZONE 3 (BUILDING & SITE)	12/01/2016	\$37.25	\$7.60	\$14.15	\$0.00	\$59.00
	06/01/2017	\$38.25	\$7.60	\$14.15	\$0.00	\$60.00
	12/01/2017	\$39.10	\$7.60	\$14.15	\$0.00	\$60.85
	06/01/2018	\$40.05	\$7.60	\$14.15	\$0.00	\$61.80
	12/01/2018	\$41.00	\$7.60	\$14.15	\$0.00	\$62.75
	06/01/2019	\$42.00	\$7.60	\$14.15	\$0.00	\$63.75
	12/01/2019	\$43.00	\$7.60	\$14.15	\$0.00	\$64.75

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: CONCRETE CUTTER/SAWYER <i>LABORERS - ZONE 3 (BUILDING & SITE)</i>	12/01/2016	\$37.50	\$7.60	\$14.15	\$0.00	\$59.25
	06/01/2017	\$38.50	\$7.60	\$14.15	\$0.00	\$60.25
	12/01/2017	\$39.35	\$7.60	\$14.15	\$0.00	\$61.10
	06/01/2018	\$40.30	\$7.60	\$14.15	\$0.00	\$62.05
	12/01/2018	\$41.25	\$7.60	\$14.15	\$0.00	\$63.00
	06/01/2019	\$42.25	\$7.60	\$14.15	\$0.00	\$64.00
	12/01/2019	\$43.25	\$7.60	\$14.15	\$0.00	\$65.00
For apprentice rates see "Apprentice- LABORER"						
DEMO: JACKHAMMER OPERATOR <i>LABORERS - ZONE 3 (BUILDING & SITE)</i>	12/01/2016	\$37.25	\$7.60	\$14.15	\$0.00	\$59.00
	06/01/2017	\$38.25	\$7.60	\$14.15	\$0.00	\$60.00
	12/01/2017	\$39.10	\$7.60	\$14.15	\$0.00	\$60.85
	06/01/2018	\$40.05	\$7.60	\$14.15	\$0.00	\$61.80
	12/01/2018	\$41.00	\$7.60	\$14.15	\$0.00	\$62.75
	06/01/2019	\$42.00	\$7.60	\$14.15	\$0.00	\$63.75
	12/01/2019	\$43.00	\$7.60	\$14.15	\$0.00	\$64.75
For apprentice rates see "Apprentice- LABORER"						
DEMO: WRECKING LABORER <i>LABORERS - ZONE 3 (BUILDING & SITE)</i>	12/01/2016	\$36.50	\$7.60	\$14.15	\$0.00	\$58.25
	06/01/2017	\$37.50	\$7.60	\$14.15	\$0.00	\$59.25
	12/01/2017	\$38.35	\$7.60	\$14.15	\$0.00	\$60.10
	06/01/2018	\$39.30	\$7.60	\$14.15	\$0.00	\$61.05
	12/01/2018	\$40.25	\$7.60	\$14.15	\$0.00	\$62.00
	06/01/2019	\$41.25	\$7.60	\$14.15	\$0.00	\$63.00
	12/01/2019	\$42.25	\$7.60	\$14.15	\$0.00	\$64.00
For apprentice rates see "Apprentice- LABORER"						
DIVER <i>PILE DRIVER LOCAL 56 (ZONE 3)</i>	08/01/2015	\$60.34	\$9.80	\$18.17	\$0.00	\$88.31
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER <i>PILE DRIVER LOCAL 56 (ZONE 3)</i>	08/01/2015	\$43.10	\$9.80	\$18.17	\$0.00	\$71.07
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER TENDER (EFFLUENT) <i>PILE DRIVER LOCAL 56 (ZONE 3)</i>	08/01/2015	\$64.65	\$9.80	\$18.17	\$0.00	\$92.62
For apprentice rates see "Apprentice- PILE DRIVER"						
DIVER/SLURRY (EFFLUENT) <i>PILE DRIVER LOCAL 56 (ZONE 3)</i>	08/01/2015	\$90.51	\$9.80	\$18.17	\$0.00	\$118.48
For apprentice rates see "Apprentice- PILE DRIVER"						
ELECTRICIAN (Including Core Drilling) <i>ELECTRICIANS LOCAL 7</i>	01/01/2017	\$39.51	\$9.35	\$10.84	\$0.00	\$59.70

Apprentice - ELECTRICIAN - Local 7

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$15.80	\$5.00	\$0.47	\$0.00	\$21.27
2	45	\$17.78	\$5.00	\$0.53	\$0.00	\$23.31
3	50	\$19.76	\$9.35	\$6.54	\$0.00	\$35.65
4	55	\$21.73	\$9.35	\$6.60	\$0.00	\$37.68
5	65	\$25.68	\$9.35	\$7.72	\$0.00	\$42.75
6	70	\$27.66	\$9.35	\$8.78	\$0.00	\$45.79

Notes: Pre-5/31/11 Begins at Step 3 \$39.72/4\$41.75/5\$46.38/6\$48.60
Steps 1-2 are 1000 hrs; Steps 3-6 are 1500 hrs.

Apprentice to Journeyworker Ratio:2:3****

ELEVATOR CONSTRUCTOR ELEVATOR CONSTRUCTORS LOCAL 41	01/01/2017	\$49.90	\$15.28	\$15.71	\$0.00	\$80.89
--	------------	---------	---------	---------	--------	---------

Apprentice - ELEVATOR CONSTRUCTOR - Local 41

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.95	\$15.28	\$15.71	\$0.00	\$55.94
2	55	\$27.45	\$15.28	\$15.71	\$0.00	\$58.44
3	65	\$32.44	\$15.28	\$15.71	\$0.00	\$63.43
4	70	\$34.93	\$15.28	\$15.71	\$0.00	\$65.92
5	80	\$39.92	\$15.28	\$15.71	\$0.00	\$70.91

Notes: Steps 1-2 are 6 mos.; Steps 3-5 are 1 year

Apprentice to Journeyworker Ratio:1:1

ELEVATOR CONSTRUCTOR HELPER ELEVATOR CONSTRUCTORS LOCAL 41	01/01/2017	\$34.93	\$15.28	\$15.71	\$0.00	\$65.92
---	------------	---------	---------	---------	--------	---------

For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"

FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY) LABORERS - ZONE 3 (HEAVY & HIGHWAY)	12/01/2016	\$29.75	\$7.60	\$10.62	\$0.00	\$47.97
---	------------	---------	--------	---------	--------	---------

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"

FIELD ENG.INST/ROD-BLDG,SITE,HVY/HWY OPERATING ENGINEERS LOCAL 98	06/01/1999	\$18.84	\$4.80	\$4.10	\$0.00	\$27.74
--	------------	---------	--------	--------	--------	---------

FIELD ENG.PARTY CHIEF:BLDG,SITE,HVY/HWY OPERATING ENGINEERS LOCAL 98	06/01/1999	\$21.33	\$4.80	\$4.10	\$0.00	\$30.23
---	------------	---------	--------	--------	--------	---------

FIELD ENG.SURVEY CHIEF-BLDG,SITE,HVY/HWY OPERATING ENGINEERS LOCAL 98	06/01/1999	\$22.33	\$4.80	\$4.10	\$0.00	\$31.23
--	------------	---------	--------	--------	--------	---------

FIRE ALARM INSTALLER ELECTRICIANS LOCAL 7	01/01/2017	\$39.51	\$9.35	\$10.84	\$0.00	\$59.70
--	------------	---------	--------	---------	--------	---------

For apprentice rates see "Apprentice- ELECTRICIAN"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FIRE ALARM REPAIR / MAINTENANCE / COMMISSIONING <i>ELECTRICIANS</i>	01/01/2017	\$39.51	\$9.35	\$10.84	\$0.00	\$59.70

LOCAL 7
For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"

FIREMAN <i>OPERATING ENGINEERS LOCAL 98</i>	12/01/2016	\$33.15	\$10.58	\$12.38	\$0.00	\$56.11
	06/01/2017	\$33.76	\$10.58	\$12.65	\$0.00	\$56.99
	12/01/2017	\$34.36	\$10.58	\$12.92	\$0.00	\$57.86
	06/01/2018	\$34.97	\$10.58	\$13.19	\$0.00	\$58.74
	12/01/2018	\$35.57	\$10.58	\$13.46	\$0.00	\$59.61
	06/01/2019	\$36.08	\$10.58	\$13.73	\$0.00	\$60.39
	12/01/2019	\$36.68	\$10.58	\$14.00	\$0.00	\$61.26

Apprentice - OPERATING ENGINEERS - Local 98 Class 3

Effective Date - 12/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$19.89	\$10.58	\$12.38	\$0.00	\$42.85
2	70	\$23.21	\$10.58	\$12.38	\$0.00	\$46.17
3	80	\$26.52	\$10.58	\$12.38	\$0.00	\$49.48
4	90	\$29.84	\$10.58	\$12.38	\$0.00	\$52.80

Effective Date - 06/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$20.26	\$10.58	\$12.65	\$0.00	\$43.49
2	70	\$23.63	\$10.58	\$12.65	\$0.00	\$46.86
3	80	\$27.01	\$10.58	\$12.65	\$0.00	\$50.24
4	90	\$30.38	\$10.58	\$12.65	\$0.00	\$53.61

Notes:

Steps 1-2 are 1000 hrs.; Steps 3-4 are 2000 hrs.

Apprentice to Journeyworker Ratio:1:6

FLAGGER & SIGNALER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 3 (HEAVY & HIGHWAY)</i>	12/01/2016	\$20.50	\$7.60	\$10.62	\$0.00	\$38.72
--	------------	---------	--------	---------	--------	---------

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"

FLOORCOVERER <i>FLOORCOVERERS LOCAL 2168 ZONE III</i>	03/01/2016	\$32.60	\$8.55	\$14.42	\$0.00	\$55.57
--	------------	---------	--------	---------	--------	---------

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - FLOORCOVERER - Local 2168 Zone III

Effective Date - 03/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$16.30	\$8.55	\$1.20	\$0.00	\$26.05
2	55	\$17.93	\$8.55	\$1.20	\$0.00	\$27.68
3	60	\$19.56	\$8.55	\$10.82	\$0.00	\$38.93
4	65	\$21.19	\$8.55	\$10.82	\$0.00	\$40.56
5	70	\$22.82	\$8.55	\$12.02	\$0.00	\$43.39
6	75	\$24.45	\$8.55	\$12.02	\$0.00	\$45.02
7	80	\$26.08	\$8.55	\$13.22	\$0.00	\$47.85
8	85	\$27.71	\$8.55	\$13.22	\$0.00	\$49.48

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

FORK LIFT	12/01/2016	\$33.37	\$10.58	\$12.38	\$0.00	\$56.33
<i>OPERATING ENGINEERS LOCAL 98</i>	06/01/2017	\$33.98	\$10.58	\$12.65	\$0.00	\$57.21
	12/01/2017	\$34.58	\$10.58	\$12.92	\$0.00	\$58.08
	06/01/2018	\$35.19	\$10.58	\$13.19	\$0.00	\$58.96
	12/01/2018	\$35.79	\$10.58	\$13.46	\$0.00	\$59.83
	06/01/2019	\$36.30	\$10.58	\$13.73	\$0.00	\$60.61
	12/01/2019	\$36.90	\$10.58	\$14.00	\$0.00	\$61.48

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

GENERATORS/LIGHTING PLANTS	12/01/2016	\$29.92	\$10.58	\$12.38	\$0.00	\$52.88
<i>OPERATING ENGINEERS LOCAL 98</i>	06/01/2017	\$30.53	\$10.58	\$12.65	\$0.00	\$53.76
	12/01/2017	\$31.13	\$10.58	\$12.92	\$0.00	\$54.63
	06/01/2018	\$31.74	\$10.58	\$13.19	\$0.00	\$55.51
	12/01/2018	\$32.34	\$10.58	\$13.46	\$0.00	\$56.38
	06/01/2019	\$32.85	\$10.58	\$13.73	\$0.00	\$57.16
	12/01/2019	\$33.45	\$10.58	\$14.00	\$0.00	\$58.03

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS)	06/01/2016	\$35.58	\$10.70	\$8.25	\$0.00	\$54.53
<i>GLAZIERS LOCAL 1333</i>						

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - GLAZIER - Local 1333

Effective Date - 06/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$17.79	\$10.70	\$1.00	\$0.00	\$29.49
2	56	\$20.01	\$10.70	\$1.00	\$0.00	\$31.71
3	63	\$22.24	\$10.70	\$1.50	\$0.00	\$34.44
4	69	\$24.46	\$10.70	\$1.50	\$0.00	\$36.66
5	75	\$26.69	\$10.70	\$2.00	\$0.00	\$39.39
6	81	\$28.91	\$10.70	\$2.00	\$0.00	\$41.61
7	88	\$31.13	\$10.70	\$8.00	\$0.00	\$49.83
8	94	\$33.36	\$10.70	\$8.00	\$0.00	\$52.06

Notes:

Apprentice to Journeyworker Ratio:1:3

GRADER/TRENCHING MACHINE/DERRICK <i>OPERATING ENGINEERS LOCAL 98</i>	12/01/2016	\$33.68	\$10.58	\$12.38	\$0.00	\$56.64
	06/01/2017	\$34.29	\$10.58	\$12.65	\$0.00	\$57.52
	12/01/2017	\$34.89	\$10.58	\$12.92	\$0.00	\$58.39
	06/01/2018	\$35.50	\$10.58	\$13.19	\$0.00	\$59.27
	12/01/2018	\$36.10	\$10.58	\$13.46	\$0.00	\$60.14
	06/01/2019	\$36.61	\$10.58	\$13.73	\$0.00	\$60.92
	12/01/2019	\$37.21	\$10.58	\$14.00	\$0.00	\$61.79

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

HVAC (DUCTWORK) <i>SHEETMETAL WORKERS LOCAL 63</i>	01/01/2017	\$32.24	\$10.64	\$15.49	\$1.75	\$60.12
---	------------	---------	---------	---------	--------	---------

For apprentice rates see "Apprentice- SHEET METAL WORKER"

HVAC (ELECTRICAL CONTROLS) <i>ELECTRICIANS LOCAL 7</i>	01/01/2017	\$39.51	\$9.35	\$10.84	\$0.00	\$59.70
---	------------	---------	--------	---------	--------	---------

For apprentice rates see "Apprentice- ELECTRICIAN"

HVAC (TESTING AND BALANCING - AIR) <i>SHEETMETAL WORKERS LOCAL 63</i>	01/01/2017	\$32.24	\$10.64	\$15.49	\$1.75	\$60.12
--	------------	---------	---------	---------	--------	---------

For apprentice rates see "Apprentice- SHEET METAL WORKER"

HVAC (TESTING AND BALANCING -WATER) <i>PLUMBERS & PIPEFITTERS LOCAL 104</i>	09/17/2016	\$38.76	\$8.45	\$15.05	\$0.00	\$62.26
	03/17/2017	\$39.26	\$8.50	\$15.30	\$0.00	\$63.06
	09/17/2017	\$40.01	\$8.50	\$15.30	\$0.00	\$63.81
	03/17/2018	\$40.76	\$8.50	\$15.30	\$0.00	\$64.56
	09/17/2018	\$41.51	\$8.50	\$15.30	\$0.00	\$65.31
	03/17/2019	\$42.26	\$8.50	\$15.30	\$0.00	\$66.06

For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"

HVAC MECHANIC <i>PLUMBERS & PIPEFITTERS LOCAL 104</i>	09/17/2016	\$38.76	\$8.45	\$15.05	\$0.00	\$62.26
	03/17/2017	\$39.26	\$8.50	\$15.30	\$0.00	\$63.06
	09/17/2017	\$40.01	\$8.50	\$15.30	\$0.00	\$63.81
	03/17/2018	\$40.76	\$8.50	\$15.30	\$0.00	\$64.56
	09/17/2018	\$41.51	\$8.50	\$15.30	\$0.00	\$65.31
	03/17/2019	\$42.26	\$8.50	\$15.30	\$0.00	\$66.06

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HYDRAULIC DRILLS (HEAVY & HIGHWAY) <i>LABORERS - ZONE 3 (HEAVY & HIGHWAY)</i>	12/01/2016	\$30.25	\$7.60	\$10.62	\$0.00	\$48.47
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
INSULATOR (PIPES & TANKS) <i>HEAT & FROST INSULATORS LOCAL 6 (SPRINGFIELD)</i>	09/01/2016	\$36.07	\$11.75	\$14.20	\$0.00	\$62.02
	09/01/2017	\$37.67	\$11.75	\$14.20	\$0.00	\$63.62
	09/01/2018	\$39.47	\$11.75	\$14.20	\$0.00	\$65.42
	09/01/2019	\$41.47	\$11.75	\$14.20	\$0.00	\$67.42

Apprentice - ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Springfield

Effective Date - 09/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$18.04	\$11.75	\$10.45	\$0.00	\$40.24
2	60	\$21.64	\$11.75	\$11.20	\$0.00	\$44.59
3	70	\$25.25	\$11.75	\$11.95	\$0.00	\$48.95
4	80	\$28.86	\$11.75	\$12.70	\$0.00	\$53.31

Effective Date - 09/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$18.84	\$11.75	\$10.45	\$0.00	\$41.04
2	60	\$22.60	\$11.75	\$11.20	\$0.00	\$45.55
3	70	\$26.37	\$11.75	\$11.95	\$0.00	\$50.07
4	80	\$30.14	\$11.75	\$12.70	\$0.00	\$54.59

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

IRONWORKER/WELDER <i>IRONWORKERS LOCAL 7 (SPRINGFIELD AREA)</i>	09/16/2016	\$31.74	\$7.80	\$19.60	\$0.00	\$59.14
	03/16/2017	\$32.39	\$7.80	\$19.60	\$0.00	\$59.79

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - IRONWORKER - Local 7 Springfield

Effective Date - 09/16/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$19.04	\$7.80	\$19.60	\$0.00	\$46.44
2	70	\$22.22	\$7.80	\$19.60	\$0.00	\$49.62
3	75	\$23.81	\$7.80	\$19.60	\$0.00	\$51.21
4	80	\$25.39	\$7.80	\$19.60	\$0.00	\$52.79
5	85	\$26.98	\$7.80	\$19.60	\$0.00	\$54.38
6	90	\$28.57	\$7.80	\$19.60	\$0.00	\$55.97

Effective Date - 03/16/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$19.43	\$7.80	\$19.60	\$0.00	\$46.83
2	70	\$22.67	\$7.80	\$19.60	\$0.00	\$50.07
3	75	\$24.29	\$7.80	\$19.60	\$0.00	\$51.69
4	80	\$25.91	\$7.80	\$19.60	\$0.00	\$53.31
5	85	\$27.53	\$7.80	\$19.60	\$0.00	\$54.93
6	90	\$29.15	\$7.80	\$19.60	\$0.00	\$56.55

Notes:

Structural 1:6; Ornamental 1:4

Apprentice to Journeyworker Ratio:

JACKHAMMER & PAVING BREAKER OPERATOR LABORERS - ZONE 3 (BUILDING & SITE)	12/05/2016	\$29.83	\$7.60	\$12.50	\$0.00	\$49.93
---	------------	---------	--------	---------	--------	---------

For apprentice rates see "Apprentice- LABORER"

LABORER LABORERS - ZONE 3 (BUILDING & SITE)	12/05/2016	\$29.58	\$7.60	\$12.50	\$0.00	\$49.68
--	------------	---------	--------	---------	--------	---------

Apprentice - LABORER - Zone 3 Building & Site

Effective Date - 12/05/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$17.75	\$7.60	\$12.50	\$0.00	\$37.85
2	70	\$20.71	\$7.60	\$12.50	\$0.00	\$40.81
3	80	\$23.66	\$7.60	\$12.50	\$0.00	\$43.76
4	90	\$26.62	\$7.60	\$12.50	\$0.00	\$46.72

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER (HEAVY & HIGHWAY) LABORERS - ZONE 3 (HEAVY & HIGHWAY)	12/01/2016	\$29.50	\$7.60	\$10.62	\$0.00	\$47.72
--	------------	---------	--------	---------	--------	---------

Apprentice - LABORER (Heavy & Highway) - Zone 3

Effective Date - 12/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$17.70	\$7.60	\$10.62	\$0.00	\$35.92
2	70	\$20.65	\$7.60	\$10.62	\$0.00	\$38.87
3	80	\$23.60	\$7.60	\$10.62	\$0.00	\$41.82
4	90	\$26.55	\$7.60	\$10.62	\$0.00	\$44.77

Notes:

Apprentice to Journeyworker Ratio:1:5

LABORER: CARPENTER TENDER <i>LABORERS - ZONE 3 (BUILDING & SITE)</i>	12/05/2016	\$29.58	\$7.60	\$12.50	\$0.00	\$49.68
---	------------	---------	--------	---------	--------	---------

For apprentice rates see "Apprentice- LABORER"

LABORER: CEMENT FINISHER TENDER <i>LABORERS - ZONE 3 (BUILDING & SITE)</i>	12/05/2016	\$29.83	\$7.60	\$12.50	\$0.00	\$49.93
---	------------	---------	--------	---------	--------	---------

For apprentice rates see "Apprentice- LABORER"

LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER <i>LABORERS - ZONE 3 (BUILDING & SITE)</i>	12/05/2015	\$29.68	\$7.60	\$12.50	\$0.00	\$49.78
---	------------	---------	--------	---------	--------	---------

For apprentice rates see "Apprentice- LABORER"

LABORER: MASON TENDER <i>LABORERS - ZONE 3 (BUILDING & SITE)</i>	12/05/2016	\$30.58	\$7.60	\$12.50	\$0.00	\$50.68
---	------------	---------	--------	---------	--------	---------

For apprentice rates see "Apprentice- LABORER"

LABORER: MASON TENDER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 3 (HEAVY & HIGHWAY)</i>	12/01/2016	\$29.75	\$7.60	\$10.62	\$0.00	\$47.97
---	------------	---------	--------	---------	--------	---------

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"

LABORER: MULTI-TRADE TENDER <i>LABORERS - ZONE 3 (BUILDING & SITE)</i>	12/05/2016	\$29.58	\$7.60	\$12.50	\$0.00	\$49.68
---	------------	---------	--------	---------	--------	---------

For apprentice rates see "Apprentice- LABORER"

LABORER: TREE REMOVER <i>LABORERS - ZONE 3 (BUILDING & SITE)</i>	12/05/2016	\$29.58	\$7.60	\$12.50	\$0.00	\$49.68
---	------------	---------	--------	---------	--------	---------

This classification applies to all tree work associated with the removal of standing trees, and trimming and removal of branches and limbs when the work is not done for a utility company for the purpose of operation, maintenance or repair of utility company equipment. For apprentice rates see "Apprentice- LABORER"

LASER BEAM OPERATOR <i>LABORERS - ZONE 3 (BUILDING & SITE)</i>	12/05/2016	\$29.83	\$7.60	\$12.50	\$0.00	\$49.93
---	------------	---------	--------	---------	--------	---------

For apprentice rates see "Apprentice- LABORER"

LASER BEAM OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 3 (HEAVY & HIGHWAY)</i>	12/01/2016	\$29.75	\$7.60	\$10.62	\$0.00	\$47.97
---	------------	---------	--------	---------	--------	---------

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"

MARBLE & TILE FINISHERS <i>BRICKLAYERS LOCAL 3 (SPR/PITT) - MARBLE & TILE</i>	09/05/2016	\$32.67	\$10.18	\$17.05	\$0.00	\$59.90
	02/27/2017	\$32.67	\$10.75	\$17.05	\$0.00	\$60.47

Apprentice - MARBLE-TILE-TERRAZZO FINISHER-Local 3 Marble/Tile (Spr/Pitt)

Effective Date - 09/05/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$16.34	\$10.18	\$17.05	\$0.00	\$43.57
2	60	\$19.60	\$10.18	\$17.05	\$0.00	\$46.83
3	70	\$22.87	\$10.18	\$17.05	\$0.00	\$50.10
4	80	\$26.14	\$10.18	\$17.05	\$0.00	\$53.37
5	90	\$29.40	\$10.18	\$17.05	\$0.00	\$56.63

Effective Date - 02/27/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$16.34	\$10.75	\$17.05	\$0.00	\$44.14
2	60	\$19.60	\$10.75	\$17.05	\$0.00	\$47.40
3	70	\$22.87	\$10.75	\$17.05	\$0.00	\$50.67
4	80	\$26.14	\$10.75	\$17.05	\$0.00	\$53.94
5	90	\$29.40	\$10.75	\$17.05	\$0.00	\$57.20

Notes:

Apprentice to Journeyworker Ratio:1:5

MARBLE MASONS, TILELAYERS & TERRAZZO MECH	09/05/2016	\$39.26	\$10.18	\$17.38	\$0.00	\$66.82
BRICKLAYERS LOCAL 3 (SPR/PITT) - MARBLE & TILE	02/27/2017	\$39.26	\$10.75	\$17.38	\$0.00	\$67.39

Apprentice - MARBLE-TILE-TERRAZZO MECH - Local 3 Marble/Tile (Spr/Pitt)

Effective Date - 09/05/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.63	\$10.18	\$17.38	\$0.00	\$47.19
2	60	\$23.56	\$10.18	\$17.38	\$0.00	\$51.12
3	70	\$27.48	\$10.18	\$17.38	\$0.00	\$55.04
4	80	\$31.41	\$10.18	\$17.38	\$0.00	\$58.97
5	90	\$35.33	\$10.18	\$17.38	\$0.00	\$62.89

Effective Date - 02/27/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.63	\$10.75	\$17.38	\$0.00	\$47.76
2	60	\$23.56	\$10.75	\$17.38	\$0.00	\$51.69
3	70	\$27.48	\$10.75	\$17.38	\$0.00	\$55.61
4	80	\$31.41	\$10.75	\$17.38	\$0.00	\$59.54
5	90	\$35.33	\$10.75	\$17.38	\$0.00	\$63.46

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MECH. SWEEPER OPERATOR (ON CONST. SITES) <i>OPERATING ENGINEERS LOCAL 98</i>	12/01/2016	\$33.68	\$10.58	\$12.38	\$0.00	\$56.64
	06/01/2017	\$34.29	\$10.58	\$12.65	\$0.00	\$57.52
	12/01/2017	\$34.89	\$10.58	\$12.92	\$0.00	\$58.39
	06/01/2018	\$35.50	\$10.58	\$13.19	\$0.00	\$59.27
	12/01/2018	\$36.10	\$10.58	\$13.46	\$0.00	\$60.14
	06/01/2019	\$36.61	\$10.58	\$13.73	\$0.00	\$60.92
	12/01/2019	\$37.21	\$10.58	\$14.00	\$0.00	\$61.79

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MECHANIC/WELDER/BOOM TRUCK <i>OPERATING ENGINEERS LOCAL 98</i>	12/01/2016	\$33.15	\$10.58	\$12.38	\$0.00	\$56.11
	06/01/2017	\$33.76	\$10.58	\$12.65	\$0.00	\$56.99
	12/01/2017	\$34.36	\$10.58	\$12.92	\$0.00	\$57.86
	06/01/2018	\$34.97	\$10.58	\$13.19	\$0.00	\$58.74
	12/01/2018	\$35.57	\$10.58	\$13.46	\$0.00	\$59.61
	06/01/2019	\$36.08	\$10.58	\$13.73	\$0.00	\$60.39
	12/01/2019	\$36.68	\$10.58	\$14.00	\$0.00	\$61.26

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

MILLWRIGHT (Zone 3) <i>MILLWRIGHTS LOCAL 1121 - Zone 3</i>	10/01/2016	\$33.24	\$9.90	\$18.25	\$0.00	\$61.39
	04/01/2017	\$34.06	\$9.90	\$18.25	\$0.00	\$62.21
	10/01/2017	\$34.89	\$9.90	\$18.25	\$0.00	\$63.04
	04/01/2018	\$35.71	\$9.90	\$18.25	\$0.00	\$63.86
	10/01/2018	\$36.54	\$9.90	\$18.25	\$0.00	\$64.69
	04/01/2019	\$37.36	\$9.90	\$18.25	\$0.00	\$65.51

Apprentice - MILLWRIGHT - Local 1121 Zone 3

Effective Date - 10/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$18.28	\$9.90	\$5.17	\$0.00	\$33.35
2	65	\$21.61	\$9.90	\$14.96	\$0.00	\$46.47
3	75	\$24.93	\$9.90	\$15.91	\$0.00	\$50.74
4	85	\$28.25	\$9.90	\$16.84	\$0.00	\$54.99

Effective Date - 04/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$18.73	\$9.90	\$5.17	\$0.00	\$33.80
2	65	\$22.14	\$9.90	\$14.96	\$0.00	\$47.00
3	75	\$25.55	\$9.90	\$15.91	\$0.00	\$51.36
4	85	\$28.95	\$9.90	\$16.84	\$0.00	\$55.69

Notes:

Steps are 2,000 hours

Apprentice to Journeyworker Ratio:1:5

MORTAR MIXER <i>LABORERS - ZONE 3 (BUILDING & SITE)</i>	12/05/2016	\$29.83	\$7.60	\$12.50	\$0.00	\$49.93
--	------------	---------	--------	---------	--------	---------

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
OILER <i>OPERATING ENGINEERS LOCAL 98</i>	12/01/2016	\$28.84	\$10.58	\$12.38	\$0.00	\$51.80
	06/01/2017	\$29.45	\$10.58	\$12.65	\$0.00	\$52.68
	12/01/2017	\$30.05	\$10.58	\$12.92	\$0.00	\$53.55
	06/01/2018	\$30.66	\$10.58	\$13.19	\$0.00	\$54.43
	12/01/2018	\$31.26	\$10.58	\$13.46	\$0.00	\$55.30
	06/01/2019	\$31.77	\$10.58	\$13.73	\$0.00	\$56.08
	12/01/2019	\$32.37	\$10.58	\$14.00	\$0.00	\$56.95
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OTHER POWER DRIVEN EQUIPMENT - CLASS VI <i>OPERATING ENGINEERS LOCAL 98</i>	12/01/2016	\$26.86	\$10.58	\$12.38	\$0.00	\$49.82
	06/01/2017	\$27.47	\$10.58	\$12.65	\$0.00	\$50.70
	12/01/2017	\$28.07	\$10.58	\$12.92	\$0.00	\$51.57
	06/01/2018	\$28.68	\$10.58	\$13.19	\$0.00	\$52.45
	12/01/2018	\$29.28	\$10.58	\$13.46	\$0.00	\$53.32
	06/01/2019	\$29.79	\$10.58	\$13.73	\$0.00	\$54.10
	12/01/2019	\$30.39	\$10.58	\$14.00	\$0.00	\$54.97
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PAINTER (BRIDGES/TANKS) <i>PAINTERS LOCAL 35 - ZONE 3</i>	01/01/2017	\$51.41	\$7.85	\$16.10	\$0.00	\$75.36

Apprentice - PAINTER Local 35 - BRIDGES/TANKS

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$25.71	\$7.85	\$0.00	\$0.00	\$33.56
2	55	\$28.28	\$7.85	\$3.66	\$0.00	\$39.79
3	60	\$30.85	\$7.85	\$3.99	\$0.00	\$42.69
4	65	\$33.42	\$7.85	\$4.32	\$0.00	\$45.59
5	70	\$35.99	\$7.85	\$14.11	\$0.00	\$57.95
6	75	\$38.56	\$7.85	\$14.44	\$0.00	\$60.85
7	80	\$41.13	\$7.85	\$14.77	\$0.00	\$63.75
8	90	\$46.27	\$7.85	\$15.44	\$0.00	\$69.56

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) *	01/01/2017	\$34.68	\$7.85	\$12.30	\$0.00	\$54.83
-------------------------------------	------------	---------	--------	---------	--------	---------

* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. *PAINTERS LOCAL 35 - ZONE 3*

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PAINTER Local 35 Zone 3 - Spray/Sandblast - New

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$17.34	\$7.85	\$0.00	\$0.00	\$25.19
2	55	\$19.07	\$7.85	\$1.57	\$0.00	\$28.49
3	60	\$20.81	\$7.85	\$1.71	\$0.00	\$30.37
4	65	\$22.54	\$7.85	\$1.85	\$0.00	\$32.24
5	70	\$24.28	\$7.85	\$11.45	\$0.00	\$43.58
6	75	\$26.01	\$7.85	\$11.59	\$0.00	\$45.45
7	80	\$27.74	\$7.85	\$11.73	\$0.00	\$47.32
8	90	\$31.21	\$7.85	\$12.02	\$0.00	\$51.08

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT) <i>PAINTERS LOCAL 35 - ZONE 3</i>	01/01/2017	\$32.00	\$7.85	\$12.30	\$0.00	\$52.15
--	------------	---------	--------	---------	--------	---------

Apprentice - PAINTER Local 35 Zone 3 - Spray/Sandblast - Repaint

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$16.00	\$7.85	\$0.00	\$0.00	\$23.85
2	55	\$17.60	\$7.85	\$1.57	\$0.00	\$27.02
3	60	\$19.20	\$7.85	\$1.71	\$0.00	\$28.76
4	65	\$20.80	\$7.85	\$1.85	\$0.00	\$30.50
5	70	\$22.40	\$7.85	\$11.45	\$0.00	\$41.70
6	75	\$24.00	\$7.85	\$11.59	\$0.00	\$43.44
7	80	\$25.60	\$7.85	\$11.73	\$0.00	\$45.18
8	90	\$28.80	\$7.85	\$12.02	\$0.00	\$48.67

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, NEW) *	01/01/2017	\$33.28	\$7.85	\$12.30	\$0.00	\$53.43
--------------------------------	------------	---------	--------	---------	--------	---------

* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. *PAINTERS LOCAL 35 - ZONE 3*

Apprentice - PAINTER - Local 35 Zone 3 - BRUSH NEW

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$16.64	\$7.85	\$0.00	\$0.00	\$24.49
2	55	\$18.30	\$7.85	\$1.57	\$0.00	\$27.72
3	60	\$19.97	\$7.85	\$1.71	\$0.00	\$29.53
4	65	\$21.63	\$7.85	\$1.85	\$0.00	\$31.33
5	70	\$23.30	\$7.85	\$11.45	\$0.00	\$42.60
6	75	\$24.96	\$7.85	\$11.59	\$0.00	\$44.40
7	80	\$26.62	\$7.85	\$11.73	\$0.00	\$46.20
8	90	\$29.95	\$7.85	\$12.02	\$0.00	\$49.82

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, REPAINT) PAINTERS LOCAL 35 - ZONE 3	01/01/2017	\$30.60	\$7.85	\$12.30	\$0.00	\$50.75
--	------------	---------	--------	---------	--------	---------

Apprentice - PAINTER Local 35 Zone 3 - BRUSH REPAINT

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$15.30	\$7.85	\$0.00	\$0.00	\$23.15
2	55	\$16.83	\$7.85	\$1.57	\$0.00	\$26.25
3	60	\$18.36	\$7.85	\$1.71	\$0.00	\$27.92
4	65	\$19.89	\$7.85	\$1.85	\$0.00	\$29.59
5	70	\$21.42	\$7.85	\$11.45	\$0.00	\$40.72
6	75	\$22.95	\$7.85	\$11.59	\$0.00	\$42.39
7	80	\$24.48	\$7.85	\$11.73	\$0.00	\$44.06
8	90	\$27.54	\$7.85	\$12.02	\$0.00	\$47.41

Notes:
Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER TRAFFIC MARKINGS (HEAVY/HIGHWAY) LABORERS - ZONE 3 (HEAVY & HIGHWAY)	12/01/2016	\$29.50	\$7.60	\$10.62	\$0.00	\$47.72
---	------------	---------	--------	---------	--------	---------

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)

PANEL & PICKUP TRUCKS DRIVER TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	12/01/2012	\$30.28	\$9.07	\$8.00	\$0.00	\$47.35
---	------------	---------	--------	--------	--------	---------

PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) PILE DRIVER LOCAL 56 (ZONE 3)	08/31/2015	\$39.00	\$9.80	\$18.17	\$0.00	\$66.97
--	------------	---------	--------	---------	--------	---------

For apprentice rates see "Apprentice- PILE DRIVER"

PILE DRIVER PILE DRIVER LOCAL 56 (ZONE 3)	08/31/2015	\$39.00	\$9.80	\$18.17	\$0.00	\$66.97
--	------------	---------	--------	---------	--------	---------

Apprentice - PILE DRIVER - Local 56 Zone 3

Effective Date - 08/31/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00

Notes: Apprentice wages shall be no less than the following Steps;
 (Same as set in Zone 1)
 1\$50.05/2\$54.25/3\$58.46/4\$60.56/5\$62.66/6\$62.66/7\$66.87/8\$66.87

Apprentice to Journeyworker Ratio:1:3

PIPELAYER <i>LABORERS - ZONE 3 (BUILDING & SITE)</i> For apprentice rates see "Apprentice- LABORER"	12/05/2016	\$29.83	\$7.60	\$12.50	\$0.00	\$49.93
PIPELAYER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 3 (HEAVY & HIGHWAY)</i> For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"	12/01/2016	\$29.75	\$7.60	\$10.62	\$0.00	\$47.97
PLUMBER & PIPEFITTER <i>PLUMBERS & PIPEFITTERS LOCAL 104</i>	09/17/2016	\$38.76	\$8.45	\$15.05	\$0.00	\$62.26
	03/17/2017	\$39.26	\$8.50	\$15.30	\$0.00	\$63.06
	09/17/2017	\$40.01	\$8.50	\$15.30	\$0.00	\$63.81
	03/17/2018	\$40.76	\$8.50	\$15.30	\$0.00	\$64.56
	09/17/2018	\$41.51	\$8.50	\$15.30	\$0.00	\$65.31
	03/17/2019	\$42.26	\$8.50	\$15.30	\$0.00	\$66.06

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PLUMBER/PIPEFITTER - Local 104

Effective Date - 09/17/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$17.44	\$8.45	\$9.05	\$0.00	\$34.94
2	50	\$19.38	\$8.45	\$9.05	\$0.00	\$36.88
3	55	\$21.32	\$8.45	\$9.05	\$0.00	\$38.82
4	60	\$23.26	\$8.45	\$9.05	\$0.00	\$40.76
5	65	\$25.19	\$8.45	\$9.05	\$0.00	\$42.69
6	70	\$27.13	\$8.45	\$9.05	\$0.00	\$44.63
7	75	\$29.07	\$8.45	\$9.05	\$0.00	\$46.57
8	80	\$31.01	\$8.45	\$9.05	\$0.00	\$48.51
9	80	\$31.01	\$8.45	\$15.05	\$0.00	\$54.51
10	80	\$31.01	\$8.45	\$15.05	\$0.00	\$54.51

Effective Date - 03/17/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$17.67	\$8.50	\$9.05	\$0.00	\$35.22
2	50	\$19.63	\$8.50	\$9.05	\$0.00	\$37.18
3	55	\$21.59	\$8.50	\$9.05	\$0.00	\$39.14
4	60	\$23.56	\$8.50	\$9.05	\$0.00	\$41.11
5	65	\$25.52	\$8.50	\$9.05	\$0.00	\$43.07
6	70	\$27.48	\$8.50	\$9.05	\$0.00	\$45.03
7	75	\$29.45	\$8.50	\$9.05	\$0.00	\$47.00
8	80	\$31.41	\$8.50	\$9.05	\$0.00	\$48.96
9	80	\$31.41	\$8.50	\$15.30	\$0.00	\$55.21
10	80	\$31.41	\$8.50	\$15.30	\$0.00	\$55.21

Notes: **1:1,2:5,3:9,4:12

Apprentice to Journeyworker Ratio:**

PNEUMATIC CONTROLS (TEMP.) <i>PLUMBERS & PIPEFITTERS LOCAL 104</i>	09/17/2016	\$38.76	\$8.45	\$15.05	\$0.00	\$62.26
	03/17/2017	\$39.26	\$8.50	\$15.30	\$0.00	\$63.06
	09/17/2017	\$40.01	\$8.50	\$15.30	\$0.00	\$63.81
	03/17/2018	\$40.76	\$8.50	\$15.30	\$0.00	\$64.56
	09/17/2018	\$41.51	\$8.50	\$15.30	\$0.00	\$65.31
	03/17/2019	\$42.26	\$8.50	\$15.30	\$0.00	\$66.06

For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"

PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 3 (HEAVY & HIGHWAY)</i>	12/01/2016	\$29.75	\$7.60	\$10.62	\$0.00	\$47.97
---	------------	---------	--------	---------	--------	---------

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"

POWDERMAN & BLASTER <i>LABORERS - ZONE 3 (BUILDING & SITE)</i>	12/05/2016	\$30.58	\$7.60	\$12.50	\$0.00	\$50.68
---	------------	---------	--------	---------	--------	---------

For apprentice rates see "Apprentice- LABORER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
POWDERMAN & BLASTER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 3 (HEAVY & HIGHWAY)</i>	12/01/2016	\$30.50	\$7.60	\$10.62	\$0.00	\$48.72
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)						
PUMP OPERATOR (CONCRETE) <i>OPERATING ENGINEERS LOCAL 98</i>	12/01/2016	\$33.68	\$10.58	\$12.38	\$0.00	\$56.64
	06/01/2017	\$34.29	\$10.58	\$12.65	\$0.00	\$57.52
	12/01/2017	\$34.89	\$10.58	\$12.92	\$0.00	\$58.39
	06/01/2018	\$35.50	\$10.58	\$13.19	\$0.00	\$59.27
	12/01/2018	\$36.10	\$10.58	\$13.46	\$0.00	\$60.14
	06/01/2019	\$36.61	\$10.58	\$13.73	\$0.00	\$60.92
	12/01/2019	\$37.21	\$10.58	\$14.00	\$0.00	\$61.79
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) <i>OPERATING ENGINEERS LOCAL 98</i>	12/01/2016	\$33.15	\$10.58	\$12.38	\$0.00	\$56.11
	06/01/2017	\$33.76	\$10.58	\$12.65	\$0.00	\$56.99
	12/01/2017	\$34.36	\$10.58	\$12.92	\$0.00	\$57.86
	06/01/2018	\$34.97	\$10.58	\$13.19	\$0.00	\$58.74
	12/01/2018	\$35.57	\$10.58	\$13.46	\$0.00	\$59.61
	06/01/2019	\$36.08	\$10.58	\$13.73	\$0.00	\$60.39
	12/01/2019	\$36.68	\$10.58	\$14.00	\$0.00	\$61.26
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY-MIX CONCRETE DRIVER <i>TEAMSTERS LOCAL 404</i>	05/01/2016	\$21.01	\$10.23	\$9.40	\$0.00	\$40.64
RESIDENTIAL WOOD FRAME CARPENTER ** ** The Residential Wood Frame Carpenter classification applies only to the construction of new, wood frame residences that do not exceed four stories including the basement. <i>CARPENTERS LOCAL 108 - HAMPDEN HAMPSHIRE FRANKLIN</i>	10/01/2016	\$21.53	\$7.07	\$7.18	\$0.00	\$35.78
	04/01/2017	\$22.08	\$7.07	\$7.18	\$0.00	\$36.33
	10/01/2017	\$22.63	\$7.07	\$7.18	\$0.00	\$36.88
	04/01/2018	\$23.01	\$7.07	\$7.18	\$0.00	\$37.26
	10/01/2018	\$23.39	\$7.07	\$7.18	\$0.00	\$37.64
	04/01/2019	\$23.78	\$7.07	\$7.18	\$0.00	\$38.03
	10/01/2019	\$24.17	\$7.07	\$7.18	\$0.00	\$38.42

As of 9/1/09 Carpentry work on wood-frame residential WEATHERIZATION projects shall be paid the RESIDENTIAL WOOD FRAME CARPENTER rate.

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - CARPENTER (Residential Wood Frame) - 108 Hampden Hampshire

Effective Date - 10/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$12.92	\$7.07	\$0.00	\$0.00	\$19.99
2	60	\$12.92	\$7.07	\$7.18	\$0.00	\$27.17
3	65	\$13.99	\$7.07	\$7.18	\$0.00	\$28.24
4	70	\$15.07	\$7.07	\$7.18	\$0.00	\$29.32
5	75	\$16.15	\$7.07	\$7.18	\$0.00	\$30.40
6	80	\$17.22	\$7.07	\$7.18	\$0.00	\$31.47
7	85	\$18.30	\$7.07	\$7.18	\$0.00	\$32.55
8	90	\$19.38	\$7.07	\$7.18	\$0.00	\$33.63

Effective Date - 04/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$13.25	\$7.07	\$0.00	\$0.00	\$20.32
2	60	\$13.25	\$7.07	\$7.18	\$0.00	\$27.50
3	65	\$14.35	\$7.07	\$7.18	\$0.00	\$28.60
4	70	\$15.46	\$7.07	\$7.18	\$0.00	\$29.71
5	75	\$16.56	\$7.07	\$7.18	\$0.00	\$30.81
6	80	\$17.66	\$7.07	\$7.18	\$0.00	\$31.91
7	85	\$18.77	\$7.07	\$7.18	\$0.00	\$33.02
8	90	\$19.87	\$7.07	\$7.18	\$0.00	\$34.12

Notes:

** 1: 1-5, 2: 6-8, 3: 9-11

Apprentice to Journeyworker Ratio:**

RIDE-ON MOTORIZED BUGGY OPERATOR LABORERS - ZONE 3 (BUILDING & SITE)	12/05/2016	\$29.83	\$7.60	\$12.50	\$0.00	\$49.93
---	------------	---------	--------	---------	--------	---------

For apprentice rates see "Apprentice- LABORER"

ROLLER OPERATOR OPERATING ENGINEERS LOCAL 98	12/01/2016	\$32.54	\$10.58	\$12.38	\$0.00	\$55.50
	06/01/2017	\$33.15	\$10.58	\$12.65	\$0.00	\$56.38
	12/01/2017	\$33.75	\$10.58	\$12.92	\$0.00	\$57.25
	06/01/2018	\$34.36	\$10.58	\$13.19	\$0.00	\$58.13
	12/01/2018	\$34.96	\$10.58	\$13.46	\$0.00	\$59.00
	06/01/2019	\$35.47	\$10.58	\$13.73	\$0.00	\$59.78
	12/01/2019	\$36.07	\$10.58	\$14.00	\$0.00	\$60.65

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

ROOFER (Coal tar pitch) ROOFERS LOCAL 248	10/16/2016	\$32.25	\$9.41	\$13.25	\$0.00	\$54.91
--	------------	---------	--------	---------	--------	---------

For apprentice rates see "Apprentice- ROOFER"

ROOFER (Inc.Roofers Waterproofing &Roofers Damproofg) ROOFERS LOCAL 248	10/16/2016	\$31.75	\$9.41	\$12.75	\$0.00	\$53.91
--	------------	---------	--------	---------	--------	---------

Apprentice - ROOFER - Local 248

Effective Date - 10/16/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$19.05	\$9.41	\$0.00	\$0.00	\$28.46
2	65	\$20.64	\$9.41	\$12.75	\$0.00	\$42.80
3	70	\$22.23	\$9.41	\$12.75	\$0.00	\$44.39
4	75	\$23.81	\$9.41	\$12.75	\$0.00	\$45.97
5	80	\$25.40	\$9.41	\$12.75	\$0.00	\$47.56
6	85	\$26.99	\$9.41	\$12.75	\$0.00	\$49.15
7	90	\$28.58	\$9.41	\$12.75	\$0.00	\$50.74
8	95	\$30.16	\$9.41	\$12.75	\$0.00	\$52.32

Notes:

Steps are 750 hrs.Roofeer(Tear Off)1:1; Same as above

Apprentice to Journeyworker Ratio:1:3

ROOFER SLATE / TILE / PRECAST CONCRETE ROOFERS LOCAL 248	10/16/2016	\$32.25	\$9.41	\$13.25	\$0.00	\$54.91
---	------------	---------	--------	---------	--------	---------

For apprentice rates see "Apprentice- ROOFER"

SCRAPER OPERATING ENGINEERS LOCAL 98	12/01/2016	\$33.15	\$10.58	\$12.38	\$0.00	\$56.11
	06/01/2017	\$33.76	\$10.58	\$12.65	\$0.00	\$56.99
	12/01/2017	\$34.36	\$10.58	\$12.92	\$0.00	\$57.86
	06/01/2018	\$34.97	\$10.58	\$13.19	\$0.00	\$58.74
	12/01/2018	\$35.57	\$10.58	\$13.46	\$0.00	\$59.61
	06/01/2019	\$36.08	\$10.58	\$13.73	\$0.00	\$60.39
	12/01/2019	\$36.68	\$10.58	\$14.00	\$0.00	\$61.26

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

SELF-POWERED ROLLERS AND COMPACTORS (TAMPERS) OPERATING ENGINEERS LOCAL 98	12/01/2016	\$32.54	\$10.58	\$12.38	\$0.00	\$55.50
	06/01/2017	\$33.15	\$10.58	\$12.65	\$0.00	\$56.38
	12/01/2017	\$33.75	\$10.58	\$12.92	\$0.00	\$57.25
	06/01/2018	\$34.36	\$10.58	\$13.19	\$0.00	\$58.13
	12/01/2018	\$34.96	\$10.58	\$13.46	\$0.00	\$59.00
	06/01/2019	\$35.47	\$10.58	\$13.73	\$0.00	\$59.78
	12/01/2019	\$36.07	\$10.58	\$14.00	\$0.00	\$60.65

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

SELF-PROPELLED POWER BROOM OPERATING ENGINEERS LOCAL 98	12/01/2016	\$29.92	\$10.58	\$12.38	\$0.00	\$52.88
	06/01/2017	\$30.53	\$10.58	\$12.65	\$0.00	\$53.76
	12/01/2017	\$31.13	\$10.58	\$12.92	\$0.00	\$54.63
	06/01/2018	\$31.74	\$10.58	\$13.19	\$0.00	\$55.51
	12/01/2018	\$32.34	\$10.58	\$13.46	\$0.00	\$56.38
	06/01/2019	\$32.85	\$10.58	\$13.73	\$0.00	\$57.16
	12/01/2019	\$33.45	\$10.58	\$14.00	\$0.00	\$58.03

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

SHEETMETAL WORKER SHEETMETAL WORKERS LOCAL 63	01/01/2017	\$32.24	\$10.64	\$15.49	\$1.75	\$60.12
--	------------	---------	---------	---------	--------	---------

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - SHEET METAL WORKER - Local 63

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$14.51	\$6.21	\$4.36	\$0.00	\$25.08
2	50	\$16.12	\$6.55	\$4.85	\$0.00	\$27.52
3	55	\$17.73	\$6.88	\$8.72	\$0.98	\$34.31
4	60	\$19.34	\$7.22	\$8.72	\$1.06	\$36.34
5	65	\$20.96	\$7.55	\$8.72	\$1.12	\$38.35
6	70	\$22.57	\$7.88	\$8.72	\$1.18	\$40.35
7	75	\$24.18	\$8.22	\$8.72	\$1.23	\$42.35
8	80	\$25.79	\$9.30	\$14.52	\$1.43	\$51.04
9	85	\$27.40	\$9.64	\$14.52	\$1.49	\$53.05
10	90	\$29.02	\$9.98	\$14.52	\$1.55	\$55.07

Notes:

Apprentice to Journeyworker Ratio:1:3

SIGN ERECTOR PAINTERS LOCAL 35 - ZONE 3	06/01/2013	\$25.81	\$7.07	\$7.05	\$0.00	\$39.93
--	------------	---------	--------	--------	--------	---------

Apprentice - SIGN ERECTOR - Local 35 Zone 3

Effective Date - 06/01/2013

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$12.91	\$7.07	\$0.00	\$0.00	\$19.98
2	55	\$14.20	\$7.07	\$2.45	\$0.00	\$23.72
3	60	\$15.49	\$7.07	\$2.45	\$0.00	\$25.01
4	65	\$16.78	\$7.07	\$2.45	\$0.00	\$26.30
5	70	\$18.07	\$7.07	\$7.05	\$0.00	\$32.19
6	75	\$19.36	\$7.07	\$7.05	\$0.00	\$33.48
7	80	\$20.65	\$7.07	\$7.05	\$0.00	\$34.77
8	85	\$21.94	\$7.07	\$7.05	\$0.00	\$36.06
9	90	\$23.23	\$7.07	\$7.05	\$0.00	\$37.35

Notes:
Steps are 4 mos.

Apprentice to Journeyworker Ratio:1:1

SPECIALIZED EARTH MOVING EQUIP < 35 TONS TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	12/01/2016	\$32.44	\$10.91	\$10.89	\$0.00	\$54.24
---	------------	---------	---------	---------	--------	---------

SPECIALIZED EARTH MOVING EQUIP > 35 TONS TEAMSTERS JOINT COUNCIL NO. 10 ZONE B	12/01/2016	\$32.73	\$10.91	\$10.89	\$0.00	\$54.53
---	------------	---------	---------	---------	--------	---------

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
SPRINKLER FITTER <i>SPRINKLER FITTERS LOCAL 669</i>	01/01/2017	\$39.01	\$9.17	\$12.28	\$0.00	\$60.46
	04/01/2017	\$40.26	\$9.17	\$12.43	\$0.00	\$61.86
	01/01/2018	\$40.26	\$9.67	\$12.63	\$0.00	\$62.56
	04/01/2018	\$41.51	\$9.67	\$12.88	\$0.00	\$64.06
	01/01/2019	\$41.51	\$10.02	\$13.08	\$0.00	\$64.61

Apprentice - *SPRINKLER FITTER - Local 669*

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$17.55	\$7.60	\$0.00	\$0.00	\$25.15
2	50	\$19.51	\$7.60	\$0.00	\$0.00	\$27.11
3	55	\$21.46	\$9.17	\$6.45	\$0.00	\$37.08
4	60	\$23.41	\$9.17	\$6.45	\$0.00	\$39.03
5	65	\$25.36	\$9.17	\$6.70	\$0.00	\$41.23
6	70	\$27.31	\$9.17	\$6.70	\$0.00	\$43.18
7	75	\$29.26	\$9.17	\$6.70	\$0.00	\$45.13
8	80	\$31.21	\$9.17	\$6.70	\$0.00	\$47.08
9	85	\$33.16	\$9.17	\$6.70	\$0.00	\$49.03
10	90	\$35.11	\$9.17	\$6.70	\$0.00	\$50.98

Effective Date - 04/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$18.12	\$7.60	\$0.00	\$0.00	\$25.72
2	50	\$20.13	\$7.60	\$0.00	\$0.00	\$27.73
3	55	\$22.14	\$9.17	\$6.60	\$0.00	\$37.91
4	60	\$24.16	\$9.17	\$6.60	\$0.00	\$39.93
5	65	\$26.17	\$9.17	\$6.85	\$0.00	\$42.19
6	70	\$28.18	\$9.17	\$6.85	\$0.00	\$44.20
7	75	\$30.20	\$9.17	\$6.85	\$0.00	\$46.22
8	80	\$32.21	\$9.17	\$6.85	\$0.00	\$48.23
9	85	\$34.22	\$9.17	\$6.85	\$0.00	\$50.24
10	90	\$36.23	\$9.17	\$6.85	\$0.00	\$52.25

Notes:

Apprentice to Journeyworker Ratio:1:1

TELECOMMUNICATION TECHNICIAN <i>ELECTRICIANS LOCAL 7</i>	01/01/2017	\$39.51	\$9.35	\$10.84	\$0.00	\$59.70
---	------------	---------	--------	---------	--------	---------

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - TELECOMMUNICATION TECHNICIAN - Local 7

Effective Date - 01/01/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$15.80	\$5.00	\$0.47	\$0.00	\$21.27
2	45	\$17.78	\$5.00	\$0.53	\$0.00	\$23.31
3	50	\$19.76	\$9.35	\$6.54	\$0.00	\$35.65
4	55	\$21.73	\$9.35	\$6.60	\$0.00	\$37.68
5	65	\$25.68	\$9.35	\$7.72	\$0.00	\$42.75
6	70	\$27.66	\$9.35	\$8.78	\$0.00	\$45.79

Notes:

Steps are 800 hours

Apprentice to Journeyworker Ratio:1:1

TERRAZZO FINISHERS BRICKLAYERS LOCAL 3 (SPR/PITT) - MARBLE & TILE	09/05/2016	\$32.67	\$10.18	\$17.05	\$0.00	\$59.90
	02/27/2017	\$32.67	\$10.75	\$17.05	\$0.00	\$60.47

Apprentice - MARBLE-TILE-TERRAZZO FINISHER-Local 3 Marble/Tile (Spr/Pitt)

Effective Date - 09/05/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$16.34	\$10.18	\$17.05	\$0.00	\$43.57
2	60	\$19.60	\$10.18	\$17.05	\$0.00	\$46.83
3	70	\$22.87	\$10.18	\$17.05	\$0.00	\$50.10
4	80	\$26.14	\$10.18	\$17.05	\$0.00	\$53.37
5	90	\$29.40	\$10.18	\$17.05	\$0.00	\$56.63

Effective Date - 02/27/2017

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$16.34	\$10.75	\$17.05	\$0.00	\$44.14
2	60	\$19.60	\$10.75	\$17.05	\$0.00	\$47.40
3	70	\$22.87	\$10.75	\$17.05	\$0.00	\$50.67
4	80	\$26.14	\$10.75	\$17.05	\$0.00	\$53.94
5	90	\$29.40	\$10.75	\$17.05	\$0.00	\$57.20

Notes:

Apprentice to Journeyworker Ratio:1:5

TEST BORING DRILLER LABORERS - FOUNDATION AND MARINE	12/01/2016	\$37.70	\$7.60	\$14.35	\$0.00	\$59.65
---	------------	---------	--------	---------	--------	---------

For apprentice rates see "Apprentice- LABORER"

TEST BORING DRILLER HELPER LABORERS - FOUNDATION AND MARINE	12/01/2016	\$36.42	\$7.60	\$14.35	\$0.00	\$58.37
--	------------	---------	--------	---------	--------	---------

For apprentice rates see "Apprentice- LABORER"

TEST BORING LABORER LABORERS - FOUNDATION AND MARINE	12/01/2016	\$36.30	\$7.60	\$14.35	\$0.00	\$58.25
---	------------	---------	--------	---------	--------	---------

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
TRACTORS <i>OPERATING ENGINEERS LOCAL 98</i>	12/01/2016	\$32.54	\$10.58	\$12.38	\$0.00	\$55.50
	06/01/2017	\$33.15	\$10.58	\$12.65	\$0.00	\$56.38
	12/01/2017	\$33.75	\$10.58	\$12.92	\$0.00	\$57.25
	06/01/2018	\$34.36	\$10.58	\$13.19	\$0.00	\$58.13
	12/01/2018	\$34.96	\$10.58	\$13.46	\$0.00	\$59.00
	06/01/2019	\$35.47	\$10.58	\$13.73	\$0.00	\$59.78
	12/01/2019	\$36.07	\$10.58	\$14.00	\$0.00	\$60.65
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TRAILERS FOR EARTH MOVING EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2016	\$33.02	\$10.91	\$10.89	\$0.00	\$54.82
TUNNEL WORK - COMPRESSED AIR <i>LABORERS (COMPRESSED AIR)</i>	12/01/2016	\$48.58	\$7.60	\$14.75	\$0.00	\$70.93
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) <i>LABORERS (COMPRESSED AIR)</i>	12/01/2016	\$50.58	\$7.60	\$14.75	\$0.00	\$72.93
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR <i>LABORERS (FREE AIR TUNNEL)</i>	12/01/2016	\$40.65	\$7.60	\$14.75	\$0.00	\$63.00
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR (HAZ. WASTE) <i>LABORERS (FREE AIR TUNNEL)</i>	12/01/2016	\$42.65	\$7.60	\$14.75	\$0.00	\$65.00
For apprentice rates see "Apprentice- LABORER"						
VAC-HAUL <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2016	\$32.44	\$10.91	\$10.89	\$0.00	\$54.24
WAGON DRILL OPERATOR <i>LABORERS - ZONE 3 (BUILDING & SITE)</i>	12/05/2016	\$29.83	\$7.60	\$12.50	\$0.00	\$49.93
For apprentice rates see "Apprentice- LABORER"						
WAGON DRILL OPERATOR (HEAVY & HIGHWAY) <i>LABORERS - ZONE 3 (HEAVY & HIGHWAY)</i>	12/01/2016	\$29.75	\$7.60	\$10.62	\$0.00	\$47.97
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
WATER METER INSTALLER <i>PLUMBERS & PIPEFITTERS LOCAL 104</i>	09/17/2016	\$38.76	\$8.45	\$15.05	\$0.00	\$62.26
	03/17/2017	\$39.26	\$8.50	\$15.30	\$0.00	\$63.06
	09/17/2017	\$40.01	\$8.50	\$15.30	\$0.00	\$63.81
	03/17/2018	\$40.76	\$8.50	\$15.30	\$0.00	\$64.56
	09/17/2018	\$41.51	\$8.50	\$15.30	\$0.00	\$65.31
	03/17/2019	\$42.26	\$8.50	\$15.30	\$0.00	\$66.06
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						
Outside Electrical - West						
EQUIPMENT OPERATOR <i>OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42</i>	08/30/2015	\$42.16	\$8.20	\$9.26	\$0.00	\$59.62
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN <i>OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42</i>	08/30/2015	\$28.87	\$8.20	\$8.87	\$0.00	\$45.94
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN / TRUCK DRIVER <i>OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42</i>	08/30/2015	\$37.73	\$8.20	\$9.13	\$0.00	\$55.06
For apprentice rates see "Apprentice- LINEMAN"						
HEAVY EQUIPMENT OPERATOR <i>OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42</i>	08/30/2015	\$44.37	\$8.20	\$9.33	\$0.00	\$61.90
For apprentice rates see "Apprentice- LINEMAN"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
JOURNEYMAN LINEMAN <i>OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42</i>	08/30/2015	\$48.80	\$8.20	\$9.46	\$0.00	\$66.46

Apprentice - LINEMAN (Outside Electrical) - West Local 42

Effective Date - 08/30/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$29.28	\$8.20	\$0.88	\$0.00	\$38.36
2	65	\$31.72	\$8.20	\$0.95	\$0.00	\$40.87
3	70	\$34.16	\$8.20	\$9.02	\$0.00	\$51.38
4	75	\$36.60	\$8.20	\$9.10	\$0.00	\$53.90
5	80	\$39.04	\$8.20	\$9.17	\$0.00	\$56.41
6	85	\$41.48	\$8.20	\$9.24	\$0.00	\$58.92
7	90	\$43.92	\$8.20	\$9.32	\$0.00	\$61.44

Notes:

Apprentice to Journeyworker Ratio:1:2

TELEDATA CABLE SPLICER <i>OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42</i>	01/01/2016	\$28.98	\$4.25	\$3.12	\$0.00	\$36.35
TELEDATA LINEMAN/EQUIPMENT OPERATOR <i>OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42</i>	01/01/2016	\$27.31	\$4.25	\$3.07	\$0.00	\$34.63
TELEDATA WIREMAN/INSTALLER/TECHNICIAN <i>OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42</i>	01/01/2016	\$27.31	\$4.25	\$3.07	\$0.00	\$34.63
TRACTOR-TRAILER DRIVER <i>OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42</i>	08/30/2015	\$42.16	\$8.20	\$9.26	\$0.00	\$59.62
TREE TRIMMER <i>OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42</i>	01/31/2016	\$18.51	\$3.55	\$0.00	\$0.00	\$22.06
This classification applies only to tree work done: (a) for a utility company, R.E.A. cooperative, or railroad or coal mining company, and (b) for the purpose of operating, maintaining, or repairing the utility company's equipment, and (c) by a person who is using hand or mechanical cutting methods and is not on the ground. This classification does not apply to wholesale tree removal.						
TREE TRIMMER GROUNDMAN <i>OUTSIDE ELECTRICAL WORKERS - WEST LOCAL 42</i>	01/31/2016	\$16.32	\$3.55	\$0.00	\$0.00	\$19.87
This classification applies only to tree work done: (a) for a utility company, R.E.A. cooperative, or railroad or coal mining company, and (b) for the purpose of operating, maintaining, or repairing the utility company's equipment, and (c) by a person who is using hand or mechanical cutting methods and is on the ground. This classification does not apply to wholesale tree removal.						

Additional Apprentice Information:

Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the pre-determined hourly wage rate established by the Commissioner under the provisions of the M.G.L. c. 149, ss. 26-27D. Apprentice ratios are established by the Division of Apprenticeship Training pursuant to M.G.L. c. 23, ss. 11E-11L.

All apprentices must be registered with the Division of Apprenticeship Training in accordance with M.G.L. c. 23, ss. 11E-11L.

All steps are six months (1000 hours.)

Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified.

** Multiple ratios are listed in the comment field.

*** APP to JM; 1:1, 2:2, 2:3, 3:4, 4:4, 4:5, 4:6, 5:7, 6:7, 6:8, 6:9, 7:10, 8:10, 8:11, 8:12, 9:13, 10:13, 10:14, etc.

**** APP to JM; 1:1, 1:2, 2:3, 2:4, 3:5, 4:6, 4:7, 5:8, 6:9, 6:10, 7:11, 8:12, 8:13, 9:14, 10:15, 10:16, etc.

TABLE OF CONTENTS

SECTION 23 00 00

HEATING, VENTILATING AND AIR CONDITIONING

PART 1 - GENERAL..... 1

1.0 GENERAL PROVISIONS 1

1.1 SCOPE OF WORK 1

1.2 RELATED WORK 2

1.3 DEFINITIONS 2

1.4 CODES, REFERENCES AND PERMITS 3

1.5 GENERAL REQUIREMENTS..... 4

1.6 MATERIAL AND EQUIPMENT STANDARDS..... 5

1.7 SUBMITTALS..... 5

1.8 OPERATION AND MAINTENANCE DATA 9

1.9 RECORD DRAWINGS..... 11

1.10 WARRANTIES 11

1.11 COORDINATION 12

1.12 INTERPRETATION OF DRAWINGS AND SPECIFICATIONS..... 13

1.13 INSPECTION OF SITE CONDITIONS 13

1.14 SURVEY AND MEASUREMENTS 13

1.15 DELIVERY, STORAGE AND HANDLING 13

1.16 PROTECTION OF WORK AND PROPERTY..... 14

1.17 SUPERVISION..... 14

1.18 SAFETY PRECAUTIONS 14

1.19 SCHEDULE..... 14

1.20 HOISTING, SCAFFOLDING AND PLANKING 14

1.21 CUTTING AND PATCHING..... 15

1.22 SLEEVES, INSERTS AND ANCHOR BOLTS..... 15

1.23 SUPPLEMENTARY STEEL, CHANNELS AND SUPPORTS 16

1.24 HAZARDOUS MATERIALS 16

1.25 ACCESSIBILITY 16

1.26 ELECTRICAL WORK..... 17

1.27 PROJECT CLOSEOUT 17

PART 2 - PRODUCTS..... 19

2.0 PIPING AND FITTINGS..... 19

2.1 PIPE HANGERS AND SUPPORTS..... 21

2.2 SLEEVES..... 23

HEATING, VENTILATION AND AIR CONDITIONING

2.3	FIRESTOPPING	23
2.4	PIPING, EQUIPMENT, PANEL AND VALVE IDENTIFICATION	24
2.5	AIR-COOLED CONDENSING UNITS (SCROLL, 3-5 TONS)	24
2.6	COILS	25
2.7	INSULATION.....	25
PART 3 - EXECUTION		27
3.0	DEMOLITION.....	27
3.1	GENERAL.....	28
3.2	AHU REFURBISHING	29
3.3	IDENTIFICATION.....	30
3.4	PIPING	31
3.5	FIRESTOPPING INSTALLATION.....	33
3.6	CONNECTIONS TO EQUIPMENT	33
3.7	SUPPORTS	34
3.8	COOLING SYSTEMS INSTALLATION.....	35
3.9	REFRIGERATION SYSTEMS TESTS.....	36
3.10	BASES AND SUPPORTS.....	37
3.11	WATERPROOFING.....	37
3.12	PLACING IN SERVICE	37
3.13	CLEANING AND ADJUSTING.....	37
3.14	OPERATING AND MAINTENANCE INSTRUCTIONS.....	38

HEATING, VENTILATION AND AIR CONDITIONING

SECTION 23 00 00

HEATING, VENTILATING AND AIR CONDITIONING

PART 1 - GENERAL

1.0 GENERAL PROVISIONS

- A. The GENERAL REQUIREMENTS, DIVISION 01, and BIDDING AND CONTRACT REQUIREMENTS, and DIVISION 00 are hereby made a part of this Specification Section.
- B. Examine all Drawings and all Sections of the Specifications and requirements and provisions affecting the work of this Section.

1.1 SCOPE OF WORK

- A. This project consists of the replacement of (3) existing roof mounted air cooled condensing units with new units. The work includes demolition and disposal of existing units, removal of existing refrigerant piping, removal of existing evaporator coils with the remaining vertical air handling units, and providing new to serve the new units as indicated in the contract documents.
- B. The work under this Section shall include the furnishing of all materials, labor, equipment and supplies and the performance of all operations to provide complete working systems, in general, to include the following items:
 - 1. Piping and Fittings (all systems and types) including submitting sizing where called for on the drawings or in these specifications
 - 2. Pipe Hangers and Supports
 - 3. Identification
 - 4. Sleeves, Firestopping
 - 5. Air Cooled Condensing Units
 - 6. Coils
 - 7. Air Filters
 - 8. Insulation
 - 9. Relocation of existing HVAC components that interfere with new construction and removal and disposal of obsolete components.
 - 10. Operating and maintenance instructions and manuals
 - 11. Shop drawings
 - 12. Cleaning, Testing, Adjusting, & Balancing of all Ducted and Piped Systems and Equipment
 - 13. Record (as-built) Drawings
- C. The work to be done under this section is generally shown on the Mechanical HVAC Drawings.

HEATING, VENTILATION AND AIR CONDITIONING

1.2 RELATED WORK

- A. Principal classes of Work related to the Work of this Section are listed below, and are specified to be performed under the indicated Sections of these Specifications. Refer to the indicated Sections for description of the extent and nature of the indicated Work, and for coordination with related trades. This listing may not include all related Work items. It is the responsibility of the Contractor to coordinate the Work of this Section with that of all other trades.
- B. The following work is not included in this section and will be provided under other sections, except as specified herein:
 - 1. Electrical power wiring for all HVAC equipment and to junction box(es) in mechanical areas. Power wiring from these box(es) to all control equipment (control panels, etc.) and all controls/interlock wiring shall be provided by the controls Contractor. Control wiring shall be from standby power source (if available).
 - 2. Flashing of roof and wall penetrations.

1.3 DEFINITIONS

- A. As used in this Section, the following terms shall be understood to have the following meaning:
 - 1. **“Contractor,”** or **“Subcontractor,”** unless otherwise qualified, shall mean the installer of the work specified under this Section, and shall be responsible for coordination of this work with the work of the ATC Contractor.
 - 2. **“Furnish”** shall mean purchase and deliver to the project site, complete with every necessary appurtenance and product support.
 - 3. **“Install”** shall mean unload at the delivery point at the site and perform all work necessary to establish secure mounting and proper operation at the proper location in the project.
 - 4. **“Provide”** shall mean furnish and install.
 - 5. **“Work”** shall mean all labor, materials, equipment, apparatus, controls, accessories and all other items required for a proper and complete installation.
 - 6. **“Concealed”** shall mean hidden from sight in chases, furred in spaces, shafts, embedded in construction, in a crawl space, and above hung ceilings.
 - 7. **“Exposed”** shall mean not installed underground or concealed as defined above.
 - 8. **“Furnished by others”** shall mean materials or equipment purchased under other sections of the general contract and installed by this section of the specifications by this trade Contractor.
 - 9. **“Owner’s Representative”** shall be the party responsible to make decisions regarding all contractual obligations in reference to the Scope of Work for the Owner.
 - 10. **“Date of Substantial Completion”** shall indicate the date where the work has been formally accepted as evidenced by completed final punch list or where the work has reached the stage that the Owner obtains beneficial use and commences utilization of the installed systems for business or occupancy purposes. The GENERAL REQUIREMENTS, DIVISION 01, shall supersede this definition where specifically defined.

HEATING, VENTILATION AND AIR CONDITIONING

11. **"Piping"** shall mean, in addition to pipe or tubing, all fittings, flanges, unions, valves, strainers, drains, hangers and other accessories relative to such piping.
12. **"ATC"** shall mean Automatic Temperature Controls, and shall be interchangeable with **"BAS"** (Building Automation System).

1.4 CODES, REFERENCES AND PERMITS

- A. Materials, installation of systems and equipment provided under this section shall be done in strict accordance with the latest governing edition of the following standards, codes, specifications, requirements, and regulations, and any other Codes and Regulations having jurisdiction including but not limited to:
 1. All Applicable NFPA Standards
 2. State and Local Building Mechanical, Electrical, and Energy Codes
 3. American Society of Mechanical Engineers (ASME)
 4. American Society of Testing and Materials (ASTM)
 5. American National Standards Institute (ANSI)
 6. Underwriters' Laboratories, Inc. (UL)
 7. Occupational Safety and Health Administration (OSHA)
 8. Any other local codes or authorities having jurisdiction.
- B. Heating, pumping, process piping and refrigeration systems shall be installed by Contractors and personnel appropriately licensed in the State (Installing Contractor).
- C. All pressure vessels shall conform to ASME and State codes and regulations.
- D. All equipment shall meet the more efficient requirement:
 1. As shown on bid documents,
 2. Minimum efficiencies state in ASHRAE 90.1-2007, or
 3. Minimum efficiencies stated in the governing Energy Code.
- E. Unless otherwise specified or indicated, materials, workmanship and equipment performance shall conform with the latest governing edition of the following standards, codes, specifications, requirements, and regulations, except when more rigid requirements are specified or are required by applicable codes but not limited to:
 1. Air Conditioning and Refrigeration Institute (ARI)
 2. Air Diffusion Council (ADC)
 3. Air Movement and Control Association (AMCA)
 4. American National Standards Institute (ANSI)
 5. American Society of Heating, Refrigeration and Air Conditioning (ASHRAE)
 6. American Society of Mechanical Engineers (ASME)
 7. American Society of Testing and Materials (ASTM)
 8. American Welding Society, Inc. (AWS)
 9. Associated Air Balance Council (AABC)

HEATING, VENTILATION AND AIR CONDITIONING

10. Copper Development Association (CDA)
 11. Manufacturer's Standardization Society of the Valve & Fitting Industry (MSS)
 12. National Electrical Contractors Association (NECA)
 13. National Electric Manufacturers Association (NEMA)
 14. National Environmental Balancing Bureau (NEBB)
 15. North American Insulation Manufacturer's Association (NAIMA)
 16. Sheet Metal and Air Conditioning Contractor's National Association, Inc. (SMACNA)
 17. The Hydronics Institute (HI)
 18. Thermal Insulation Manufacturer's Association (TIMA)
- F. Codes, laws and standards provide a basis for the minimum installation criteria acceptable. The drawings and specifications illustrate the scope required for this project, which may exceed minimum codes, laws and standards.
- G. The date of the code or standard is that in effect at the Bid date.
- H. Give all notices, file all plans, obtain all permits and licenses, and obtain all necessary approvals from authorities having jurisdiction. Deliver all certificates of inspection to the authorities having jurisdiction. No work shall be covered before examination and approval by the Owner's Representative, inspectors, and authorities having jurisdiction. Replace imperfect or condemned work to conform to requirements, satisfactory to Owner's Representative, and without extra cost to the Owner. If work is covered before inspection and approval, this Contractor shall pay costs of uncovering and reinstalling the covering, whether it meets contract requirements or not.

1.5 GENERAL REQUIREMENTS

- A. Nameplates
1. Each item of equipment shall have a nameplate bearing the manufacturer's name, address, type or style, model number, catalog number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.
- B. Maintenance Information
1. Systems and equipment which require periodic maintenance to maintain efficient operation shall be furnished with complete necessary maintenance information. Required routine maintenance actions, as specified by the manufacturer, shall be stated clearly and incorporated on a readily accessible label on the equipment. Such label may be limited to identifying, by title or publication number, the operation and maintenance manual for that particular model and type of product.
- C. Equipment Guards
1. Belts, pulleys, chains, gears, couplings, projecting setscrews, keys, and other rotating parts so located that any person may come in close proximity thereto shall be completely enclosed or guarded. High-temperature equipment and piping so located as to endanger personnel or create a fire hazard shall be guarded or covered with insulation of type specified for service.

HEATING, VENTILATION AND AIR CONDITIONING

1.6 MATERIAL AND EQUIPMENT STANDARDS

- A. Where equipment or materials are specified with the name of a manufacturer, such specification shall be deemed to be used for the purpose of establishing a standard for that particular item. No equipment or material shall be used unless previously approved by the Owner's Representative.
- B. Substitutions (approved equals) may be offered for review provided the material, equipment or process offered for consideration is equal in every respect to that indicated or specified. In order for Requests for substitution to be considered, all must be submitted for pre-approval of manufacturer within 30 days of award of contract. All requests must be accompanied by a list of minimum 5-year-old successful installations of similar scope (with Owner contact and phone number), complete specifications together with drawings or samples to properly appraise the materials, equipment or process. Allow 30 days for Owner's Representative's review.
- C. If a substitution of materials or equipment in whole or in part is made, this Contractor shall bear the cost of any changes necessitated by any other trade as a result of said substitution.
- D. All materials, equipment and accessories provided under this section shall be new and unused products of recognized manufacturers as approved.

1.7 SUBMITTALS

- A. Conform to the requirements of Division 01, General Conditions, for schedule and form of all submittals unless specifically noted otherwise in this section. Coordinate this submittal with submittals for all other finishes. Shop drawings and design layouts shall be prepared by licensed installing Contractors and shall note the name(s), license number(s) and license expiration date(s) of the Contractor(s) installing the refrigeration systems.
- B. Definitions:
 - 1. Shop Drawings are information prepared by the Contractor to illustrate portions of the work in more detail than indicated in the Contract Documents.
 - 2. Acceptable Manufacturers: The mechanical design for each product is based on the single manufacturer listed in the schedule or shown on the drawings. In Part 2 of the specifications certain Alternate Manufacturers are listed as being acceptable. In addition, the MATERIAL AND EQUIPMENT STANDARDS paragraph potentially allows for substitutions as being acceptable. These are acceptable only if, as a minimum, they:
 - a. Meet all performance criteria listed in the schedules and outlined in the specifications. For example, to be acceptable, an air handling unit must deliver equal CFM against equal external static pressure (with the allowed pressure drop of dirty filters) using equal or less horsepower as the air handler listed in the schedules.
 - b. Fit within the available space it was designed for, including space for maintenance and component removal, with no modification to either the space or the product. Clearances to walls, ceilings, and other equipment will be at least equal to those shown on the design drawings. The fact that a manufacturer's name appears as acceptable shall not be taken to mean the Engineer has determined that the manufacturer's products will

HEATING, VENTILATION AND AIR CONDITIONING

fit within the available space – this determination is solely the responsibility of the Contractor.

- c. For rooftop mounted equipment and equipment mounted in areas where structural matters are a concern, the products must have a weight no greater than the product listed in the schedules or specifications.
- d. Products must adhere to all architectural considerations including, but not limited to: being of the same color as the product scheduled or specified, fitting within the architectural enclosures and details.

C. Submittal Procedures, Format and Requirements

1. Review submittal packages for compliance with Contract Documents and then submit to Owner's Representative for review. Submit enough sets of shop drawings such that, after review, two sets will be kept by the reviewer, with only the remaining sets returned with reviewer's marks and comments.
2. Each Shop Drawing shall indicate in title block, and each Product Data package shall indicate on cover sheet, the following information:
 - a. Title.
 - b. Equipment number.
 - c. Name and location of project.
 - d. Names of Owner, Engineer and Seller.
 - e. Names of manufacturers, suppliers, vendors, etc.
 - f. Date of submittal.
 - g. Whether original submittal or resubmitted.
3. Shop drawings showing manufacturer's product data shall contain detailed dimensional drawings (minimum $\frac{1}{4}'' = 1'$ scale) including plans and sections (where physical clearance could be an issue). Provide larger scale details as necessary. Sheet metal drawings shall show elements of Architect's reflected ceiling plan, exposed ductwork, walls and partitions (highlighting fire walls and smoke partitions), diffusers, registers, grilles, all dampers (fire, smoke, balancing, backdraft, and control dampers), sleeves and other aspects of construction as necessary for coordination.
4. Submit accurate and complete description of materials of construction, manufacturer's published performance characteristics, sizes, weights, capacity ratings (performance data, alone, is not acceptable), electrical requirements, starting characteristics, wiring diagrams, and acoustical performance for complete assemblies. Drawings shall clearly indicate location (terminal block or wire number), voltage and function for all field terminations, and other information necessary to demonstrate compliance with all requirements of Contract Documents.
5. Provide shop drawings showing details of piping connections to all equipment. If connection details are not submitted and connections are found to be installed incorrectly, this Contractor shall reinstall them within the original contract price.
 - a. Alternate pipe joining methods such as grooved and permanent push-to-connect systems shall be shown on drawings and product submittals, and be specifically identified with the applicable manufacturer's style or series number. Installation shall include any additional hangers required for the alternate system.

HEATING, VENTILATION AND AIR CONDITIONING

6. Provide complete data for all auxiliary services and utilities required by submitted equipment. This shall include power, cooling water and compressed air requirements and points of connection.
7. Provide a complete description of all controls and instrumentation required including electrical power connection drawing for all components and interconnection wiring to starters, detailed information on starters, control diagrams, termination diagrams, and all control interfaces with a central control system.
8. Provide installation and erection information including; lifting requirements, and any special rigging or installation requirements for all equipment.
9. The Owner's Representative shall approve all materials before commitment for materials is made.

D. Specifications, Schedule, and Control Sequence Compliance Statement

1. The manufacturer shall submit a point by point statement of compliance with each specification criteria listed in each paragraph for those submittals listed in Paragraph E: Product Data that are noted with an asterisk (*).
2. The statement of compliance shall consist of a list of all paragraphs (line by line) identified in Part 2 and applicable Part 3 of the specification and that the unit controls will provide all manufacturer's portions of the control sequences shown on the drawings for which the submitted product in the opinion of the manufacturer complies, deviates, or does not meet.
3. Where the proposed submittal complies fully, the word "comply" shall be placed opposite the paragraph number.
4. Where the proposed submittal does not comply, or accomplishes the stated function in a manner different from that described, a full description of the deviation shall be provided.
5. Verify each field of the associated schedule where associated technical data is presented and sequences are shown on the drawings. Where the submitted material does not "comply" provide the value the submitted equipment will achieve based upon the specified conditions.
6. Where a full description of a deviation is not provided, it shall be assumed that the proposed system does not comply with the paragraph in question and the product will be rejected.
7. Submissions which do not include a point by point statement of compliance as specified shall be disapproved.

E. Product Data: Submit complete manufacturer's product description and technical information including:

1. Piping and Fittings (all services, types, and joining methods)
2. Pipe Hangers and Supports
3. Identification
4. Sleeves, Firestopping
5. Air Cooled Condensing Units
6. Equipment layout, and piping shop drawings, construction details and construction standards

HEATING, VENTILATION AND AIR CONDITIONING

7. Coils
 8. Insulation
 9. Operating and maintenance instructions and manuals
 10. Testing, Adjusting, & Balancing Qualifications, Plan, and Reports
 11. Identification, labels and tags
 12. O&M manual
- F. Submit shop drawings and product data grouped to include complete submittals of related systems, products and accessories in an individual (combined) submittal.
1. Access panel shop drawings shall be submitted to the Construction Supervisor for approval.
 2. Do not submit multiple product information in a single bound manual.
 3. Three-ring binders shall not be accepted.
- G. Deviations
1. Concerning deviations other than substitutions, proposed deviations from Contract Documents shall be requested individually in writing whether deviations result from field conditions, standard shop practice, or other cause. Submit letter with transmittal of Shop Drawings which flags the deviation to the attention of the Owner's Representative.
 2. Without letters flagging the deviation to the Owner's Representative, it is possible that the Engineer may not notice such deviation or may not realize its ramifications. Therefore, if such letters are not submitted to the Owner's Representative, the Seller shall hold the Engineers, his consultants and the Owner harmless for any and all adverse consequences resulting from the deviations being implemented. This shall apply regardless of whether the Engineer has reviewed or approved shop drawings containing the deviation, and will be strictly enforced.
 3. Approval of proposed deviations, if any, will be made at discretion of Engineer.
- H. Schedule: Incorporate shop drawing review period into construction schedule so that Work is not delayed. This Contractor shall assume full responsibility for delays caused by not incorporating the following shop drawing review time requirements into his project schedule: Allow at least 10 working days, exclusive of transmittal time, for review each time shop drawing is submitted or resubmitted with the exception that 20 working days, exclusive of transmittal time are required for the following:
1. O&M manuals
 2. As built drawings
 3. If more than five shop drawings of a single trade are received in one calendar week.
- I. Responsibility
1. Intent of Submittal review is to check for capacity, rating, and certain construction features. HVAC Contractor shall ensure that work meets requirements of Contract Documents regarding information that pertains to fabrication processes or means, methods, techniques, sequences and procedures of construction; and for coordination of work of this and other Sections. Work shall comply with

HEATING, VENTILATION AND AIR CONDITIONING

approved submittals to extent that they agree with Contract Documents. Submittal review shall not diminish responsibility under this Contract for dimensional coordination, quantities, installation, wiring, supports and access for service, nor the shop drawing errors or deviations from requirements of Contract Documents. The Engineer's noting of some errors while overlooking others will not excuse the HVAC Contractor from proceeding in error and will not absolve the Contractor from meeting the full design intent of the associated system(s). Contract Documents requirements are not limited, waived nor superseded in any way by review.

2. Inform Contractors, manufacturers, suppliers, etc. of scope and limited nature of review process and enforce compliance with contract documents.
- J. In the event that the HVAC Subcontractor fails to provide Shop Drawings for any of the products specified herein:
1. The HVAC Subcontractor shall furnish and install all materials and equipment herein specified in complete accordance with these Specifications.
 2. If the HVAC Subcontractor furnishes and installs material and/or equipment that is not in complete accordance with these Specifications, he shall be responsible for the removal of this material and/or equipment. He shall also be responsible for the replacement of this material and/or equipment with material and/or equipment that is in complete accordance with these Specifications, at the direction of the Owner's Representative.
 3. Removal and replacement of materials and/or equipment that is not in complete compliance with these Specifications shall be done at no extra cost to the Owner.
 4. Removal and replacement of materials and/or equipment that is not in complete compliance with these Specifications shall not be allowed as a basis for a claim of delay of completion of the Work.
- K. Mark dimensions and values in units to match those specified.
- L. Submit Material Safety Data Sheets (MSD) on each applicable product with submittal.

1.8 OPERATION AND MAINTENANCE DATA

- A. Commence preparation of the Operating and Maintenance (O&M) Manuals immediately upon receipt of "Approved" or "Approved as Noted" shop drawings and submit each section within one month. The final submission shall be no later than two months prior to the projected date of Substantial Completion of the Project.
- B. Each O&M document shall include the manufacturer's web address for equipment - specific O&M information for Internet access by the Owner.
- C. The manual shall consist of (3) sets of manuals and include (3) sets of CDs, which shall contain the scanned content of the entire manual. The manual shall highlight the actual equipment used and not be a master catalog of all similar products of the manufacturer. The manual shall be submitted for review prior to creation of the CDs.
- D. The Manual shall contain the following:
 1. Operations Manual

HEATING, VENTILATION AND AIR CONDITIONING

- a. Systems description including all relevant information needed for day-to-day operations and management including:
 - 1) Start-up requirements and procedures.
 - 2) Shut-down requirements and procedures.
 - 3) Trouble-shooting checklist (i.e., common alarms with possible cause & effect, etc.).
 - b. Wiring diagrams and schematics.
2. Maintenance Manual
- a. Define all maintenance activities required to ensure system operation within manufacturers specified parameters. Maintenance documentation shall include:
 - 1) Data retrieval sheet
 - 2) Special instructions (i.e., lockout/tag-out, etc.)
 - 3) Special tools (i.e., key, allen wrench, etc.)
 - 4) Tasks
 - 5) Frequency
 - 6) Required materials, lubricants, etc.
 - b. Provide table of all required activities plotted vs. interval with adequate fill-in-space for "activity completion date" and "comments". Where multiple instrument readings are required, provide data sheet formatted to accommodate activity.
 - c. Provide as part of each package, lubricating charts indicating equipment tag number, location, equipment service, greasing and lubricating requirements, lubricants, and intervals.
 - d. The HVAC Subcontractor shall furnish spare-parts data for each different item of equipment furnished. The data shall include a complete list of: parts and supplies, with current unit prices, lead time, and source of supply; a list of parts and supplies that are either normally furnished at no extra cost with the purchase of the equipment, or specified hereinafter to be furnished as part of the contract; and a list of additional items recommended by the manufacturer to assure efficient operation for a period of 360 days at the particular installation. The foregoing shall not relieve the HVAC Subcontractor of any responsibilities under the guarantees specified herein.
 - e. Provide copy of all warranty information including extended warrantees where specified with associated date of substantial completion (commencement of warranty) and end date of coverage. Define all components/subsystems specifically included and excluded.
- E. Provide O&M manuals for each of the following as a minimum:
- 1. Air Cooled Condensing Units
 - 2. Coils

HEATING, VENTILATION AND AIR CONDITIONING

1.9 RECORD DRAWINGS

- A. Refer to DIVISION 01, General Conditions, for record drawings and procedures to be provided under this section, unless specifically noted otherwise in this section.
- B. Record Drawings (red-line drawings) will be updated by this Contractor daily for review with the monthly requisition. The record drawing shall be an accurate depiction of the systems as completed, including dimensions (vertical/horizontal) of concealed components off fixed building elements.
- C. The HVAC Foreman shall maintain complete and separate set of prints of Contract Drawings at job site at all times and shall record work completed and all changes from original Contract Drawings clearly and accurately including work installed as a modification or addition to the original design.
- D. At completion of work the HVAC Contractor shall prepare a complete set of record drawings on AutoCAD showing all systems as actually installed. The Architectural background AutoCAD files will be made available for the Contractor's copying, at his expense, to serve as backgrounds for the drawings. The HVAC Contractor shall transfer changes from field drawings onto AutoCAD drawings and submit copy of files and three sets of prints to Owner's Representative for comments as to compliance with this section. CADD layering as established by the A & E design team shall be maintained with any and all changes done by the Contractor.
- E. The Engineer is not granting to the Contractor any Ownership or property interest in the CADD Drawings by the delivery of the CADD Disks to the Contractor. The Contractor's rights to use the CADD disks and the CADD Drawings are limited to use for the sole purpose of assisting in the Contractor's performance of its contractual obligations under its contract with respect to the Project. The Engineer is granting no further rights. Any reuse or other use by the Contractor will be at the Contractor's sole risk and without liability to the Engineer. The Contractor hereby waives and releases any losses, claims, damages, liabilities of any nature whatsoever, and costs (including attorney fees) arising out of, resulting from, or otherwise related to the use of the CADD Disks and CADD Drawings by the Contractor. The Contractor, to the maximum extent permitted by law, hereby agrees to indemnify, defend and hold the Engineer harmless from all loses, claims, damages, liabilities, and costs (including attorney fees) arising out of, resulting from, or otherwise related to the use of the CADD Disks and CADD Drawings by the Contractor.
- F. Record Drawings, shall show "as-built" condition of all plans, mechanical room part plans, details, sections, piping diagrams, and corrections to schedules. Schedules shall show actual manufacturer model numbers and capacities of final installed equipment.
- G. The HVAC Contractor shall submit the record set for approval a minimum of three weeks prior to seeking the permanent certificate of occupancy.

1.10 WARRANTIES

- A. Submit manufacturer's standard replacement warranties for material and equipment furnished under this Section. Such warranties shall be in addition to and not in lieu of all liabilities which the manufacturer and the HVAC Subcontractor may have by law or by provisions of the Contract Documents.

- B. All materials, equipment and work furnished under this Section shall be guaranteed against all defects in materials and workmanship for a minimum period of one year commencing with the Date of Substantial Completion. Where individual equipment sections specify longer warranties, provide the longer warranty. Any failure due to defective material, equipment or workmanship which may develop, shall be corrected at no expense to the Owner including all damage to areas, materials and other systems resulting from such failures.
- C. Guarantee that all elements of each system meet the specified performance requirements as set forth herein or as indicated on the Drawings.
- D. Upon receipt of notice from the Owner of the failure of any part of the systems during the guarantee period, the affected parts shall be replaced. Any equipment requiring excessive service shall be considered defective and shall be replaced.

1.11 COORDINATION

- A. Refer to DIVISION 01, General Conditions, for record drawings and procedures to be provided under this section, unless specifically noted otherwise in this section.
- B. Materials and apparatus shall be installed as fast as conditions of the building will permit and must be installed promptly when and as required.
- C. Confer with all other trades relative to location of all apparatus and equipment to be installed and select locations so as not to conflict with work of other Sections. Any conflicts shall be referred immediately to the Owner's Representative for decision to prevent delay in installation of work. All work and materials placed in violation of this clause shall be readjusted to the Owner's Representative's satisfaction at no expense to the Owner.
- D. Where work of this section will be installed in close proximity to work of other sections or where there is evidence that the work of this section may interfere with work of other sections, assist in working out space conditions to make satisfactory adjustment. Prepare and submit for approval 3/8" scale or larger working drawings and sections, clearly showing how the work is to be installed in relation to the work of other sections. If the work of this section is installed before coordinating with other trades or so as to cause interference with work of other trades, make changes necessary to protect conditions without extra charge.
- E. Keep fully informed as to the shape, size and position of all openings required for all apparatus, piping, ductwork, etc., and give information in advance to build openings into the work. Furnish all sleeves, pockets, supports and incidentals, and coordinate with the Owner's Representative for the proper setting of same.
- F. All distribution systems which require pitch or slope such as condensate drains and water piping shall have the right of way over those which do not.
- G. Make reasonable modifications in the work as required by structural interferences, interference with work of other trades, or for proper execution of the work without extra charge.
- H. Keep fully informed as to the size, shape and location of all openings required for the work of this Section and give full information to all Subcontractors and the Owner's Representative.

HEATING, VENTILATION AND AIR CONDITIONING

1.12 INTERPRETATION OF DRAWINGS AND SPECIFICATIONS

- A. It is the intention of the Specifications and Drawings to call for complete, finished work, tested and ready for continuous operation. Any apparatus, appliance, material or work not shown on the Drawings, but mentioned in the Specifications or vice versa, or any incidental accessories necessary to make the work complete in all respects and ready for operation, even if not particularly specified, shall be provided by the HVAC Subcontractor or his/her Sub Subcontractors, without additional expense to the Owner.
- B. The Drawings are generally diagrammatic. The locations of all items that are not definitely fixed by dimensions are approximate only. The exact locations must be determined at the site and shall have the approval of the Architect before being installed. The HVAC Subcontractor shall follow Drawings, including shop drawings, in laying out work and shall check the Drawings of other trades to verify spaces in which work will be installed. Maintain maximum headroom and space conditions. Where space conditions appear inadequate, notify the Architect before proceeding with the installation. The HVAC Subcontractor shall, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades or for proper execution of the work.
- C. Any requests for information (RFI) for resolving an apparent conflict or unclarity, or a request for additional detail, shall include a sketch or equivalent description of Contractors proposed solution.
- D. Sizes of ducts and pipes and routing are shown, but it is not intended to show every offset and fitting, nor every structural difficulty that may be encountered. To carry out the intent and purpose of the Drawings, all necessary parts to make complete approved working systems ready for use, shall be furnished without extra charge.

1.13 INSPECTION OF SITE CONDITIONS

- A. Prior to submission of bid, visit the site and review the related construction documents to determine the conditions under which the Work has to be performed. Send a report, in writing, to the Owner's Representative, noting any conditions which might adversely affect the Work of this Section of the Specifications.

1.14 SURVEY AND MEASUREMENTS

- A. Base all required measurements, horizontal and vertical, from referenced points established with the Owner's Representative and be responsible for correctly laying out the Work required under this Section of the Specification.
- B. In the event of discrepancy between actual measurements and those indicated, notify the Owner's Representative in writing and do not proceed with the related work until instructions have been issued.

1.15 DELIVERY, STORAGE AND HANDLING

- A. No materials shall be delivered or stored on site until Shop Drawings have been approved.

- B. All manufactured materials shall delivered to the site in original packages or containers bearing the manufacturer's labels and product identification.
- C. Protect materials against dampness. Store off floors, under cover, and adequately protected from damage.
- D. Inspect all equipment and materials, upon receipt at the job site, for damage and conformance to approved shop drawings.

1.16 PROTECTION OF WORK AND PROPERTY

- A. This Contractor shall be responsible for the care and protection of all work included under this Section until the completion and final acceptance of this Contract.
- B. Protect all equipment and materials from damage from all causes including, but not limited to, fire, vandalism and theft. All materials and equipment damaged or stolen shall be repaired or replaced with equal material or equipment at no additional cost to the Owner.
- C. Protect all equipment, outlets and openings with temporary plugs, caps and covers. Protect work and materials of other trades from damage that might be caused by work or workmen under this Section and make good damage thus caused.
- D. Damaged materials are to be removed from the site; no site storage of damaged materials will be allowed.

1.17 SUPERVISION

- A. Provide a competent Supervisor with a minimum of 5 years of experience in HVAC Construction Supervision who shall be in charge of the HVAC work at the site.

1.18 SAFETY PRECAUTIONS

- A. Life safety and accident prevention shall be a primary consideration. Comply with all of the safety requirements of the Owner and OSHA throughout the entire construction period of the project.
- B. Furnish, place and maintain proper guards and any other necessary construction required to secure safety of life and property.

1.19 SCHEDULE

- A. Construct work in sequence under provisions of Division 01 and as coordinated with the Owner's Representative.

1.20 HOISTING, SCAFFOLDING AND PLANKING

- A. The work to be done under this Section of the Specifications shall include the furnishing, set-up and maintenance of all derricks, hoisting machinery, cranes, helicopters, scaffolds, staging and planking as required for the work.

1.21 CUTTING AND PATCHING

- A. Include all coring, cutting, patching, and fireproofing necessary for the execution of the work of this Section. Structural elements shall not be cut without written approval of the Engineer. This Contractor shall be responsible for taking all precautions required to identify hidden piping, conduits, etc. before any core drilling and/or cutting of slabs commences, including X-raying the affected slabs. Provide fire stopping to maintain the fire rating of the fire resistance-rated assembly. All penetrations and associated fire stopping shall be installed in accordance with the fire stopping manufacturer's listed installation details and be listed by UL or FM.
- B. All work shall be fully coordinated with all phases of construction, in order to minimize the requirements for cutting and patching.
- C. Form all chases or openings for the installation of the work of this Section of the specifications, or cut the same in existing work and see that all sleeves or forms are in the work and properly set in ample time to prevent delays. Be responsible that all such chases, openings, and sleeves are located accurately and are of the proper size and shape and consult with the Owner's Representative and all trades concerned in reference to this work. Confine the cutting to the smallest extent possible consistent with the work to be done. In no case shall piers or structural members be cut without the approval of the Owner's Representative.
- D. Fit around, close up, repair, patch, and point around the work specified herein to match the existing adjacent surfaces and to the satisfaction of the Owner's Representative.
- E. Fill and patch all openings or holes left in the existing structures by the removal of existing equipment that is part of this Section of the Specifications.
- F. All of this work shall be carefully done by workmen qualified to do such work and with the proper and smallest tools applicable.
- G. Any cost caused by defective or ill-timed work required by this Section of the specifications shall be borne by the Subcontractor.
- H. When, in order to accommodate the work required under this Section of the specifications, finished materials of other trades must be cut or fitted, furnish the necessary drawings and information to the trades whose materials must be cut or fitted.

1.22 SLEEVES, INSERTS AND ANCHOR BOLTS

- A. Coordinate with other trades the location of and maintaining in proper positions, sleeves, inserts and anchor bolts to be supplied and/or set in place under this section of the specifications. In the event of incorrectly located preset sleeves, inserts and anchor bolts, etc., all required cutting and patching of finished work shall be done under this section of the specifications.
- B. All pipes passing through floors, walls, ceilings or partitions shall be provided with fire stopping to maintain the fire rating of the structure. All penetrations and associated fire

HEATING, VENTILATION AND AIR CONDITIONING

stopping shall be installed in accordance with the fire stopping manufacturer's listed installation details. Provide sleeves for all penetrations where required by the listed detail, for the penetration of all mechanical room floors and where specifically required on the drawings.

- C. Field drilling (core drilling), when required, shall be performed under this section of the specifications, after receipt of approval by the Owner's Representative.
 - 1. When coring cannot be avoided, provide ¼ inch pilot hole prior to coring. When coring through floor or slab, verify location of core on floor below and protect and piping, ductwork, wiring, furniture, personnel, etc., below the location of the core.

1.23 SUPPLEMENTARY STEEL, CHANNELS AND SUPPORTS

- A. Provide all supplementary steel, factory fabricated channels and supports required for proper installation, mounting and support of all equipment and systems provided under this section of the specification.
- B. Supplementary steel and factory fabricated channels shall be firmly connected to building construction in a manner approved by the Owner's Representative, as shown on the drawings, or hereinafter specified.
- C. The type and size of the supporting channels and supplementary steel provided under this section of the specifications shall be determined by the Subcontractor and shall be of sufficient strength and size to allow only a minimum deflection in conformance with the manufacturer's requirements for loading.
- D. All supplementary steel and factory fabricated channels shall be installed in a neat and workmanlike manner parallel to the walls, floors and ceiling construction. All turns shall be made with 90 degree and 45 degree fittings, as required to suit the construction and installation conditions.
- E. All supplementary steel including factory fabricated channels, supports and fittings shall be galvanized steel, aluminum, or stainless steel where exposed or subject to rust producing atmosphere and shall be manufactured by Unistrut, H-strut, Powerstrut, ERICO or approved equal.

1.24 HAZARDOUS MATERIALS

- A. Dispose of all hazardous materials in accordance with Federal and State laws. All handling shall conform to EPA requirements. A uniform hazardous waste manifest shall be prepared for all disposals and returned with all applicable signoffs prior to application for final payment. Provide breakout cost for this scope.
- B. Recovered refrigerant shall be recycled by a licensed facility approved by the Owner's Representative.
- C. Removed equipment or fluids containing any hazardous materials such as ethylene glycol, oil, mercury or chromate shall be recycled by a licensed facility approved by the Owner's Representative.

1.25 ACCESSIBILITY

HEATING, VENTILATION AND AIR CONDITIONING

- A. All work provided under this Section of the Specification shall be installed so that parts requiring periodic inspection, maintenance and repair are readily accessible. Work of this trade shall not infringe upon clearances required by equipment of other trades, especially code required clearances to electrical gear. Minor deviations from the drawings may be made to accomplish this, but changes of substantial magnitude shall not be made prior to written approval from the Owner's Representative.

1.26 ELECTRICAL WORK

- A. All electrical apparatus and controls furnished, and the installation thereof, as a part of the HVAC work, equipment, and controls shall conform to applicable requirements under DIVISION 26 - ELECTRICAL.

1.27 PROJECT CLOSEOUT

A. Construction Observations By The Engineer

1. The engineer shall make up to two (2) progress site visits during construction and one substantial completion (punch list) site visit for determining substantial completion.
2. The Trade Contractors and the General Contractor are required to inspect their own work and make any corrections to the work to comply with the specifications and the contract documents. It is not the responsibility of the engineer to develop lists of incomplete work items.
3. Progress Site Visits
 - a. The purpose of the progress site visit by the engineer is to observe if the work is proceeding in accordance with the contract documents.
 - b. The engineer will prepare a field report which will note in general the work completed since the last observation visit, work found not to be in accordance with the contract documents and work not corrected since the previous observation visit.

B. Substantial Completion

1. When the Contractor considers the Work under this Section is substantially complete, the Contractor shall submit written notice, through the General Contractor, with a detailed list of items remaining to be completed or corrected and a schedule of when each remaining work item will be completed. Should the engineer determine the list of remaining work does not constitute substantial completion the engineer will notify the Engineer and/or Owner and he will not make a substantial completion site visit.
2. The following items shall be completed prior to the written request for substantial completion site visit:
 - a. Certification of successful operation of all systems.
 - b. Training of the Owner's personnel in the operation of the systems.
 - c. Record Drawings in accordance with the contract specifications.
 - d. Operation and Maintenance manuals.
 - e. Testing reports.

HEATING, VENTILATION AND AIR CONDITIONING

- f. Manufacturers certificates of approvals.
 - g. Emergency contact list for reporting of malfunctioning equipment during the warrantee period.
 - h. Contractors Project Completion certificate in accordance with the building code requirements.
 3. Should the Engineer, during the substantial completion visit, observe that the Work is substantially complete, s/he will provide a written listing of the observed deficiencies referred herein as the Punch List. The Punch List will provide for a place for the Contractor and general Contractor to sign off and date each item individually indicating that the observed deficiency item has been corrected.
 4. Should the Engineer, during the substantial completion site visit, observe that the Work is not substantially complete, s/he will provide, a written list of the major deficiencies and a reason for the work not being considered substantially complete.
 5. If the work is found not to be substantially complete then the engineer shall be reimbursed for his time to re-observe the work. A re-observation fee shall be charged to the Contractor through the contractual agreement for any further observations by the engineer.
 6. The Contractor shall remedy all deficiencies listed in the punch list within the time frame required by the contract.
- C. Engineers Construction Completion Certification
 1. Where required by the applicable code, the Engineers Construction Completion Certification will be issued by RDK Engineers when all life safety and health related issues are complete, all required functional tests are complete and all reports are complete. The following is a minimum listing of the required systems to be tested with reports generated indicating they are complete and ready for use:
 - a. Pipe Pressure Tests
 - b. Commissioning of Systems
 2. There shall be NO outstanding items identified on the punch list for scope within any of these categories.
- D. Final Completion
 1. The following items shall be submitted prior to the written request for Final completion:
 - a. Revised Substantial Completion items to be resubmitted in accordance with the review process comments.
 - b. Warranties commencing the date of Substantial completion
 - c. Individual Signed and dated Punch List acknowledging completion of all punch list items
 2. When the Contractor considers all of the punch list work items complete, the Contractor shall submit written notice through the General Contractor that all Punch List items are complete and resolved and the work is ready for final observation site visit. The signature lines for completion of each punch list item shall be signed by the Contractor indicating the work is complete and signed by the General Contractor indicating s/he has inspected the work and found it to be

HEATING, VENTILATION AND AIR CONDITIONING

complete. Should the Engineer find the work to be finally complete and all Punch List items are complete the Engineer will make a recommendation to the Owner. If the Engineer has found the punch list work to be incomplete during final inspection a written listing of the observed deficiencies will be prepared by the Engineer.

3. If the work is not fully complete then the engineer shall be reimbursed for his time to re-observe the work. A re-observation fee shall be charged to the Contractor through the contractual agreement for any re-observations by the engineer.

E. Re-observation Fees

1. The re-observation fee shall be \$1200.00 per visit.

F. Contractor's Project Completion Certificate

1. Upon completion of work and prior to request for Certificate of Occupancy, each Trade Contractor and the General Contractor shall issue a certificate stating that work has been installed generally consistent with construction documents and all applicable codes. RDK Engineers can furnish a blank Contractor's certificate form upon request. The certificate shall certify:
 - a. Execution of all work has been installed in accordance with the approved construction documents.
 - b. Execution and control of all methods of construction was in a safe and satisfactory manner in accordance with all applicable local, state and federal statutes and regulations.
2. The certificate shall include the following information:
 - a. Project.
 - b. Permit Number.
 - c. Location.
 - d. Construction Documents.
 - e. Date on Plans and Specifications submitted for approval and issuance of the Building Permit.
 - f. Addendum(a) and Revision Dates.
3. The certificate shall be signed by the Contractor and include the following:
 - a. Signature.
 - b. Date.
 - c. Company.
 - d. License Number.
 - e. License Expiration Date.

PART 2 - PRODUCTS

2.0 PIPING AND FITTINGS

A. General Requirements for Pipe

HEATING, VENTILATION AND AIR CONDITIONING

1. Pipe material shall be indicated in the Schedule of Pipe and Fittings for each type of service.
2. Copper tubing shall conform to ASTM B75 or ASTM B88, seamless. Thickness (type) shall be as required for the service with a minimum safety factor of 4:1. Tubing for compressed air tubing shall conform to ASTM B251.

B. General Requirements for Fittings

1. Pipe fittings shall be indicated in the Schedule of Pipe and Fittings for each type of service. Fittings shall be rated to match the larger of the pipe pressure rating in the Schedule or the valve rating listed in the valve tables in the Part 2 Valve and Strainer section of this specification.
2. All fittings shall be installed per code requirements and the manufacturer's best recommendations.
3. Fittings for copper tubing shall be wrought copper and bronze fittings conforming to ASME B16.22 and ASTM B75 or cast copper alloy fittings conforming to ASME B16.18. Copper may be used up to 2" tubing size. Adapters may be used for connecting tubing to flanges and threaded ends of valves and equipment. The copper tubing/pipe joining methods below are only allowed when they are specifically listed in the Schedule of Pipe and Fittings:
 - a. Type C1: Soldered copper fittings shall use either 95/5 (Tin/Antimony), silver solder (for systems up to 250 degrees F and 175 psi), or shall be brazed (for higher temperature/pressure systems – Contractor shall submit brazing material and pressure/temperature rating of joint). Solder shall conform to ASTM B32. Solder and flux shall be lead free. Silver solder shall conform to FS QQ-B-654. Brazing alloys shall be B-Ag alloy (or equivalent strength alloy) having a melting point above 1000 degrees F.
4. Adapters for copper tubing shall be brass or bronze for soldered and brazed fittings.

C. Refrigerant Piping:

1. Dimensions and material requirements for refrigerant (and other fluids/gasses that can be below 35 degrees F) pipe, pipe fittings and components shall conform to ASHRAE 15 and ASME/ANSI B31.5 and shall be compatible with fluids used and capable of withstanding the pressures and temperatures of the service. Pipe, tubing, and components used for refrigerant service shall be cleaned, sealed, capped, or plugged prior to shipment from the manufacturer's plant.
 - a. Copper pipe and fittings shall be seamless copper tubing, soft drawn, Type K for underground use (all underground piping shall be pre-insulated with no joints), Type ACR for all other uses (unless otherwise noted), ASTM B 280. Fittings for copper tubing shall be wrought copper, brazed joint type (type C1), ASME/ANSI B16.22. Brazing alloys shall be B-Ag alloy (or equivalent strength alloy) having a melting point above 1000 degrees F. Flared-tube joint fittings conforming to ASME B16.26 and ASTM B62 (where operating pressures allow) may be used with soft

HEATING, VENTILATION AND AIR CONDITIONING

copper tubing (annealed ASTM B280) only in nominal sizes smaller than one inch for connection to equipment and no larger than 1 3/8 inches outside diameter for other connections. Flanges shall be bronze, ANSI B16.24.

- b. Where copper pipe size or pressure rating is too small, refrigerant piping shall be ASTM A53 Schedule 40, black steel. All joints shall be welded. Unions for use with steel piping shall be 300 pound malleable iron, ground joint, or 2000 pound forged steel.

2.1 PIPE HANGERS AND SUPPORTS

- A. Hangers shall be as manufactured by Carpenter & Patterson, Inc., Grinnell Corporation, B-Line Systems, ERICO, or equal. Hangers shall transmit the load exclusively to the structure of the building. All hangers and supports to conform to MSS standards SP-58 and SP-69 and ANSI B 31.1.
- B. Hangers for all piping 4 inches and above shall be adjustable roll type. Hangers for piping below 4 inches shall be clevis type. Hangers for piping in tunnels on strut support frames shall be roller type, similar to Fig. B379 by B-Line Systems. Additionally, the first five (5) pipe hangers on both sides of all pump piping (suction and discharge) to be precompressed spring and double-deflection neoprene style, with 30° hanging rod swing capability, similar and equal in all respects to Mason Industries Model PC 30N, selected by manufacturer for anticipated loading and deflection.
- C. Provide all additional structural steel required for proper installation of hangers, anchors, guides and supports; hangers shall be arranged to maintain the required grading and pitch of piping, to prevent vibration and to provide for expansion and contraction.
- D. Horizontal copper tubing shall have maximum hanger spacing of 5' for tubing up to 1-1/4" and 8' for 1 1/2" and larger. Vertical copper tubing shall have maximum hanger and support spacing of 10 feet. Maximum spacing for PVC pipe hangers and supports shall be 4' (horizontal), and 10' (vertical) with mid-story guides.
- E. If any other piping material is used, the maximum hanger and support spacing shall be the lesser of manufacturers recommendation or the listed spacing in the mechanical code (currently IMC-2009 Table 305.4).
- F. Branch piping and runouts of over 5 feet shall have at least one hanger or support.
- G. At all copper piping, provide pipe supports with copper finish to eliminate the possibility of galvanic action.
- H. Furnish additional hangers or supports at vertical or horizontal changes of direction and at locations of concentrated loads due to valves, fittings, strainers, and accessories.
- I. Hangers and supports shall provide for 2" of vertical adjustments.
- J. Hanger rods shall be steel, threaded and furnished with two removable nuts at each end of positioning rod and hanger and locking each in place.
- K. Except as otherwise noted, hanger rods shall be of the following sizes:

SCHEDULE OF PIPE HANGER ROD SIZES		
Pipe sizes (inches)	Single rod diameter (inches)	Double rod diameter (inches)
½-2	3/8	3/8
2½-3	½	3/8
4 & 5	5/8	½
6	¾	5/8
8 – 12	N/A	7/8
14 – 18	N/A	1
20	N/A	1¼
24	N/A	1-½

- L. Pipe covering protection saddles shall not be loaded to more than 80% of maximum loading as rated by the manufacturer.
- M. Insulated piping insulation shields:
- Up to 3" pipe size: 18 gauge galvanized steel, located outside the vapor barrier, minimum 180° arc, 12" long, or pipe covering protection saddles.
 - 4" pipe size and larger: pipe covering protection saddles.
- N. Vertical support shall be by means of riser clamps (anchors with split ring type allowable up to 2" size only) and adjustable pipe support with flange anchored to floor or supplementary steel.
- O. Rods, clamps and hangers shall be electro-galvanized coated.
- P. Valve and piping supports, from the floor, shall be equal to Carpenter & Paterson, Inc. Figure 101, adjustable pipe support and complete with pipe standard and flange, anchored to floor.
- Supports shall be installed at each control valve, riser, tee or elbow and where any unsupported section exceeds 4'-0" in length measured along piping centerline.
- Q. Upper Attachments to Building Structure:
- Existing Reinforced Concrete Construction: Upper attachment welded or clamped to steel clip angles that are expansion-bolted to the concrete. Expansion bolting shall be located so that piping loads place bolts in shear. Submit details for approval.
 - Structural Steel Framing: Upper attachments welded or clamped to structural steel members. Additional steel members may be necessary in some support locations where piping locations differ from that known on contract drawings. Submit details for approval.
 - Structural Wood Framing: Submit details for approval.
 - Expansion Fasteners and Power Set Fasteners: In existing concrete slab construction, expansion fasteners may be used for hanger loads up to one-third

HEATING, VENTILATION AND AIR CONDITIONING

the manufacturer's rated strength of the expansion fastener. Power set fasteners may be used for loads up to one-fourth of rated load. When greater hanger loads are encountered, additional fasteners may be used and interconnected with steel members combining to support the hanger.

- R. All hangers and shields exposed to the exterior shall be galvanized steel and PVC coated to manufacturer's standard thickness.

2.2 SLEEVES

- A. Size sleeves to provide a minimum of 1 inch clearance around piping and ductwork, and to allow continuous runs of insulation where specified. Ensure that insulated piping and ductwork do not touch sleeves.
- B. Pack clearance spaces with Thermafibre Firestopping. Caulk with fire-resistant, resilient waterproof compound, RectorSeal Biostop 500+ or equal. Ensure that fire ratings of floors and walls are maintained.
- C. Piping sleeves shall be according to the following:
 1. Through interior non-masonry walls, use 18 gauge rolled and tack welded galvanized steel sleeves, set flush with finished surfaces on both sides.
 2. Through interior masonry walls, exterior walls above grade and roofs, use machine cut and reamed standard weight steel piping, set flush with finished surfaces on inside and to suit flashing on outside.
 3. For floors in mechanical equipment rooms, and similar areas where a water dam is required, use machine cut and reamed standard weight steel piping set flush to underside of structure and extending 6 inches above finished floor.
 4. For other floors, use 18 gauge rolled and tack welded galvanized steel, or machine cut and reamed plastic pipe or standard weight steel piping set flush to both finished surfaces. Refer to Room Finish Schedule.
 5. Cover pipe sleeves in walls and ceilings of finished areas other than equipment rooms with satin finish stainless steel, or satin finish chrome or nickel plated brass escutcheons, with non-ferrous set screws. Do not use stamped steel split plates. Split cast plates with screw locks may be used.
 6. In non-rated walls, escutcheon plates shall be of adequate size to allow for piping with full insulation to pass through the wall uninterrupted. The interior diameter of the plate shall fit snugly around the outside diameter of the insulation.

2.3 FIRESTOPPING

- A. Provide asbestos-free firestopping material capable of maintaining an effective barrier against flame, gases, and temperature. Provide noncombustible firestopping that is nontoxic to human beings during installation or during fire conditions. Devices and equipment for firestopping service shall be UL FRD listed or FM P7825 approved for use with applicable construction, and penetrating items.
 1. Fire Hazard Classification: Material shall have a flame spread of 25 or less, a smoke developed rating of 50 or less when tested in accordance with UL 723 or UL listed and accepted.

2. Firestopping Rating: Firestopping materials shall be UL FRD listed or FM P7825 approved for "F" and "T" ratings at least equal to fire-rating of fire wall or floor in which penetrated openings are to be protected, except that "F" and "T" ratings may be 3 hours for firestopping in through-penetrations of 4-hour fire rated wall or floor.

2.4 PIPING, EQUIPMENT, PANEL AND VALVE IDENTIFICATION

- A. All piping, equipment, panels and valves furnished and/or installed under this Section of the Specifications including automatic temperature controls shall be identified with pipe markers, valve tags, and equipment name plates. Refer to Part 3 – IDENTIFICATION for materials and methods of installation.

2.5 AIR-COOLED CONDENSING UNITS (SCROLL, 3-5 TONS)

- A. General: Units shall be assembled on heavy gauge steel mounting/lifting rails and shall be weather proofed. Units shall include hermetic scroll compressor(s), plate fin condenser coil, fans and motors, controls and holding charge of nitrogen. Units shall be suitable for use with refrigerant HFC-410A, be UL listed, certified and rated in accordance with ARI Standard 210/240, 340/360 or 365. Unit efficiency shall meet or exceed the more stringent of the following: 1) scheduled efficiency, or 2) minimum efficiency required by the latest edition of the state energy code or ASHRAE 90-1. Air-cooled condensing units as manufactured by Trane or equivalent units from York, McQuay, Addison Products, AAON, or Carrier are acceptable providing they meet the scheduled performance and the requirements of these specifications.
- B. Unit casings shall be constructed of minimum 18 gauge zinc-coated galvanized steel. Exterior surfaces shall be cleaned, phosphatized and finished with a weather-resistant baked enamel finish. Unit's surface shall be tested 500 hours in salt spray test. Units shall have removable panels for access to all major components and controls.
- C. Refrigeration System
 1. Scroll type compressors shall be provided with vibration isolators to reduce transmission of noise and vibration to building structure, equipment and adjacent spaces. Isolators shall be either neoprene-in-shear or spring-flex type. Provide flexible connectors for each compressor, unless the refrigerant piping design has enough flexibility to prevent the transmission of vibration. Each refrigerant circuit shall have refrigeration filter drier, and both liquid line and suction gas line service valve with gauge ports.
 2. The units shall have direct-drive hermetic scroll compressor(s) with centrifugal oil pump to provide positive lubrication to moving parts. Motor(s) shall be suction gas-cooled and shall have a voltage utilization range of plus or minus 10 percent of unit nameplate voltage. Crankcase heaters, discharge line thermostats, internal temperature and current-sensitive motor overloads shall be included for maximum protection. External high and low pressure cutout devices shall be provided. Compressors shall be protected from slugging. If this protection requires evaporator defrost control, manufacturer shall furnish all required components for field installation by the Contractor.
 3. Provide time delay relay in dual compressor units to prevent compressors from coming on line simultaneously. Timer shall have minimum 4-minute timing period. Provide anti-short-cycle solid state timer in all units to prevent rapid on-

HEATING, VENTILATION AND AIR CONDITIONING

off compressor cycling in light load conditions by not allowing compressor to operate for 5-7 minutes upon shutdown.

4. Provide the following compressor arrangement(s):
 - a. Single Compressor (3-5 tons): Units shall have single compressor and refrigeration circuit with integral sub-cooling.

D. Condenser

1. Coils shall be aluminum tubes mechanically bonded to configured aluminum plate fin as standard. Factory pressure and leak tested to 425 psig air pressure. For all units to be mounted on grade, provide metal grilles with PVC coating for coil protection.
2. Condenser fan and motor shall be direct-drive, statically and dynamically balanced propeller fan with aluminum blades (with blade guards) and electro-coated steel hubs. Fans shall be used in draw-through vertical discharge position. Either permanently lubricated totally enclosed or open construction motors shall be provided and shall have built in current and thermal overload protection. Motor(s) shall have ball or roller type bearings.

E. Controls: Condensing units shall be completely factory wired with necessary controls, anti-short-cycle and other safeties, and contactor pressure lugs or terminal block for power wiring. Control wiring shall be 24-volt control circuit, which includes fusing and control transformer. Units shall be wired for a single point power connection.

F. Low Ambient Operation: Unit shall operate down to at least 45°F ambient as standard.

2.6 COILS

A. Coils shall be fin-and-tube type constructed of seamless copper tubes and aluminum copper fins mechanically bonded or soldered to the tubes. Copper tube wall thickness shall be a minimum of 0.016 inches. Aluminum fins shall be 0.0055 inch minimum thickness. Casing and tube support sheets shall be not lighter than 16 gauge galvanized steel, formed to provide structural strength. When required, multiple tube supports shall be provided to prevent tube sag. Each coil shall be tested at the factory under water at not less than 400 psi air pressure and shall be suitable for 200 psi working pressure. Coils shall be mounted for counterflow service. Coils shall be rated and certified according to ARI 410.

B. Direct-Expansion Coils: Direct-expansion coils shall be suitable for the refrigerant involved. Suction headers shall be seamless copper tubing or seamless or resistance welded steel tube with copper connections. Supply headers shall consist of a distributor which shall distribute the refrigerant through seamless copper tubing equally to all circuits in the coil. Tubes shall be circuited to ensure minimum pressure drop and maximum heat transfer. Circuited shall permit refrigerant flow from inlet to suction outlet without causing oil slugging or restricting refrigerant flow in coil. Each coil to be field installed shall be completely dehydrated and sealed at the factory upon completion of pressure tests.

2.7 INSULATION

A. Scope: Provide all labor, equipment, materials and accessories, and perform all operations required, for the correct installation of insulation on the following systems and

HEATING, VENTILATION AND AIR CONDITIONING

all other necessary items connected into the systems subject to condensation, loss of heat, or personnel protection (above 120 degrees F):

1. Piping insulation (other than pre-insulated underground piping), jackets and accessories (including all valves and fittings with easily removable sections for maintenance of strainers, balance valves, and unions).
- B. Environmental Requirements: Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- C. Quality Assurance: Insulation materials must be asbestos free, UL listed, and manufactured at facilities certified and registered to conform to ISO 9000 Quality Standard. All insulating products and jackets shall carry a 25/50-flame spread/smoke developed rating as tested in accordance with ASTM E 84.
- D. Workmanship: All insulation shall be installed by a licensed applicator and applied in accordance with the manufacturer's recommendations. All work shall comply with all applicable federal, state, and local codes including, but not limited to, OSHA. All work shall conform to industry and trade accepted standards for commercial and industrial insulations. Verify that piping, heat trace, and ductwork has been tested (including applicable pressure/leakage tests) before applying insulation materials. Surfaces to be insulated shall be cleaned free of dirt, scale, moisture, oil and grease. No vapor barrier leaks or insulation voids will be accepted. Continue insulation vapor barrier through penetrations except where prohibited by code. All fire rated walls and penetrations shall be sealed with fire stopping. Locate insulation and cover seams in least visible locations. Neatly finish insulation at supports, protrusions, and interruptions. For all systems requiring a vapor barrier seal all terminations including fittings, wall penetrations, and supports with vapor barrier mastic such as Foster 30-65, Childers CP-35 or approved equal. In addition, in brine or chilled water pipe systems vapor seal pipe terminations every four pipe sections, using Foster 30-65, Childers CP-35 or approved equal. Bevel and seal ends of insulation at equipment, flanges, and unions. Where insulation is used over stainless surfaces, the material shall be chlorine free.
- E. Delivery and Storage of Materials
1. Deliver all materials to the job site and protect the insulation against dirt, water, chemical and mechanical damage before, during and after installation. Do not install damaged insulation and remove it from the job site.
 2. Deliver insulation, coverings, cements, adhesives coatings etc. to the site in factory-fabricated containers with the manufacturer's stamp or label affixed showing fire hazard ratings of the products, name of manufacturer and brand.
 3. Installed insulation that has not been weatherproofed shall be protected from inclement weather by an approved waterproof sheeting installed by the Contractor. Any water-damaged insulation shall be removed and replaced by the Contractor at no additional cost.
- F. Manufacturers: Johns Manville (JM), CertainTeed, Owens-Corning, 3M, Armstrong, Knauf, Armacell, or approved equal. Note that the listed manufacturers may not be able to supply all the insulation products required for the project. Unless otherwise noted, JM insulation products are listed to provide the minimum standards required for each type of insulation.
- G. Pipe Insulation: Provide the following products depending on temperature of each system. Insulation shall be marked to show the locations of all unions, break flanges, strainers, check and balancing valves.

HEATING, VENTILATION AND AIR CONDITIONING

1. For all refrigerant suction and cold chilled water/brine solutions (below 60°F) and all outdoor refrigerant liquid and hot gas piping with a service temperature between -40°F and 200°F, provide PBDE (polybrominated diphenyl esthers) free elastomeric foam insulation equal to Armacell AP/Armaflex (up to 1" thick) or AP/Armaflex/FS (over 1" thick). This insulation type may also be used for condensate drain and chilled water piping and fittings that are not heat traced. If used in computer room plena or over stainless steel pipe or fittings, the material shall be chlorine free equal to Armacell NH/Armaflex. Insulation shall be flexible, cellular elastomeric, meeting ASTM C 534, Type I. K-factor shall be 0.27 at 75°F mean temperature. Insulation shall be rated for no more than 25/50-flame spread/smoke developed rating. Provide waterproof vapor retardant adhesive as needed for installation. Provide 2 coats of waterproof Foster 30-64 Elastomeric Foam Coating, or equal UV protective coating for all outdoor insulation that is not jacketed (allowed up to 1" pipe diameter).
- H. Minimum pipe insulation thicknesses shall be as shown on the drawings.
- I. Field Applied Piping and Fitting Jackets
1. Provide covers for insulation of all pipe fittings (i.e. elbows, tees, end caps, reducers, unions, flanges, mechanical joints), strainers and valves with surface temperatures between -20°F and 150°F (all water, low pressure steam and condensate systems with glass fiber insulation and over 1" foam insulation on refrigerant piping). Provide easily removable sections for cleaning and maintenance of unions, balancing valves, and strainers. Fitting covers shall be 30-mil thick white PVC equal to JM Zeston 2000 molded high impact, UV resistant covers. Attach with water-resistant pressure sensitive color matching vinyl tape to maintain vapor barrier. Insulate all fittings per manufacturer's recommendations to prevent surface temperature from exceeding the 150°F limit.
 2. Other than where foam type insulation is used on up to 1" outdoor pipe, with 2 coats of UV protection, protect all piping insulation that passes through walls and floors, all outdoor pipe insulation, mechanical room pipe insulation (all within 7 feet of floor) and elsewhere where called for on drawings with 0.016 inch thick smooth or embossed aluminum sheet jacket or 0.01 inch thick smooth or corrugated type 304 stainless steel or 30 mil thick Zeston 2000 perma-weld high impact UV resistant PVC jacket with perma-weld fitting covers. Seams shall be on the bottom half of the pipe arranged to shed water. Provide minimum 2-inch overlap for all longitudinal and transverse joints. All seams of outdoor jacket shall be filled with waterproof adhesive. Provide 1" wide draw bands (same material as jacket) on 12" centers.

PART 3 - EXECUTION

3.0 DEMOLITION

- A. The existing facility will continue to operate during all phases of the demolition work and subsequent construction. No interruption of the systems will be permitted without prior approval of the Owner's Representative.

- B. Submit proposed methods and sequence of operations for the selective demolition work to the Owner's Representative for review prior to the start of the work.
- C. Perform all demolition while ensuring minimum interference with adjacent occupied areas.
- D. Where sections of a system are to be removed and the system serves other areas of the building that are outside the scope of the work, perform the following:
 - 1. Coordinate the temporary shutdown of the system with the Owner's representative.
 - 2. Install supports in the remaining active sections of the system as required by the removal of nearby supports associated with the demolition.
 - 3. Isolate the system.
 - 4. Cap the remaining system section, leaving the remainder of the system active.
- E. Provide temporary shoring or bracing during the demolition work to prevent movement, settlement, or collapse of the system or adjacent systems due to the work.
- F. Promptly repair any damage caused to adjacent facilities or areas that are designated to remain at no additional cost to the Owner.
- G. Equipment:
 - 1. Coordinate with the Contractor and Subcontractors to provide disconnection prior to equipment removal.
 - 2. Remove equipment by unfastening at the supports or attachments. Then remove the attachments from the building, leaving no component of the original installation.
 - 3. The Owner shall choose to take possession of the equipment or not. If the Owner chooses not to take possession of the equipment, the Subcontractor shall remove the equipment and dispose of the equipment in accordance with Paragraph H specified below.
 - 4. Exercise care with equipment that is to be relocated or turned over to the Owner, examine the equipment before removal in the presence of the Owner's representative to determine its condition. Make a record of any marks, etc. by a photograph or videotape acknowledged by the Owner's representative.
 - 5. Install relocated equipment to ensure no damage.
 - 6. Equipment to be turned over to the Owner: Deliver to an on-site location designated by the Owner, and obtain acknowledgment of receipt in good condition.
- H. All equipment, etc., not turned over to the Owner shall be put into the General Contractor's dumpsters; become the property of the General Contractor, and shall be removed from the site by the General Contractor. For equipment containing any refrigerant, it shall be reclaimed for recycling. Any hazardous materials such as mercury from thermometers or thermostats; ethylene glycol; or lead shall be properly disposed of, following EPA guidelines.

3.1 GENERAL

HEATING, VENTILATION AND AIR CONDITIONING

- A. Install all items specified under PART 2 - PRODUCTS, according to the manufacturer's requirements and best quality recommendations, shop drawings, the details as shown on the Drawings and as specified in this specification section.
- B. Install all work so that parts requiring inspection, replacements, maintenance and repair shall be readily accessible. Minor deviations from the Drawings may be made to accomplish this, but any substantial change shall not be made without prior written approval from the Owner.
- C. Equipment bases mounted on concrete slabs and pads, or mounted on stands, gratings, platforms, or other, shall not be set in any manner, except on the finished and permanent support.
- D. Support of equipment on studs or other means, and the placing or building of the supporting slab, pad, pier, stand, grating, or other "to the equipment", is prohibited.
- E. Care shall be taken when working on the roof. Protect the roof from damage.

3.2 AHU REFURBISHING

- A. The existing air handling units (AHU) shall be thoroughly refurbished. Work shall include replacement of all fan belts, cleaning of all components (inside and out), replacement of all filters, lubrication of all motors and dampers, testing of all components and controls, and balancing.
- B. Belts: Contractor shall replace all fan belts with new, premium grade belts. Belts shall be tightened to proper tension.
- C. Cleaning: A member of the National Air Duct Cleaners Association (NADCA) shall perform all interior and exterior cleaning. The Contractor shall remove and dispose of all filters and then wash (high pressure for coils), dry and use hepa-filter vacuums to completely clean all components inside and out (fans, dampers, coils, filter rack, casing, drain pans, motors, actuators and linkages, etc.). After all other work is done, the units shall be wiped clean, with all traces of oil, dust, and dirt removed.
- D. Filters: After cleaning, filter rack and safing shall be sealed to prevent air leakage and all filters shall be replaced with new filters of the same type and efficiency as the existing filters.
- E. Lubrication: Contractor shall lubricate all fan and motor bearings and all applicable valve and damper actuators and linkages.
- F. Testing: Provide fan vibration tests and testing of proper operation of all control components.
 - 1. Fan vibration analysis: Operate fan at design rpm, set fan drive and conduct vibration spectrum. Fan, motor, drive and base assembly vibration shall be brought to within 2 mils. Check motor and drive vibration with fan as a complete assembly. Submit a report of the findings and adjustments made.
 - 2. Controls: Proper operation of all components and alarms shall be verified and compared against the existing sequences of operation in all modes. Control loops shall be exercised by inducing a set point shift of at least 10% and observing whether the system successfully adjusts to the new set point. Record

HEATING, VENTILATION AND AIR CONDITIONING

all test results and attach to Functional Performance Test Results Sheets and submit to Owner's Representative.

- G. Balancing: Prior to doing any of the duct cleaning and refurbishing work, airflow readings (supply, return and outdoor air) for the existing AHUs shall be measured, recorded, and submitted (4 copies) to the Owner. The Contractor shall select AABC MN-1, NEBB-01, SMACNA-07 or ASHRAE 111 as the standard for providing testing, adjusting and balancing of airflow. Testing, adjusting, and balancing shall be accomplished by a firm certified for testing and balancing by Associated Air Balance Council (AABC) or National Environmental Balancing Bureau (NEBB). Testing, adjusting, and balancing shall not commence until approved by the Owner's Representative.
1. Instrument Accuracy Requirements: All instrumentation shall be checked for accuracy before beginning testing, adjusting and balancing procedures. All instrumentation used for testing shall be calibrated within 6 months of use. Pitot tubes and U-tube manometers do not require checking. In no case shall the instrumentation accuracy be less than specified by the instrument manufacturer. Any instrument falling out of calibration during the process of balancing and testing shall be re-calibrated or removed from the site and replaced by a properly calibrated instrument. No instruments shall be allowed to remain on-site that are not in calibration.
 2. Procedure: Throttling losses shall be limited. Airflow adjustments shall be made by first adjusting the fan speed to meet the design flow conditions. Fan speed adjustment may not be required for fan motors which are less than 746 W, (one horsepower,) or if throttling results in no greater than an additional 1/3 W (horsepower) draw above that required if the fan speed were adjusted. Provide additional sheaves and belts as required to reach design CFM levels.
 3. Final Balancing: The clean filters shall be installed before the final air balancing. The filter pressure drops shall be simulated as halfway between clean and dirty by the temporary addition of cheese cloth or other means. Each system shall be adjusted until all flow quantities are within +/-5% (+5%/-0% for outdoor air) of the previously recorded airflows or where shown, the revised air flows listed on the drawings. Submit 4 copies of a final balancing report to the Owner.

3.3 IDENTIFICATION

A. General

1. All piping, ductwork, equipment, panels, and valves furnished and/or installed under this Section of the Specifications shall be marked for ease of identification.
2. Marking shall be done using self-adhering (screw or rivets for equipment) labels applied to clean, smooth surfaces. All lettering shall have sharply contrasting background for ease of identification. Colors shall be in accordance with ANSI A13.1 Standards. Samples of stickers together with color schedules shall be submitted for approval.

B. Pipe Identification

1. Provide color-coded pipe identification markers prominently located on all piping in the building installed under this Section. Pipe markers shall be heavy plastic faced cloth labels with heat resistant backing, "Set Mark" by Seton Nameplate Corporation, Zipper Tubing Co., or equal by the W. H. Brady Company or approved equal.

HEATING, VENTILATION AND AIR CONDITIONING

2. Provide each pipe with markers/labels indicating the service, size (in inches), and arrow markers to indicate the direction(s) of flow.
3. Pipe labels shall be spaced at maximum intervals of 40 feet along each run. Reduce intervals to 20 feet in areas of congested piping and equipment and above ceilings. In finished occupied spaces without ceilings (exposed piping) labels shall be located just before the piping enters the space and just after the piping exits the space and at intervals of 100' within the space. Provide labels near each valve and control device. This work shall be done after finish painting has been completed.
4. The following color coding shall be used with names in black letters on backgrounds indicated:

SCHEDULE OF PIPING IDENTIFICATION		
Service	Legend	Background Color
Refrigerant suction	RS	Yellow
Refrigerant liquid	RL	Yellow

5. In general, a 2" high legend shall be used for pipe lines 4" diameter and larger, and a 3/4" high legend shall be used for pipe lines 3" diameter and smaller.

C. Equipment Identification (by Unit Manufacturer)

1. Equipment marking shall be prominently located and securely attached with screws or rivets (no adhesives or cements are permitted) on the normally visible side of the equipment.
2. Equipment identification designations shall be taken from equipment callouts as shown on drawings and coordinated with the Owner's facility group to assure designations match up with Owner's maintenance management system identification database.
3. Provide on the label (or on a prominently located second label) all required routine maintenance action (per manufacturer). Label may be limited to identifying, by title or publication number, the operation and maintenance manual for that particular model and type of product.

3.4 PIPING

A. General

1. Piping shall be cut accurately to measurements established at the jobsite, shall be installed without cold springing, and shall properly clear windows, doors and other openings and electrical gear. Cutting or other weakening of the building structure to facilitate piping installation will not be permitted. Piping shall be free of burrs, oil, grease, and other foreign matter. Piping shall be installed to permit free expansion and contraction without damaging building structure, pipe, joints, or hangers. Changes in direction shall be made with fittings. Vent pipes shall be carried through the roof and shall be properly flashed.
2. Pipes passing through concrete or masonry walls or concrete floors or roofs shall be provided with pipe sleeves fitted into place at the time of construction. A waterproofing clamping flange shall be installed as indicated. Sleeves shall not be installed in structural members except where indicated or approved. Rectangular and square openings shall be as detailed. Each sleeve shall extend through its specified wall, floor, or roof, and shall be cut flush with each surface, except that sleeves through floors and roofs shall extend above the top surface

HEATING, VENTILATION AND AIR CONDITIONING

at least 6 inches for proper flashing or finishing. Membrane clamping rings shall be provided where membranes are penetrated. Unless otherwise indicated or required by the sealing system, sleeves shall be sized to provide a minimum clearance of 1/4 inch between bare pipe and sleeves or between jacket over insulation and sleeves. Sleeves in bearing walls, waterproofing membrane floors, and wet areas shall be galvanized steel pipe. Sleeves in nonbearing walls, floors, or ceilings may be galvanized steel pipe or galvanized sheet metal with lock-type longitudinal seam. Except in pipe chases or interior walls, the annular space between pipe and sleeve or between jacket over insulation and sleeve in non-fire rated walls, partitions, and floors shall be sealed as indicated and specified. Metal jackets shall be provided over insulation passing through exterior walls, fire walls, fire partitions, floors, or roofs, shall not be thinner than 0.006 inch thick aluminum, if corrugated, and 0.16 inch thick aluminum, if smooth, and shall be secured with aluminum or stainless steel bands not less than 3/8 inch wide and not more than 8 inches apart. When penetrating roofs, before fitting the metal jacket into place, a 1/2-inch wide strip of sealant shall be run vertically along the inside of the longitudinal joint of the metal jacket from a point below the backup material to a minimum height of 36 inches above the roof.

3. If the pipe turns from vertical to horizontal, the sealant strip shall be run to a point just beyond the first elbow. When penetrating waterproofing membrane for floors, the metal jacket shall extend from a point below the backup material to a minimum distance of 2 inches above the flashing. For other areas, the metal jacket shall extend from a point below the backup material to a point 12 inches above floor; or when passing through walls above grade, jacket shall extend at least 4 inches beyond each side of the wall.
4. Pipes Passing through Waterproofing Membranes: In addition to the pipe sleeves referred to above, pipes passing through roof or floor waterproofing membranes shall be provided with a 16 ounce copper flashing, each within an integral skirt or flange. Flashing shall be suitably formed, and the skirt or flange shall extend not less than 8 inches from the pipe and shall set over the roof or floor membrane in a troweled coating of bituminous cement. The flashing shall extend up the pipe a minimum of 10 inches above the roof or floor. The annular space between the flashing and the bare pipe or between the flashing and the metal-jacket-covered insulation shall be sealed as indicated. Pipes passing through roof or floor waterproofing membrane shall be installed through a galvanized steel sleeve. The annular space between pipe and sleeve or conduit and sleeve shall be sealed by a modular mechanical-type sealing assembly (equal to Link-Seal). The seals shall consist of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe/conduit and sleeve with corrosion protected carbon steel bolts, nuts, and pressure plates. The links shall be loosely assembled with bolts to form a continuous rubber belt around the pipe with a pressure plate under each bolt head and each nut. After the seal assembly is properly positioned in the sleeve, tightening of the bolts shall cause the rubber sealing elements to expand and provide a water-tight seal between the pipe/conduit and the sleeve. Each seal assembly shall be sized as recommended by the manufacturer to fit the pipe/conduit and sleeve involved. The Contractor shall provide sleeves of the proper diameters and gauge.

B. Refrigerant Piping

1. Flared, Soldered and Brazed Pipe and Tubing: Pipe and tubing shall be cut square and burrs shall be removed. Both inside of fittings and outside of tubing shall be cleaned with an abrasive before sweating. Care shall be taken to prevent annealing of fittings and hard drawn tubing when making connection.

HEATING, VENTILATION AND AIR CONDITIONING

Installation shall be made in accordance with the manufacturer's recommendations. Changes in direction of piping shall be made with flared, soldered, or brazed fittings only. Solder and flux shall be lead free. Joints for soldered fittings shall be made with silver solder or 95:5 tin-antimony solder. Cored solder shall not be used. Joints for brazed fittings shall use brazing alloys with strength equal to B-Ag alloy and have a melting point above 1000 degrees F. Flared-tube joint fittings conforming to ASME B16.26 and ASTM B62 may be used at equipment connections where operating pressures allow. Joints for flared fittings shall be of the compression pattern.

3.5 FIRESTOPPING INSTALLATION

- A. Install firestopping assembly at locations shown and as specified in accordance with UL FRD systems or FM P7825 designs, and as recommended by manufacturer. Do not cover or enclose firestopped areas until approved by the Owner's Representative.
- B. Completely fill openings around penetrating items with firestopping material to prevent spread of fire in the following locations:
 - 1. Around duct, cable, conduit, piping, and their supports that penetrate fire-rated above grade floor slabs, interior partitions, and exterior walls.
 - 2. Around openings and penetrations through fire-rated ceiling assemblies.
 - 3. Around penetration of vertical fire-rated service shafts.
 - 4. Around openings and penetrations through fire-rated enclosures.
 - 5. Other locations indicated.
 - 6. At all air barrier penetrations as defined in the State's Energy Code.
- C. Completely fill voids flush with the surface; the depth of material shall be in accordance with UL FRD or FM P7825. Firestopping for filling voids in floors in which smallest dimension of a void is 4 inches or more shall support the floor design load or be protected by a permanent barrier. Damaged, disrupted, or removed firestopplings shall be replaced with new firestopplings as specified in this section.
- D. Insulated Pipes and Ducts: Cut and remove thermal insulation where pipes or ducts pass through firestopplings. Replace thermal insulation with a material having equal thermal insulating characteristics and equal firestopping characteristics.
- E. Wall and Floor Penetration by Plastic Drain, Waste, and Vent Pipes: A 2 hour fire resistive chase enclosure shall be maintained by encasing the pipe in an 18 inch steel sleeve and penetrating the chase at a 45 degree downward angle. Chases shall be firestopped at each floor.

3.6 CONNECTIONS TO EQUIPMENT

- A. Supply and return connections shall be provided by the Contractor unless otherwise indicated. Valves and traps shall be installed in accordance with the manufacturer's recommendations. Unless otherwise indicated, the size of the supply and return pipes to each piece of equipment shall be not smaller than the connections on the equipment. No bushed connections shall be permitted. Change in sizes shall be made with reducers or increasers only.

3.7 SUPPORTS

- A. Hangers used to support piping 2 inches and larger shall be fabricated to permit adequate adjustment after erection while supporting the load. Pipe guides and anchors shall be installed to keep pipes in accurate alignment, to direct the expansion movement, and to prevent buckling, swaying, and undue strain. All piping subjected to vertical movement when operating temperatures exceed ambient temperatures, shall be supported by variable spring hangers and supports or by constant support hangers.
- B. Piping and attached valves shall be supported and braced to resist seismic loads as specified under the SEISMIC PROTECTION FOR MECHANICAL, ELECTRICAL EQUIPMENT section. Structural steel required for reinforcement to properly support piping, headers, and equipment, but not shown, shall be provided under this section. Material used for supports shall be as specified under the STRUCTURAL STEEL section.
 - 1. Structural steel brackets required to support piping, headers, and equipment, but not shown, shall be provided under this section. Material and installation shall be as specified under the STRUCTURAL STEEL section. Pipe hanger loads suspended from steel joist panel points shall not exceed 50 pounds. Loads exceeding 50 pounds shall be suspended from panel points.
 - 2. Multiple pipe runs on a common base member shall be supported by clamps where each pipe crosses the base support member. Spacing of the base support members shall not exceed the hanger and support spacing required for any individual pipe in the multiple pipe run.
- C. Pipe hangers, inserts and supports shall conform to MSS SP-58 and MSS SP-69, except as specified as follows:
 - 1. Types 5, 12, and 26 shall not be used.
 - 2. Type 3 shall not be used on insulated pipe which has a vapor barrier. Type 3 may be used on insulated pipe that does not have a vapor barrier if clamped directly to the pipe and if the clamp bottom does not extend through the insulation and the top clamp attachment does not contact the insulation during pipe movement.
 - 3. Type 18 inserts shall be secured to concrete forms before concrete is placed. Continuous inserts which allow more adjustment may be used if they otherwise meet the requirements for Type 18 inserts.
 - 4. Type 19 and 23 C-clamps shall be torqued per MSS SP-69 and have both locknuts and retaining devices, furnished by the manufacturer. Field-fabricated C-clamp bodies or retaining devices are not acceptable.
 - 5. Type 20 attachments used on angles and channels shall be furnished with an added malleable iron heel plate or adapter.
 - 6. Type 24 may be used only on trapeze hanger systems or on fabricated frames.
 - 7. Where Type 39 saddle or Type 40 shield are permitted for a particular pipe attachment application, the Type 39 saddle shall be used on all pipe 4 inches and larger.
 - 8. Horizontal pipe supports shall be spaced as specified in MSS SP-69 and a support shall be installed not over 1 foot from the pipe fitting joint at each change in direction of the piping. Pipe supports shall be spaced not over 5 feet apart at valves.

9. Vertical pipe shall be supported at each floor, except at slab-on-grade, and at intervals of not more than 15 feet, except that pipe shall be supported not more than 8 feet from end of risers, and at vent terminations.
10. Type 35 guides using steel, reinforced PTFE or graphite slides shall be provided where required to allow longitudinal pipe movement. Lateral restraints shall be provided as required. Slide materials shall be suitable for the system operating temperatures, atmospheric conditions and bearing loads encountered. Where steel slides do not require provision for restraint or lateral movement, an alternate guide method may be used. On piping 4 inches and larger, a Type 39 saddle may be welded to the pipe and freely rest on a steel plate. On piping under 4 inches, a Type 40 protection shield may be attached to the pipe or insulation and freely rest on a steel slide plate. Where there are high system temperatures and welding to piping is not desirable, then the Type 35 guide shall include a pipe cradle, welded to the guide structure and strapped securely to the pipe. The pipe shall be separated from the slide material by at least 4 inches, or by an amount adequate for the insulation, whichever is greater.
11. Except for Type 3, pipe hangers on horizontal insulated pipe shall be the size of the outside diameter of the insulation.

3.8 COOLING SYSTEMS INSTALLATION

- A. Necessary supports shall be provided for all equipment, appurtenances, and pipe as required, including frames or supports for condensers, pumps, cooling towers, chillers and similar items. All rotating equipment shall be isolated from the building structure. If mechanical vibration isolators are not provided, vibration absorbing foundations shall be provided. Each foundation shall include isolation units consisting of machine and floor or foundation fastenings, together with intermediate isolation material. Other floor-mounted equipment shall be set on not less than a 4 inch concrete pad doweled in place. Concrete foundations for floor mounted pumps shall have a mass equivalent to three times the weight of the components, pump, base plate, and motor to be supported. Isolators shall provide at least 90% isolation efficiency at all speeds. Pipes connected to isolation mounted equipment shall be provided with flexible connectors. Foundation drawings, bolt-setting information, and foundation bolts shall be furnished prior to concrete foundation construction for all equipment indicated or required to have concrete foundations. Equipment shall be properly leveled, aligned, and secured in place in accordance with manufacturer's instructions.
- B. Refrigerant Piping and Charging
 1. Pipe sizing on drawings is approximate, confirm and provide all pipe sizes as recommended by unit manufacturer based on actual field routing. Provide bypass circuits, control equipment, any recommended double suction risers, traps, appurtenances, and any hot gas bypass and reheat piping as recommended sized and diagrammed by the unit manufacturer. Install refrigerant piping per manufacturer's best recommended practice and layout and test pipe for leakage. Submit piping diagram (with all recommended components) along with calculations and sizing charts for engineer's review.
 2. Initial Charge: Upon completion of all the refrigerant pipe tests, add the required charge of refrigerant and oil for which the system is designed, in accordance with the manufacturer's recommendations. Contractor shall provide the complete charge of refrigerant in accordance with manufacturer's recommendations. Upon satisfactory completion of the system performance tests, any refrigerant that has been lost from the system shall be replaced. After the system is fully operational,

HEATING, VENTILATION AND AIR CONDITIONING

any service valve seal caps and blanks over gauge points shall be installed and tightened.

3. Refrigerant Leakage: If a refrigerant leak is discovered after the system has been charged, the leaking portion of the system shall immediately be isolated from the remainder of the system and the refrigerant shall be pumped into the system receiver or other suitable container. The refrigerant shall not be discharged into the atmosphere.
 4. Contractor's Responsibility: The Contractor shall, at all times during the installation and testing of the refrigeration system, take steps to prevent the release of refrigerants into the atmosphere. The steps shall include, but not be limited to, procedures which will minimize the release of refrigerants to the atmosphere and the use of refrigerant recovery devices to remove refrigerant from the system and store the refrigerant for reuse or reclaim. At no time shall more than 3 oz. of refrigerant be released to the atmosphere in any one occurrence. Any system leaks within the first year shall be repaired in accordance with the specified requirements including material, labor, and refrigerant if the leak is the result of defective equipment, material, or installation.
- C. Oil Charging: Except for factory sealed units, two complete charges of lubricating oil for each compressor crankcase shall be furnished. One charge shall be used during the performance testing period, and upon the satisfactory completion of the tests, the oil shall be drained and replaced with the second charge.

3.9 REFRIGERATION SYSTEMS TESTS

- A. Field tests shall be conducted in the presence of the Owner's Representative. Electricity required for the tests will be furnished by the Owner. Any material, equipment, instruments, and personnel required for the test shall be provided by the Contractor. The services of a qualified technician shall be provided as required to perform all tests and procedures indicated herein. Reports shall be on industry standard forms. Submit test reports to the engineer and Owner's Representative.
- B. Refrigerant Pipe Testing (Packaged Equipment Piping)
1. After all components of the refrigerant systems have been installed and the piping connected, each system shall be subjected to refrigerant leakage tests. The refrigerant leakage tests shall be done before any refrigerant pipe is insulated or covered. The first test shall be done after charging the system to half normal operating pressure. All piping shall then be test for leakage using electronic leak detectors. Fix any leaks found and retest until there are no more leaks.
 2. The final test of the high and low side of the refrigerant system shall be tested for the minimum refrigerant leakage test pressure specified in ASHRAE 15, for the refrigerant used. System shall be proved tight and free of leaks by allowing the refrigerant leakage test pressure to remain on the system for a minimum of 12 hours with no drop in pressure.
 3. Leaks, damage, and defects discovered or resulting from testing shall be repaired or replaced to like-new condition with acceptable materials. Tests shall be continued until systems operate without leaks or repairs. When the final test is successful, the refrigerant levels shall be set at manufacturer's recommended pressures.

3.10 BASES AND SUPPORTS

- A. In addition to supports and hangers as mentioned in the MISCELLANEOUS METALS section, provide all bases and supports not part of the building structure, of required size, type, and strength, as approved by the Architect, for all equipment and materials furnished by him. All equipment, bases and supports shall be adequately anchored to the building structure to prevent shifting of position under operating conditions.
- B. All concrete foundations and all concrete supports will be provided by the General Contractor. The HVAC Subcontractor shall furnish shop drawings and templates for all concrete foundations and supports for setting all required hanger and foundation bolts and other appurtenances necessary for the proper installation of his equipment. All concrete work shall be shown in detail on the shop drawings prepared by the HVAC Subcontractor, and be submitted to the Architect, showing the complete details of all foundations, including the necessary concrete and steel work and vibration isolation devices.
- C. All floor-mounted equipment shall be erected on concrete pads over the complete floor area of the equipment, unless specified to the contrary herein.

3.11 WATERPROOFING

- A. Pipes passing through slabs shall have the sleeve extended $\frac{1}{4}$ " above floors of finished spaces and 2" above floors of mechanical equipment rooms. The space between the pipe and sleeve shall be sealed with interlinking seals equal to Link-Seal.

3.12 PLACING IN SERVICE

- A. At the completion of performance tests and following approval of test result, recheck all equipment to see that each item is adequately lubricated and functioning correctly.
- B. Furnish upon completion of all work, certificates of inspections from the manufacturers stating that authorized factory engineers have inspected and tested the operation of their respective equipment and found same to be in satisfactory operating conditions.

3.13 CLEANING AND ADJUSTING

- A. During the progress of the work, clean up and remove all oil, grease, and other debris caused by the work performed under this Section.
- B. At the conclusion of the project, clean and repair all areas and finishes as installed or affected by this installation of work under this Section.
- C. Equipment shall be wiped clean, with all traces of oil, dust, dirt, or paint spots removed. Temporary filters shall be provided for all fans that are operated during construction, and new filters shall be installed after all construction dirt has been removed from the building. System shall be maintained in this clean condition until final acceptance. Bearings shall be properly lubricated with oil or grease as recommended by the manufacturer. Belts shall be tightened to proper tension. Control valves and other miscellaneous equipment requiring adjustment shall be adjusted to setting indicated or directed. Fans shall be adjusted to the speed indicated by the manufacturer to meet specified conditions.

3.14 OPERATING AND MAINTENANCE INSTRUCTIONS

- A. All operating equipment installed under this section shall be placed in operation and shall function continuously in an operating test for a period of one week without shutdown due to mechanical failure or necessity of adjustment. Prior to scheduling the Project Final Inspection and after completion of all installation and running adjustments, the HVAC Subcontractor shall perform all work required to place the equipment in complete operating condition to meet all requirements under this Specification.
- B. During this running test period, the HVAC Subcontractor shall deliver to the designated representative of the Owner, through the Architect, six complete sets of operating, service and replacement data for all equipment which will require operating maintenance or replacement and one copy of this literature shall be available during the instruction of the operating personnel while the other is checked for completeness by the Architect.

END OF SECTION

TABLE OF CONTENTS

SECTION 26 00 00

ELECTRICAL

PART 1 - GENERAL..... 1

1.1 GENERAL PROVISIONS..... 1

1.2 SCOPE OF WORK 1

1.3 RELATED WORK 2

1.4 DEFINITIONS 2

1.5 CODES, REFERENCES AND PERMITS 3

1.6 GENERAL REQUIREMENTS..... 3

1.7 MATERIAL AND EQUIPMENT STANDARDS..... 4

1.8 SUBMITTALS..... 4

1.9 RECORD DRAWINGS..... 8

1.10 WARRANTIES 9

1.11 COORDINATION 9

1.12 INTERPRETATION OF DRAWINGS AND SPECIFICATIONS 10

1.13 INSPECTION OF SITE CONDITIONS 10

1.14 SURVEY AND MEASUREMENTS 11

1.15 DELIVERY, STORAGE AND HANDLING 11

1.16 PROTECTION OF WORK AND PROPERTY..... 11

1.17 SUPERVISION..... 11

1.18 SAFETY PRECAUTIONS 11

1.19 SCHEDULE..... 12

1.20 CUTTING AND PATCHING..... 12

1.21 SUPPLEMENTARY STEEL, CHANNELS AND SUPPORTS..... 12

1.22 ACCESSIBILITY 13

1.23 PROJECT CLOSEOUT..... 13

PART 2 - PRODUCTS..... 16

2.0 IDENTIFICATION..... 16

2.1 RACEWAYS AND CONDUIT 16

2.2 WIRE AND CABLE (600V) 17

2.3 JUNCTION AND PULL BOXES..... 18

2.4 SAFETY DISCONNECT SWITCHES 18

2.5 MODIFICATIONS TO EXISTING PANELBOARD AND LOAD CENTER 19

PART 3 - EXECUTION 20

3.0 DEMOLITION..... 20

3.1 IDENTIFICATION..... 21
3.2 RACEWAYS AND CONDUIT 21
3.3 WIRE AND CABLE (600V) 23
3.4 JUNCTION AND PULL BOXES..... 24
3.5 SAFETY DISCONNECT SWITCHES 25
3.6 MODIFICATIONS TO EXISTING PANELBOARD AND LOAD CENTER 25
3.7 BASIC ACCEPTANCE TESTS 25

SECTION 26 00 00

ELECTRICAL

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. The GENERAL REQUIREMENTS, DIVISION 01, and BIDDING AND CONTRACT REQUIREMENTS, DIVISION 00, are hereby made a part of this Specification Section.
- B. Examine all Drawings and all Sections of the Specifications and requirements and provisions affecting the work of this Section.

1.2 SCOPE OF WORK

- A. This project consists of the replacement of (3) existing roof mounted air cooled condensing units with new. The scope of work includes, but is not limited to demolition of existing units, removal of existing branch circuitry, and providing new branch circuitry to serve the new units as indicated in the contract documents.
- B. The work under this Section shall include the furnishing of all materials, labor, equipment and supplies and the performance of all operations to provide complete working systems, in general, to include the following items:
 - 1. Identification
 - 2. Raceways and Conduit
 - 3. Wire and Cable (600V)
 - 4. Junction Boxes, Pull Boxes and Wireways
 - 5. Safety Disconnect Switches
 - 6. Modifications to existing Panelboard and Load Center
 - 7. Fuses
 - 8. Sleeving
 - 9. Fire Seal and Fireproof Sealant
 - 10. Supervision and Approval
 - 11. Electrical connections to HVAC equipment and other equipment provided under other Sections or by Owner.
 - 12. Relocation of existing electrical components that interfere with new construction and removal and disposal of obsolete components.
 - 13. Testing
 - 14. Shop drawings
 - 15. Record (as-built) drawings
- C. Work of this Section is generally shown on the Electrical Drawings.

1.3 RELATED WORK

- A. Principal classes of Work related to the Work of this Section are listed in the Specification Table of Contents, and are specified to be performed under the indicated Sections of the Specifications. Refer to the indicated Sections for description of the extent and nature of the indicated Work, and for coordination with related trades. This listing may not include all related Work items. It is the responsibility of the Contractor to coordinate and schedule the Work of this Section with that of all other trades.
- B. The following work is not included in this section and will be provided under other sections:
 - 1. Furnishing and installation of motors.
 - 2. Structural supports necessary to distribute loading from equipment to roof or floor except as specified.
 - 3. Automatic Temperature Control and Direct Digital Communication wiring except as noted on Drawings.
 - 4. Flashing of roof and wall penetrations.
 - 5. Painting, except as specified herein.

1.4 DEFINITIONS

- A. As used in this Section, the following items are understood to have the following meaning:
 - 1. **“Contractor or Subcontractor”**, unless otherwise qualified, shall mean the installer of the work specified under this Section.
 - 2. **“Furnish”** shall mean purchase and deliver to the project site, complete with every necessary appurtenance.
 - 3. **“Install”** shall mean unload at the delivery point at the site and perform all work necessary to establish secure mounting and proper operation at the proper location in the project.
 - 4. **“Provide”** shall mean "Furnish" and "Install".
 - 5. **“Work”** shall mean all labor, materials, equipment, apparatus, controls, accessories and all other items required for a proper and complete installation.
 - 6. **“Concealed”** shall mean hidden from sight in chases, furred-in spaces, shafts, hung ceilings, embedded in construction or in a crawl space. Areas to be concealed as part of tenant alterations to the building shall also be considered in this definition.
 - 7. **“Exposed”** shall mean not installed underground or concealed as defined above.
 - 8. **“Furnished by Others”** shall mean materials or equipment purchased under other sections of the general contract and installed by this section of the specifications by this trade Contractor.
 - 9. **“Owners Representative”** shall be the party responsible to make decisions regarding all contractual obligations in reference to the Scope of Work for the Owner.
 - 10. **“Date of Substantial Completion”** shall indicate the date where the work has been formally accepted as evidenced by completed final punch list or where the

work has reached the stage that the Owner obtains beneficial use and commences utilization of the installed systems for business or occupancy purposes. The GENERAL REQUIREMENTS, DIVISION 01, shall supersede this definition where specifically defined.

1.5 CODES, REFERENCES AND PERMITS

- A. Materials, installation of systems and equipment provided under this section shall be done in strict accordance with the Department of Public Safety, Department of Environmental Protection, State Building Code and any other Codes and Regulations having jurisdiction including but not limited to:
1. All Applicable NFPA Standards
 2. National Electrical Code (NEC)
 3. Occupational Safety and Health Administration (OSHA)
 4. State and Local Building Codes
 5. Underwriters' Laboratories, Inc. (UL)
- B. Unless otherwise specified or indicated, materials, workmanship and equipment performance shall conform with the latest governing edition of the following standards, codes, specifications, requirements, and regulations, except when more rigid requirements are specified or are required by applicable codes but not limited to:
1. American National Standards Institute (ANSI)
 2. American Society of Mechanical Engineers (ASME)
 3. American Society of Testing and Materials (ASTM)
 4. Institute of Electrical and Electronics Engineers (IEEE)
 5. Insulated Cable Engineers Association (ICEA)
 6. National Electrical Contractors Association (NECA)
 7. National Electric Manufacturers Association (NEMA)
 8. Thermal Insulation Manufacturers Association (TIMA)
- C. Codes, laws and standards provide a basis for the minimum installation criteria acceptable. The drawings and specifications illustrate the scope required for this project, which may exceed minimum codes, laws and standards.
- D. Give all notices, file all plans, obtain all permits and licenses, and obtain all necessary approvals from authorities having jurisdiction. Deliver all certificates of inspection to the authorities having jurisdiction. No work shall be covered before examination and approval by the Owner's Representative, inspectors, and authorities having jurisdiction. Replace imperfect or condemned work to conform to requirements, satisfactory to Owner's Representative, and without extra cost to the Owner. If work is covered before inspection and approval, this Contractor shall pay costs of uncovering and reinstalling the covering, whether it meets contract requirements or not.

1.6 GENERAL REQUIREMENTS

- A. Nameplates

1. Each major component of equipment shall have the manufacturer's name, address, type or style, model or serial number, and catalog number on a plate secured to the equipment.

B. Equipment Guards

1. Belts, pulleys, chains, gears, couplings, projecting setscrews, keys, and other rotating parts so located that any person may come in close proximity thereto shall be completely enclosed or guarded. High-temperature equipment and piping so located as to endanger personnel or create a fire hazard shall be guarded or covered with insulation of type specified for service.

1.7 MATERIAL AND EQUIPMENT STANDARDS

- A. Where equipment or materials are specified with the name of a manufacturer, such specification shall be deemed to be used for the purpose of establishing a standard for that particular item. No equipment or material shall be used unless previously approved by the Owner's Representative.
- B. Substitutions may be offered for review provided the material, equipment or process offered for consideration is equal in every respect to that indicated or specified. The request for each substitution must be accompanied by complete specifications together with drawings or samples to properly appraise the materials, equipment or process. The Contractor shall highlight and list all applicable specification requirements which the substituted material deviates from.
- C. If a substitution of materials or equipment in whole or in part is made, this Contractor shall bear the cost of any changes necessitated by any other trade as a result of said substitution.
- D. All materials, equipment and accessories provided under this section shall be new and unused products of recognized manufacturers as approved.

1.8 SUBMITTALS

- A. Conform to the requirements of Division 01, General Conditions, for schedule and form of all submittals unless specifically noted otherwise in this section. Coordinate this submittal with submittals for all other finishes. Shop drawings and design layouts shall be prepared by licensed installing Contractor s and shall note the name(s), license number(s) and license expiration date(s) of the Contractor (s) installing electrical systems.
- B. Definitions:
 1. Shop Drawings are information prepared by the Contractor to illustrate portions of the work in more detail than indicated in the Contract Documents.
 2. Acceptable Manufacturers: The mechanical design for each product is based on the single manufacturer listed in the schedule or shown on the drawings. In Part 2 of the specifications, certain Alternate Manufacturers are listed as being acceptable. In addition, the MATERIAL AND EQUIPMENT STANDARDS paragraph potentially allows for substitutions as being acceptable. These are acceptable only if, as a minimum, they:
 - a. Meet all performance criteria listed in the schedules and outlined in the specifications. For example, to be acceptable, an emergency generator

must deliver equal kW / kVA at equal or greater efficiency using equal or less fuel as the emergency generator listed in the schedules.

- b. Fit within the available space it was designed for, including space for maintenance and component removal, with no modification to either the space or the product. Clearances to walls, ceilings, and other equipment will be at least equal to those shown on the design drawings. The fact that a manufacturer's name appears as acceptable shall not be taken to mean the Engineer has determined that the manufacturer's products will fit within the available space – this determination is solely the responsibility of the Contractor.
- c. For rooftop mounted equipment and equipment mounted in areas where structural matters are a concern, the products must have a weight no greater than the product listed in the schedules or specifications.
- d. Products must adhere to all architectural considerations including, but not limited to; being of the same color as the product scheduled or specified, fitting within the architectural enclosures and details, and for lighting – being the same size and of the same physical appearance as scheduled or specified products.

C. Submittal Procedures, Format and Requirements

- 1. Review submittal packages for compliance with Contract Documents and then submit to Owner's Representative for review. Submit enough sets of shop drawings such that, after review, two sets will be kept by the reviewer, with only the remaining sets returned with reviewer's marks and comments.
- 2. Each Shop Drawing shall indicate in title block, and each Product Data package shall indicate on cover sheet, the following information:
 - a. Title
 - b. Equipment number
 - c. Name and location of project
 - d. Names of Owner, Engineer and Seller
 - e. Names of manufacturers, suppliers, vendors, etc.
 - f. Date of submittal
 - g. Whether original submittal or resubmitted
- 3. Shop Drawings showing manufacturer's product data shall contain detailed dimensional drawings (minimum ¼" – 1' scale) including plans and sections (where physical clearance could be an issue). Provide larger scale details as necessary.
- 4. Submit accurate and complete description of materials of construction, manufacturer's published performance characteristics, sizes, weights, capacity ratings (performance data, alone, is not acceptable), electrical requirements, starting characteristics, wiring diagrams, and acoustical performance for complete assemblies. Drawings shall clearly indicate location (terminal block or wire number), voltage and function for all field terminations, and other information necessary to demonstrate compliance with all requirements of Contract Documents.
- 5. Provide Shop Drawings showing details of piping connections to all equipment. If connection details are not submitted and connections are found to be installed incorrectly, this Contractor shall reinstall them within the original contract price.

6. Provide complete data for all auxiliary services and utilities required by submitted equipment. This shall include fuel, cooling and exhaust requirements and points of connections.
7. Provide a complete description of all controls and instrumentation required including electrical power connection drawing for all components and interconnection wiring to starters, detailed information on starters, control diagrams, termination diagrams, and all control interfaces with a central control system.
8. Provide installation and erection information including; lifting requirements, and any special rigging or installation requirements for all equipment.
9. The Owner's Representative shall approve all materials before commitment for materials is made.

D. Specifications and Schedule Compliance Statement

1. The manufacturer shall submit a point by point statement of compliance with each specification criteria listed in each paragraph for those submittals listed in Paragraph E: Product Data that are noted with an asterisk (*).
2. The statement of compliance shall consist of a list of all paragraphs (line by line) identified in Part 2 and applicable Part 3 of the specification for which the submitted product in the opinion of the manufacturer complies, deviates, or does not meet.
3. Where the proposed submittal complies fully, the word "comply" shall be placed opposite the paragraph number.
4. Where the proposed submittal does not comply, or accomplishes the stated function in a manner different from that described, a full description of the deviation shall be provided.
5. Verify each field of the associated schedule where associated technical data is presented on the drawings. Where the submitted material does not "comply" provide the value the submitted equipment will achieve based upon the specified conditions.
6. Where a full description of a deviation is not provided, it shall be assumed that the proposed system does not comply with the paragraph in question and the product will be rejected.
7. Submissions which do not include a point by point statement of compliance as specified shall be disapproved.

E. Product Data: Submit complete manufacturer's product description and technical information including:

1. Identification
2. Raceways and Conduit
3. Wire and Cable (600V)
4. Junction Boxes, Pull Boxes and Wireways
5. Safety Disconnect Switches
6. New Circuit Breakers In Existing Panelboard/Load Center
7. Fire Seal and Fireproof Sealant
8. Identification, labels and tags.

- F. Submit shop drawings and product data grouped to include complete submittals of related systems, products and accessories in a single submittal.
1. Access panel shop drawings shall be submitted to the Construction Supervisor for approval.
 2. Do not submit multiple product information in a single bound manual.
 3. Three-ring binders shall not be accepted.
- G. Deviations:
1. Concerning deviations other than substitutions, proposed deviations from Contract Documents shall be requested individually in writing whether deviations result from field conditions, standard shop practice, or other cause. Submit letter with transmittal of Shop Drawings which flags the deviation to the attention of the Owner's Representative.
 2. Without letters flagging the deviation to the Owner's Representative, it is possible that the Engineer may not notice such deviation or may not realize its ramifications. Therefore, if such letters are not submitted to the Owner's Representative, the Seller shall hold the Engineers, his consultants and the Owner harmless for any and all adverse consequences resulting from the deviations being implemented. This shall apply regardless of whether the Engineer has reviewed or approved shop drawings containing the deviation, and will be strictly enforced.
 3. Approval of proposed deviations, if any, will be made at discretion of Engineer.
- H. Schedule: Incorporate shop drawing review period into construction schedule so that Work is not delayed. This Contractor shall assume full responsibility for delays caused by not incorporating the following shop drawing review time requirements into his project schedule. Allow at least 10 working days, exclusive of transmittal time, for review each time shop drawing is submitted or resubmitted with the exception that 20 working days, exclusive of transmittal time are required for the following:
1. If more than five shop drawings of a single trade are received in one calendar week.
- I. Responsibility
1. Intent of Submittal review is to check for capacity, rating, and certain construction features. The Contractor shall ensure that work meets requirements of Contract Documents regarding information that pertains to fabrication processes or means, methods, techniques, sequences and procedures of construction; and for coordination of work of this and other Sections. Work shall comply with approved submittals to extent that they agree with Contract Documents. Submittal review shall not diminish responsibility under this Contract for dimensional coordination, quantities, installation, wiring, supports and access for service, nor the shop drawing errors or deviations from requirements of Contract Documents. The Engineer's noting of some errors while overlooking others will not excuse the Contractor from proceeding in error. Contract Documents requirements are not limited, waived nor superseded in any way by review.
 2. Inform Contractor, manufacturers, suppliers, etc. of scope and limited nature of review process and enforce compliance with contract documents.
- J. In the event that the Contractor fails to provide Shop Drawings for any of the products specified herein:

1. The Contractor shall furnish and install all materials and equipment herein specified in complete accordance with these Specifications.
 2. If the Contractor furnishes and installs material and/or equipment that is not in complete accordance with these Specifications, he shall be responsible for the removal of this material and/or equipment. He shall also be responsible for the replacement of this material and/or equipment with material and/or equipment that is in complete accordance with these Specifications, at the direction of the Owner's Representative.
 3. Removal and replacement of materials and/or equipment that is not in complete compliance with these Specifications shall be done at no extra cost to the Owner.
 4. Removal and replacement of materials and/or equipment that is not in complete compliance with these Specifications shall not be allowed as a basis for a claim of delay of completion of the Work.
- K. Mark dimensions and values in units to match those specified.
- L. Submit Material Safety Data Sheets (MSD) on each applicable product with submittal.

1.9 RECORD DRAWINGS

- A. Refer to DIVISION 01, General Conditions, for record drawings and procedures to be provided under this section, unless specifically noted otherwise in this section.
- B. Record Drawings (red-line drawings) will be updated by this Contractor daily for review with the monthly requisition. The record drawing shall be an accurate depiction of the systems as completed, including dimensions (vertical/horizontal) of concealed components off fixed building elements.
- C. The Electrical Foreman shall maintain complete and separate set of prints of Contract Drawings at job site at all times and shall record work completed and all changes from original Contract Drawings clearly and accurately including work installed as a modification or addition to the original design.
- D. At completion of work the Electrical Contractor shall prepare a complete set of record drawings on AutoCAD showing all systems as actually installed. The Architectural background AutoCAD files will be made available for the Contractor's copying, at his expense, to serve as backgrounds for the drawings. The Electrical Contractor shall transfer changes from field drawings onto AutoCAD drawings and submit copy of files and three sets of prints to Owner's Representative for comments as to compliance with this section. CADD layering as established by the A&E design team shall be maintained with any and all changes done by the Contractor.
- E. The Engineer is not granting to the Contractor any ownership or property interest in the CADD Drawings by the delivery of the CADD Disks to the Contractor. The Contractor's rights to use the CADD disks and the CADD Drawings are limited to use for the sole purpose of assisting in the Contractor's performance of its contractual obligations under its contract with respect to the Project. The Engineer is granting no further rights. Any reuse or other use by the Contractor will be at the Contractor's sole risk and without liability to the Engineer. The Contractor hereby waives and releases any losses, claims, damages, liabilities of any nature whatsoever, and costs (including attorney fees) arising out of, resulting from, or otherwise related to the use of the CADD Disks and CADD Drawings by the Contractor. The Contractor, to the maximum extent permitted by law, hereby agrees to indemnify, defend and hold the Engineer harmless from all losses,

claims, damages, liabilities, and costs (including attorney fees) arising out of, resulting from, or otherwise related to the use of the CADD Disks and CADD Drawings by the Contractor.

- F. Record Drawings, shall show "as-built" condition of details, sections, riser diagrams, control changes and corrections to schedules. Schedules shall show actual manufacturer and model numbers of final equipment installation.
- G. The Electrical Contractor shall submit the record set for approval by the engineer a minimum of four weeks prior to seeking the permanent certificate of occupancy.

1.10 WARRANTIES

- A. Submit manufacturer's standard replacement warranties for material and equipment furnished under this Section. Such warranties shall be in addition to and not in lieu of all liabilities which the manufacturer and the Electrical Contractor may have by law or by provisions of the Contract Documents.
- B. All materials, equipment and work furnished under this Section shall be guaranteed against all defects in materials and workmanship for a minimum period of one-year (1) commencing with the Date of Substantial Completion. Where individual equipment sections specify longer warranties, provide the longer warranty. Any failure due to defective material, equipment or workmanship which may develop, shall be corrected at no expense to the Owner including all damage to areas, materials and other systems resulting from such failures.
- C. Guarantee that all elements of each system meet the specified performance requirements as set forth herein or as indicated on the Drawings.
- D. Upon receipt of notice from the Owner of the failure of any part of the systems during the warranty period, the affected parts shall be replaced. Any equipment requiring excessive service shall be considered defective and shall be replaced.

1.11 COORDINATION

- A. Refer to Division 01, General Conditions, for coordination requirements applicable to this section, unless specifically noted otherwise in this section.
- B. Materials and apparatus shall be installed as fast as conditions of the building will permit and must be installed promptly when and as required.
- C. Confer with all other trades relative to location of all apparatus and equipment to be installed and select locations so as not to conflict with work of other Sections. Any conflicts shall be referred immediately to the Owner's Representative for decision to prevent delay in installation of work. All work and materials placed in violation of this clause shall be readjusted to the Owner's Representative's satisfaction at no expense to the Owner.
- D. Where work of this section will be installed in close proximity to work of other sections or where there is evidence that the work of this section may interfere with work of other sections, assist in working out space conditions to make satisfactory adjustment. Prepare and submit for approval 3/8" scale or larger working drawings and sections, clearly showing how the work is to be installed in relation to the work of other sections. If

the work of this section is installed before coordinating with other trades or so as to cause interference with work of other trades, make changes necessary to protect conditions without extra charge.

- E. Keep fully informed as to the shape, size and position of all openings required for all apparatus, conduit, cable, sleeves, etc., and give information in advance to allow construction of required openings. Furnish all sleeves, pockets, supports and incidentals, and coordinate with the General Contractor for the proper setting of same.
- F. All distribution systems which require pitch or slope such as condensate drains and water piping shall have the right of way over those which do not. Confer with other trades as to the location of pipes, ducts, lights and apparatus and install work to avoid interferences.
- G. Make reasonable modifications in the work as required by structural interferences, or by interference with work of other trades, or for proper execution of the work without extra charge.

1.12 INTERPRETATION OF DRAWINGS AND SPECIFICATIONS

- A. It is the intention of the Specifications and Drawings to call for complete, finished work, tested and ready for continuous operation. Any apparatus, appliance, material or work not shown on the Drawings, but mentioned in the Specifications or vice-versa, or any incidental accessories necessary to make the work complete in all respects and ready for operation, even if not particularly specified, shall be provided by this Contractor without additional expense to the Owner.
- B. The Drawings are generally diagrammatic. The locations of all items that are not definitely fixed by dimensions are approximate only. The exact locations must be determined at the project and shall have the approval of the Owner's Representative before being installed. This Contractor shall follow Drawings, including his shop drawings, in laying out work and shall check the Drawings of other trades to verify spaces in which work will be installed. Maintain maximum headroom and space conditions. Where space conditions appear inadequate, notify the Owner's Representative before proceeding with the installation. This Contractor shall, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades or for proper execution of the work.
- C. Any requests for information (RFI) for resolving an apparent conflict or unclarity, or a request for additional detail, shall include a sketch or equivalent description of Contractor's proposed solution.
- D. Size of conduits, cable trays, raceways and methods of running them are shown, but it is not intended to show every offset and fitting, nor every structural difficulty that may be encountered. To carry out the true intent and purpose of the Drawings, all necessary parts to make complete approved working systems ready for use, shall be furnished without extra charge. All work shall be installed in an approved workmanlike manner.

1.13 INSPECTION OF SITE CONDITIONS

- A. Prior to submission of bid, visit the site and review the related construction documents to determine the conditions under which the Work has to be performed and send a report, in writing, to the Owner's Representative, noting any conditions which might adversely affect the Work of this Section of the Specifications.

1.14 SURVEY AND MEASUREMENTS

- A. Base all required measurements, horizontal and vertical, from referenced points established WITH the Owner's Representative. The Electrical Contractor shall be responsible for correctly laying out the Work required under this Section of the Specifications.
- B. In the event of discrepancy between actual measurements and those indicated, notify the Owner's Representative in writing and do not proceed with the related work until instructions have been issued.

1.15 DELIVERY, STORAGE AND HANDLING

- A. No materials shall be delivered or stored on site until corresponding Shop Drawings have been approved.
- B. All manufactured materials shall be delivered to the site in original packages or containers bearing the manufacturer's labels and product identification.
- C. Protect materials against dampness. Store off floors, under cover and adequately protected from damage.
- D. Inspect all equipment and materials, upon receipt at the job site, for damage and conformance to approved shop drawings.

1.16 PROTECTION OF WORK AND PROPERTY

- A. This Contractor shall be responsible for the care and protection of all work included under this Section until the completion and final acceptance of this Contract.
- B. Protect all equipment and materials from damage from all causes including, but not limited to, fire, vandalism and theft. All materials and equipment damaged or stolen shall be repaired or replaced with equal material or equipment at no additional cost to the Owner.
- C. Protect all equipment, outlets and openings with temporary plugs, caps and covers. Protect work and materials of other trades from damage that might be caused by work or workmen under this Section and make good damage thus caused.
- D. Damaged materials are to be removed from the site; no site storage of damaged materials will be allowed.

1.17 SUPERVISION

- A. Supply the service of a competent Supervisor with a minimum of 5 years experience in Electrical construction supervision who shall be in charge of the Electrical work at the site.

1.18 SAFETY PRECAUTIONS

- A. Life safety and accident prevention shall be a primary consideration. Comply with all of the safety requirements of the Owner and OSHA throughout the entire construction period of the project.
- B. Furnish, place and maintain proper guards and any other necessary construction required to secure safety of life and/or property.

1.19 SCHEDULE

- A. Construct work in sequence under provisions of Division 01 and as coordinated with the Owner's Representative.

1.20 CUTTING AND PATCHING

- A. Include all coring, cutting, patching, and fireproofing necessary for the execution of the work of this Section. Structural elements shall not be cut without written approval of the Engineer. This Contractor shall be responsible for taking all precautions required to identify hidden piping, conduits, etc. before any core drilling and/or cutting of slabs commences, including X-raying the affected slabs. Provide fire stopping to maintain the fire rating of the fire resistance-rated assembly. All penetrations and associated fire stopping shall be installed in accordance with the fire stopping manufacturer's listed installation details and be listed by UL or FM.
- B. All work shall be fully coordinated with all phases of construction, in order to minimize the requirements for cutting and patching.
- C. Form all chases or openings for the installation of the work of this Section of the specifications, or cut the same in existing work and see that all sleeves or forms are in the work and properly set in ample time to prevent delays. Be responsible that all such chases, openings, and sleeves are located accurately and are of the proper size and shape and consult with the Owner's Representative and all other trades concerned in reference to this work. Confine the cutting to the smallest extent possible consistent with the work to be done. In no case shall piers or structural members be cut without the approval of the Owner's Representative.
- D. Fit around, close up, repair, patch, and point around the work specified herein to match the existing adjacent surfaces and to the satisfaction of the Owner's Representative.
- E. Fill and patch all openings or holes left in the existing structures by the removal of existing equipment which is part of this Section of the Specifications.
- F. All of this work shall be carefully done by workmen qualified to do such work and with the proper and smallest tools applicable.
- G. Any cost caused by defective or ill-timed work required by this Section of the specifications shall be borne by this Contractor.
- H. When, in order to accommodate the work required under this Section of the specifications, finished materials of other trades must be cut or fitted, furnish the necessary drawings and information to the trades whose materials must be cut or fitted.

1.21 SUPPLEMENTARY STEEL, CHANNELS AND SUPPORTS

- A. Provide all supplementary steel, factory fabricated channels and supports required for the proper installation, mounting and support of all Electrical equipment, piping, etc., required by the Specifications.
- B. Supplementary steel and factory fabricated channels shall be firmly connected to building construction in a manner approved by the Owner's Representative as shown on the drawings or herein specified.
- C. The type and size of the supporting channels and supplementary steel shall be determined by the Contractor and shall be of sufficient strength and size to allow only a minimum deflection in conformance with the manufacturer's requirements for loading.
- D. All supplementary steel and factory fabricated channels shall be installed in a neat and workmanlike manner parallel to the walls, floors and ceiling construction. All turns shall be made with 90 degree and 45 degree fittings, as required to suit the construction and installation conditions.
- E. All supplementary steel including factory fabricated channels, supports and fittings shall be galvanized steel, aluminum or stainless steel where exposed or subject to rust producing atmosphere. Factory fabricated channels shall be manufactured by Unistrut, H-strut, Powerstrut or approved equal.

1.22 ACCESSIBILITY

- A. All work provided under this Section of the Specification shall be installed so that parts requiring periodic inspection, maintenance and repair are accessible. Work of this trade shall not infringe upon clearances required by equipment of other trades, especially code required clearances to electrical gear. Minor deviations from the drawings may be made to accomplish this, but changes of substantial magnitude shall not be made prior to written approval from the Owner's Representative.

1.23 PROJECT CLOSEOUT

- A. Construction Observations By The Engineer
 - 1. The engineer shall make one progress site visit during construction and one substantial completion (punch list) site visit for determining substantial completion.
 - 2. The Trade Contractors and the General Contractor are required to inspect their own work and make any corrections to the work to comply with the specifications and the contract documents. It is not the responsibility of the engineer to develop lists of incomplete work items.
 - 3. Progress Site Visits
 - a. The purpose of the progress site visit by the engineer is to observe if the work is proceeding in accordance with the contract documents.
 - b. The engineer will prepare a field report which will note in general the work completed since the last observation visit, work found not to be in accordance with the contract documents and work not corrected since the previous observation visit.
- B. Substantial Completion

1. When the Contractor considers the Work under this Section is substantially complete, the Contractor shall submit written notice, through the General Contractor, with a detailed list of items remaining to be completed or corrected and a schedule of when each remaining work item will be completed. Should the engineer determine the list of remaining work does not constitute substantial completion the engineer will notify the Owner and he will not make a substantial completion site visit.
 2. The following items shall be completed prior to the written request for substantial completion site visit:
 - a. Certification of successful operation of all systems.
 - b. Training of the Owner's personnel in the operation of the systems.
 - c. Record Drawings in accordance with the contract specifications.
 - d. Testing reports.
 - e. Manufacturer's certificates of approvals.
 - f. Emergency contact list for reporting of malfunctioning equipment during the warranty period.
 - g. Contractors Project Completion certificate.
 3. Should the Engineer, during the substantial completion visit, observe that the Work is substantially complete, s/he will provide a written listing of the observed deficiencies referred herein as the Punch List. The Punch List will provide for a place for the Contractor and general Contractor to sign off and date each item individually indicating that the observed deficiency item has been corrected.
 4. Should the Engineer, during the substantial completion site visit, observe that the Work is not substantially complete, s/he will provide, a written list of the major deficiencies and a reason for the work not being considered substantially complete.
 5. If the work is found not to be substantially complete then the engineer shall be reimbursed for his time to reobserve the work. A reobservation fee shall be charged to the Contractor through the contractual agreement for any further observations by the engineer.
 6. The Contractor shall remedy all deficiencies listed in the punch list within the time frame required by the contract.
- C. Engineers Construction Completion Certification
1. Where required by the applicable code, the Engineers Construction Completion Certification will be issued by RDK Engineers when all life safety and health related issues are complete, all required functional tests are complete and all reports are complete.
- D. Final Completion
1. The following items shall be submitted prior to the written request for Final completion:
 - a. Revised Substantial Completion items to be resubmitted in accordance with the review process comments.
 - b. Warranties commencing the date of Substantial completion
 - c. Individual Signed and dated Punch List acknowledging completion of all punch list items

2. When the Contractor considers all of the punch list work items complete, the Contractor shall submit written notice through the General Contractor that all Punch List items are complete and resolved and the work is ready for final observation site visit. The signature lines for completion of each punch list item shall be signed by the Contractor indicating the work is complete and signed by the General Contractor indicating s/he has inspected the work and found it to be complete. Should the Engineer find the work to be finally complete and all Punch List items are complete the Engineer will make a recommendation to the Owner. If the Engineer has found the punch list work to be incomplete during final inspection a written listing of the observed deficiencies will be prepared by the Engineer.
3. If the work is not fully complete then the engineer shall be reimbursed for his time to reobserve the work. A reobservation fee shall be charged to the Contractor through the contractual agreement for any reobservations by the engineer.

E. Re-observation Fees

1. The re-observation fee shall be \$1200.00 per visit.

F. Contractor's Project Completion Certificate

1. Upon completion of work and prior to request for Certificate of Occupancy, each Trade Contractor and the General Contractor shall issue a certificate stating that work has been installed generally consistent with construction documents and all applicable codes. RDK Engineers can furnish a blank Contractor's certificate form upon request. The certificate shall certify:
 - a. Execution of all work has been in accordance with the approved construction documents.
 - b. Execution and control of all methods of construction was in a safe and satisfactory manner in accordance with all applicable local, state and federal statutes and regulations.
2. The certificate shall include the following information:
 - a. Project.
 - b. Permit Number.
 - c. Location.
 - d. Construction Documents.
 - e. Date on Plans and Specifications submitted for approval and issuance of the Building Permit.
 - f. Addendum(a) and Revision Dates.
3. The certificate shall be signed by the Contractor and include the following:
 - a. Signature.
 - b. Date.
 - c. Company.
 - d. License Number.
 - e. License Expiration Date.

PART 2 - PRODUCTS

2.0 IDENTIFICATION

A. Nameplates

1. Nameplates shall be laminated black Bakelite with minimum 1/4" high white recessed letters.
2. Nameplates shall be securely attached to the equipment. Utilize mechanical fasteners such as galvanized steel or brass screws for exterior applications. High strength adhesives or cements may be used for interior applications.

2.1 RACEWAYS AND CONDUIT

A. Rigid Galvanized Steel (RGS) Conduit

1. RGS shall be zinc-coated steel that conforms to ANSI C80.1, UL Specification No. 6 and Federal Specification WW-C-581e by Allied Tube and Conduit, Republic Steel, Wheatland Tube or approved equal.
2. RGS fittings shall be threaded. Split couplings or non-threaded fittings shall not be used.
3. Nipples and Close Nipples shall be RGS, length as noted or as required to conform to field conditions.

B. Electrical Metallic Tubing (EMT)

1. EMT shall be zinc-coated steel that conforms to ANSI C80.3, UL Standard No. 797 and Federal Specification WW-C-563 a by Republic Steel, Allied Tube and Conduit or approved equal.
2. EMT fittings shall be
 - a. zinc plated pressed steel set screw type that shall form a positive ground path.

C. Miscellaneous Conduit Fittings

1. Elbows shall be standard radius unless noted otherwise. Where Large Radius elbows are specified, provide 48" radius unless noted otherwise.
2. Bushings shall be threaded pressed steel hot dipped galvanized with conduit end stop and integrally molded noncombustible phenolic insulated surface rated for 150°C.
3. Bonding bushings shall be threaded pressed steel hot dipped galvanized with conduit end stop and integrally molded noncombustible phenolic insulated surface rated for 150°C with a lay-in tin plated copper grounding lug.
4. Exposed conduit expansion fittings shall be hot-dipped galvanized malleable iron with external bonding jumper equal to O.Z./Gedney Type EX for RGS or Type TX for EMT (4" maximum expansion).
5. Provide water-tight gland sealing assemblies with pressure bushings equal to OZ/Gedney Type WSK for new cast-in-place installations or Type CSCM for retrofit (core drilling of existing walls) as required for below grade wall and floor penetrations.

- D. Flexible Metallic Conduit
1. Liquidtight Metal Conduit shall be UL Listed fabricated from a spiral wound strip of heavy gauge, corrosion resistant, hot dipped galvanized steel equal to Electri-flex Company Type LA. The jacket shall be flame retardant, sunlight resistant PVC extruded over the spiral wrap. Sizes through 1 ¼" shall have an integral copper bonding strip.
 2. Liquidtight fittings shall be UL listed zinc plated insulated throat.
 3. Flexible metal conduit shall be UL Listed non-jacketed steel fabricated from a spiral wound strip of heavy gauge, corrosion resistant, hot dipped galvanized steel equal to Electri-flex Company Type BR.
- E. Wireways shall be minimum 16-gauge steel with all straight runs having hinged spring-latched covers. Finish shall be painted over a corrosion resistant phosphate pretreatment to protect against corrosion. Interior parts shall be smooth and free of sharp edges and burrs. Provide wireway as identified on the drawings for NEMA 1, 3R or 12 service. Wireways shall be equal to Square D and UL Listed.

2.2 WIRE AND CABLE (600V)

- A. Provide single-conductor, annealed copper wire and cable with insulation rated for 600 V, of sizes specified and scheduled on Drawings, by General Electric, Southwire, Okonite or approved equal, for secondary service, feeders, branch and system wiring. Wire sizes shown and specified are American Wire Gauge for copper conductors.
- B. The use of aluminum conductors is not allowed.
- C. Wire #10 and larger shall be stranded; #12 and smaller shall be solid. Wire and cable shall have THWN-THHN or XHHW insulation for branch circuit and feeder conductors. Type RHWUSE shall be used for all conductors installed in below grade raceways for generator applications only.
- D. Conductor Color-coding
1. Service entrance, branch circuit and feeder conductors shall be color-coded. Conductors #12 and #10 shall be colored with a factory applied solid or striped compound coating (black, red, blue, brown, orange or yellow). Neutrals and equipment grounds shall have solid compound or solid color coating (white, gray and green), except that neutrals with colored stripe shall be used where required by code. Phase conductors #8 and larger with stripes, bands or hash marks shall have background color other than white, green and gray.
 2. Alternative field-applied color coding methods may be used for wire #8 or larger, with color code as specified in other sections of this specification. Coloring shall be applied by the use of flame-retardant vinyl tape, equal to 3M Scotch 35.
- E. Splices and Terminations
1. Ampacity and temperature rating of splices and connectors shall be equal to or greater than those of associated wires and cables.
 2. Make splices in branch circuit or feeder wiring from #12 to #10 with UL-listed, solderless screw on connectors rated 600 V.
 3. Make splices in branch circuit or feeder wiring above #10 with UL-listed 90°C, 600V, compression butt splice barrel equal to Burndy YS-L HYLINK.

4. Conductor terminations shall be standard bolt-on lugs with hex screws listed for attachment of copper wire and cable to panelboards, switchboards, disconnect switches and other electrical equipment.
 5. Make terminations for stranded conductors on screw terminals with UL Listed 105°C, 600V PVC insulated barrel compression locking fork tongue terminal equal to Burndy TP-LF VINYLUG.
 6. Make bus terminations for conductors #6 and larger with UL-listed 90°C, 600V, compression standard barrel length lugs equal to Burndy YA-L for conductor sizes to #4/0. Connectors for cable 250 KCMil and larger shall be with UL-listed 90°C, 600V, compression long barrel length two hole lugs equal to Burndy YA-2N. Lugs shall be high conductivity seamless copper electro-tin plated for corrosion protection.
- F. Wire management shall be provided by self-extinguishing self-locking nylon ties with -65 to 350°F. range for bundling conductors.
- G. Cable pulling compounds shall be UL Listed and be suitable for use with the specified cable insulation system. The compound shall reduce the coefficient of friction, while not adding any long term issues to the installation such as premature aging of the insulation system, added flammability or drying in such a manner as to stick the cable in place in the raceway.

2.3 JUNCTION AND PULL BOXES

- A. Provide galvanized steel junction and pull boxes where indicated and as necessary to facilitate installation. Steel shall be minimum 16 gauge. Junction and pull boxes shall be of code required dimensions. Cover shall be of the same type and thickness material as the box construction.
- B. Junction and pull boxes intended for dry interior locations shall be NEMA 1 enclosures with accessible, removable screw-on covers. Covers shall be secured with corrosion-resistant screws with keyhole slots to accommodate easy removal.
- C. Junction and pull boxes intended for wet or exterior locations shall be NEMA 3R enclosures with hinged gasketed covers. Interior and exterior shall be finished with a gray enamel powder coat over the galvanized metal. Hinge shall be galvanized steel with stainless steel pin. Covers shall be secured with corrosion-resistant zinc plated lockable pull catches.
- D. Custom fabricated medium to large junction and pull boxes shall have internal structural steel bracing welded to form a rigid assembly adequate to maintain alignment and shape in shipment and installation.

2.4 SAFETY DISCONNECT SWITCHES

- A. Switches shall be three-pole heavy-duty type rated for 600V in NEMA 1 (interior dry applications) and NEMA 3R (exterior applications) enclosures unless noted otherwise on the drawings. All switches shall be horsepower rated and suitable for service entrance use. Provide with solid neutral where four wire circuits are indicated and with 200% solid neutral where neutrals are sized for 200% full load ampacity.
1. Operating mechanisms shall be quick-make/quick-break. Current-carrying parts shall be high-conductivity copper. Contacts shall be silver-tungsten or plated.

Provide positive pressure fuse clips and switch operating mechanism suitable for continuous use at rated capacity without auxiliary springs in current path. Switches shall withstand available fault current or let-through current before operating, without damage or rating change.

2. Terminations shall be suitable for copper or aluminum conductors 60°/75° C rated. Clear shielding shall prevent accidental contact with energized line terminals.
 3. The cover shall be mechanically interlocked to prevent access unless the disconnect is in the OFF position. A defeater shall be provided to bypass this interlock. With the door open, an interlock shall be provided to prevent inadvertent closing of the disconnect. Padlocking facilities shall be provided to positively lock the disconnect in the OFF position with from one to three padlocks with the door open or closed.
 4. The enclosure shall be given a phosphatizing pretreatment. The paint finish shall be manufacturer's standard color and shall pass 600 hours of corrosion resistance testing per ASTM B 117.
- B. Fused switches shall have short circuit ratings no less than 100,000 amperes RMS, with capabilities to 200,000 amperes when used with Class J, L or R fuses at 480V from 400A to 1200A.

2.5 MODIFICATIONS TO EXISTING PANELBOARD AND LOAD CENTER

- A. New Overcurrent Devices In Existing Panelboard/Load Center
1. New circuit breakers shall be added to existing panelboard/load center. New circuit breakers shall be molded case bolt-on devices. Multi-pole breakers shall have internal common trip crossbars for simultaneous tripping of each pole.
 2. All breakers shall have handle trip indication and a trip indicator in the window of the circuit breaker housing.
 3. Internal accessories shall be UL Listed for field installation without removing the circuit breaker cover. Internal accessories shall be common to all frame sizes. Shunt trips, auxiliary contacts, and other accessories shall be factory installed.
 4. New circuit breakers shall match existing manufacturer, frame size, type, and AIC rating. Existing load center is manufactured by GE and existing panelboard is manufactured by Siemens.
- B. Submittals
1. The manufacturer shall provide copies of the following documents for review and evaluation in accordance with general requirements of Division 01 and Division 26:
 - a. Product Data on specified product
 - b. Shop Drawings on specified product
 - c. Certified trip curves for each specified product
 - d. Nameplate list

PART 3 - EXECUTION

3.0 DEMOLITION

A. General

1. The Electrical Contractor shall visit the site before submitting his bid to familiarize himself with the existing conditions and the extent of the work. No extra compensation will be allowed for work required to be performed or to overcome existing conditions, by failure to visit the site.
2. The Electrical demolition work shall be performed by the Electrical Contractor in cooperation with the other trades and as scheduled and approved by the Owner's Representative.
3. The locations of existing equipment to remain including piping, ductwork, conduits, etc., are shown in an approximate way only. The Contractor shall determine the exact location of all existing equipment before commencing work.
4. Power outages caused by demolition that affect other areas shall be held to a minimum. Shutdowns shall be coordinated with the users and the Owner. Night, weekend and/or Holiday time required to perform electrical demolition work or new electrical work shall be carried as part of the Contract Cost.

B. Scope

1. Disconnect and make safe all electrical equipment identified for removal on the Electrical and HVAC plans.
2. The electrical demolition notes and power plans indicate the general scope and are not intended to show all items to be removed or retained. Devices and equipment located on walls and/or ceilings to be removed shall be disconnected and made safe. The Electrical Contractor shall notify the Owner's Representative of any unanticipated hidden conditions encountered during demolition.
3. The Electrical Contractor shall circuit trace and label all existing branch circuits and feeders within the area of demolition scope prior to de-energizing and disconnection. All circuits within panelboards identified for removal shall be traced and labeled to ensure that no area outside the demolition scope limit is affected.
4. The Electrical Contractor shall identify all branch circuits, feeders and system components, which are to remain within the area of demolition scope. There shall be no interruption of service to any area outside the scope limits without approval from the Owner's Representative. Existing equipment to remain shall be left in a code compliant manner.
5. The Electrical Contractor shall de-energize and remove all conductors and raceways to their points of origin within the area of demolition scope. Items identified for demolition shall not be abandoned in place. Raceways that enter masonry walls and floors shall be cut flush at the surface for patching by others. All circuit breakers associated with the demolition scope shall be de-energized and labeled spare.
6. The Electrical Contractor shall be responsible for the repair of all systems or building components damaged during the execution of the work. Damage shall include but not be limited to destruction or disposal of items intended to remain or to be salvaged.

7. The Electrical Contractor shall temporarily support all items to remain that are affected by the demolition of building structural components (walls, ceilings, etc.). Temporarily supported items shall be permanently supported and installed when finalized structures are in place.
8. The existing fire alarm system shall remain fully functional during the entire demolition and construction period.

C. Disposal

1. The Owner's Representative shall inspect all retained items prior to placement in the identified storage location by the Electrical Contractor . Selected items will be disposed at no additional cost to the project.

3.1 IDENTIFICATION

A. Nameplates

1. Provide nameplates on all equipment listed in other sections of this specification including but not limited to panelboards, load centers, junction and pull boxes, and disconnect switches.
2. Nameplates shall designate equipment tag number as defined on the drawings, system voltage where applicable, circuit number, device controlled and system function. Refer to typical nameplate detail on the drawings for additional requirements.
3. Submit a complete list of proposed nameplates prior to order to ensure conformance to design criteria. Submittal shall include nomenclature, size and layout of each tag.
4. Samples of stickers together with color schedules shall be submitted during the submittal phase of this project.

B. Equipment Identification

1. Equipment identification designations shall be taken from equipment schedules and coordinated with the Owner's facility group to assure designations match up with Owner's maintenance management system identification database.

3.2 RACEWAYS AND CONDUIT

A. General

1. Unless specified or shown on Drawings otherwise, install raceways and conduits concealed. Raceways and conduits may be run exposed on unfinished walls and basement ceilings with exposed structure, in mechanical rooms, electric rooms, attics and roof spaces.
2. Run concealed raceways and conduits in as direct lines as possible with minimum number of bends of longest possible radius. Install exposed raceways and conduits parallel to or at right angles to building lines.
3. Raceway and conduit runs shall be mechanically and electrically continuous from supply to outlet. Conduit shall enter and be secured to metallic enclosures with lock nut and bushing inside. Provide additional exterior lock nut for RGS connections. Bushings shall be the bonding type for conduit connections to

metallic enclosures with concentric or eccentric knockouts. Lock nuts and bushings will not be required where conduits are screwed into threaded hubs.

4. Size raceways and conduits as required by NEC unless oversized raceways and conduits are shown on the Drawings. Raceways and conduits shall be $\frac{3}{4}$ " minimum.
5. Install conduit systems complete before installation of conductors. Blow through and swab after plaster is finished and dry, and before conductors are installed.
6. Raceways and conduits supports shall be rigidly attached to the building structure utilizing corrosion resistant components suitable for use with the selected raceway or conduit. Refer to the seismic restraint sections of this specification for any additional requirements.
7. Field bending, cutting and threading shall be executed with the proper tools, resulting in bends and shortened conduits and raceways that are equivalent to factory fabricated and purchased components.
8. Provide standoff clips for conduits on exterior and wet location walls.
9. Protect all vertical conduit runs from the entrance of foreign material before installation of conductors and the final closure of the raceway system. All spare conduits (vertical and horizontal runs) shall be sealed with a bushing and appropriate insert to prohibit entrance of debris or vermin. Affix a label that indicates "Spare Conduit to _____" at each seal. Label shall be in accordance with the labeling section of this specification.

B. Rigid Galvanized Steel (RGS) Conduit

1. RGS may be used for all raceway applications outlined for EMT and PVC. RGS shall be used in locations where subject to accidental damage or abuse and for all above grade exterior applications unless other wiring methods are specified on the drawings. All circuit conductors in excess of 600 V shall be installed in RGS.
2. RGS shall not be used in corrosive environments.
3. All RGS fittings shall be threaded. Utilize Erickson couplings where joining two threaded conduits that cannot be rotated.

C. Electrical Metallic Tubing (EMT)

1. EMT may be used for mechanical equipment branch circuits and for control circuits. EMT may be used in masonry walls, above hung ceilings, in equipment rooms, in mechanical and electrical chases and closets, in exposed locations along ceilings or walls above normal traffic level and where not subject to accidental damage or abuse.
2. EMT shall not be used in exposed applications below 8 feet above finished floor or in exterior or damp/wet/corrosive locations. Electrical, telephone and communications closets are considered exempt from this restriction and EMT may be installed below 8' AFF in this application only. EMT shall not be installed underground, in slabs on grade, in exterior locations, in hazardous areas, or for circuits operating at more than 600 V.

D. Miscellaneous Conduit Fittings

1. Expansion/Deflection Fittings: Raceways and conduit buried or secured rigidly on opposite sides of building expansion joints and long runs of exposed conduit subject to expansion and contraction due to variations in temperature shall have

expansion fittings. Raceways and conduit shall cross building expansion joints at right angles. Provide separate external copper bonding jumper secured with grounding straps on each end of fitting. Fittings shall safely deflect and/or expand/contract to twice the distance of potential movement.

2. Sealing Fittings shall be installed wherever conduits pass from warm to cold locations to minimize condensation within the conduit. Sealing fittings shall be installed with RGS penetration of the wall and terminate in a suitably sized junction box.
 3. Refer to other specification sections for requirements pertaining to sealing for hazardous atmospheres.
- E. Wireways shall be provided where specifically shown on the drawings or where the group mounting of controllers, disconnects, enclosures, etc warrant the use for elimination of multiple short conduit runs. Wireways shall be provided complete with all required appurtenances necessary to have a totally enclosed system rated for the environment. Wireways shall not be installed in any location where subject to accidental damage or abuse.

3.3 WIRE AND CABLE (600V)

- A. Homerun designations on the drawings are diagrammatic only. Install branch circuits and feeders from the power source to the attachment point as required for a complete system. Provide slack wire for connections to equipment installed by others. Refer to schedules and risers where specific conductor and associated raceway sizes are not indicated on the floor plans.
- B. Connect branch circuit homerun with two or three circuits and common neutral only where specifically shown on the drawings. Circuits with common neutrals shall not be connected to the same phase to ensure cancellation of the return current in the neutral conductor.
- C. Install wires and cable in raceways as specified. All conductor sizing is based upon no greater than three current carrying conductors in a conduit. Installation of up to six circuits (no greater than twelve current carrying conductors) in a single conduit will be allowed if the conductor sizing is increased to the required ampacity to accommodate de-rating factors required by the NEC and NFPA 70.
- D. The minimum wire size shall be #12 unless #14 specifically allowed on the drawings for wiring of controls. Branch circuits longer than 75' for 120 V from panel to last outlet shall be increased a minimum of one size above that shown on the drawings to minimize voltage drop to less than 3%.
- E. Conductors shall be identified at all accessible locations in the following manner:

1. Color code secondary service, feeders and branch circuit conductors as follows:

<u>208/120 Volts</u>	<u>Phase</u>
Black	A
Red	B
Blue	C
White	Neutral
Green	Ground

2. Provide nonferrous wire markers, embossed or printed to correspond with the Drawings. Labels shall be permanently marked so that the source of the branch

circuit or feeder may be readily identified. Hand written labels are not acceptable. Embossed tag equal to 3M Scotch Code STL-TAG or SCS-TM shall be applied with two miniature cable ties or slipped through both end holes. Heat bonded tag equal to 3M Scotch Code SCS-HB shall be permanently affixed with a heat gun.

F. Cable

1. Flexible Metal Clad (MC) cable shall not be used.

G. Splices and Terminations

1. No more than twelve splices of current carrying conductors or six circuits, whichever is greater, shall be allowed in a single enclosure or junction box.
2. Splices and terminations shall be sized to the specified conductor. The insulation shall be cut back with the appropriate tools such that the conductors are not nicked or damaged.
3. The compression tool shall be appropriate for the installation of the provided lug or butt splice to ensure pressure necessary for a proper connection is applied.
4. Terminations shall not be stacked or bent unless specifically listed for the application.

H. Cable Pulling

1. Pull cables that share conduit at same time into completely installed raceway. Conductors shall not be pulled in raceways with existing wiring.
2. Submit cable pulling calculations for engineers' approval prior to all mechanically assisted pulls. Attach pull ropes to conductors with basket-weave grips on pulling eyes. Provide means to measure tension during entire pull. Utilize pulling compounds to lessen friction in accordance with the manufacturer's recommendations.
3. Mechanically assisted pulls shall utilize equipment specifically designed for the purpose such as ropes, electric wench, pulleys, etc. The use of a motorized vehicle to assist in a cable pull is prohibited.

3.4 JUNCTION AND PULL BOXES

- A. Junction box covers shall be accessible. Do not install junction boxes above suspended ceilings except where ceiling is removable or where an access panel is provided.
- B. Pull boxes connected to concealed conduits shall be mounted with covers flush with finished wall or ceiling.
- C. Pull boxes exposed to rain or in damp/wet locations shall be weatherproof NEMA 3R unless noted otherwise on the drawings.
- D. No pull box shall be within 2 feet of another.
- E. Provide clamps, grids, cable ties and other non-conductive or combustible appurtenances to secure cables. No cable shall be unsupported for more than 30". Cables shall not touch or be unsupported within 1" of the box cover.

- F. Each junction and pull box shall have a suitable laminated plastic nameplate with white cut letters identifying power source, voltage and driven load of the associated branch circuits or feeders.
- G. Submit box sizing calculations to confirm all box dimensions are in accordance with code requirements with product data prior to installation.

3.5 SAFETY DISCONNECT SWITCHES

- A. Provide safety disconnects as required and indicated on the drawings. Each motor shall be provided with a local disconnecting means in accordance with code requirements.
- B. Disconnect switches for all applications with available fault current in excess of 10,000 amperes RMS symmetrical shall be fusible. Fuses shall be Class J, L or R and rejection clips shall be installed in the fuse holders to prohibit the installation of non-current limiting fuses.
- C. Each disconnect switch shall have a suitable laminated plastic nameplate with white cut letters identifying power source, voltage and driven load.

3.6 MODIFICATIONS TO EXISTING PANELBOARD AND LOAD CENTER

- A. Cleaning
 - 1. Clean the interior and exterior of all equipment at project completion of all construction debris and residue. Damaged surfaces shall be repaired and finishes touched up (paint to match the manufacturer's finish). Extensively damaged enclosures shall be replaced.
- B. Updated Circuit Directories
 - 1. Provide new typed circuit directories for all panels and load centers within the scope of work identifying new loads and existing spares.

3.7 BASIC ACCEPTANCE TESTS

- A. General Scope
 - 1. This section covers the required field tests and inspections to assess the suitability for initial energization of electrical power distribution equipment and systems. Failed components shall be replaced and retested for no additional cost to the project.
 - 2. The purpose of this specification is to assure that all tested electrical equipment and systems are operational and within applicable standards and manufacturer's tolerances and that the equipment and systems are installed in accordance with design specifications.
 - 3. All testing shall be performed by the Contractor responsible for the installation of the systems or by an independent testing organization under contract with the Contractor.
 - 4. All equipment utilized for testing shall have a valid calibration sticker. All test reports shall indicate the equipment utilized and its associated calibration due date.

5. Coordinate all required shutdowns with the Owner. Any and all testing required after the Owner has taken occupancy (temporary or permanent) shall be assumed to be conducted during premium time.
6. A written record of all tests and a final report summarizing the findings shall be submitted for approval prior to energizing any electrical power distribution equipment and systems. All equipment shall be left in clean operational condition.

B. Inspection and Test Procedures

The following tests shall be conducted using the noted section of the latest edition of NETA ATS Acceptance Testing Specifications for Electrical Power Distribution Equipment Systems as a reference:

1. Load Center and Panelboard Assemblies – Visually inspect the equipment inside and out, check attachment to wall or floor, verify bus joint tightness, exercise all active components and perform continuity testing and megger phase to phase, neutral and ground. Minimum resistance shall be 25 megohms when 208V equipment tested at 500VDC. Tabulate readings for each test. NETA ATS-7.1.

END OF SECTION