



City of Tacoma
Department of Public Works
Facilities Management Division

PROJECT MANUAL

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Division 01: General Requirements

Fire Station 11 & 13 HVAC Improvements (RE-BID)

**SPECIFICATION NO.:
PW23-0089F**

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**City of Tacoma
Facilities Management**

**REQUEST FOR BIDS PW23-0089F
Fire Station 11 & 13 HVAC Improvements (RE-BID)**

Submittal Deadline: 11:00 a.m., Pacific Time, Tuesday, May 30, 2023

Submittals must be received by the City's Procurement and Payables Division prior to 11:00 a.m. Pacific Time.

For electronic submittals, the City of Tacoma will designate the time of receipt recorded by our email, sendbid@cityoftacoma.org, as the official time of receipt. This clock will be used as the official time of receipt of all parts of electronic bid submittals. Late submittals will be returned unopened and rejected as non-responsive.

Submittal Delivery: Sealed submittals will be received as follows:

By Email:

sendbid@cityoftacoma.org

Maximum file size: 35 MB. Multiple emails may be sent for each submittal

Bid Opening: Sealed submittals in response to a RFB will be opened Tuesday's at 11:15 AM by a purchasing representative and read aloud during a public bid opening held at the Tacoma Public Utilities Administrative Building North, 3628 S. 35th Street, Tacoma, WA 98409, conference room M-1, located on the main floor. They will also be held virtually Tuesday's at 11:15 AM. Attend [via this link](#) or call 1 (253) 215 8782. Submittals in response to an RFP, RFQ or RFI will be recorded as received. As soon as possible, after 1:00 PM, on the day of submittal deadline, preliminary results will be posted to www.TacomaPurchasing.org.

Solicitation Documents: An electronic copy of the complete solicitation documents may be viewed and obtained at the City's plan distribution service provider, ARC, 632 Broadway, Tacoma, WA, or by going to <http://www.e-arc.com/location/tacoma>. Prospective bidders will be required to pay reproduction costs. A list of vendors registered for this solicitation is also available at their website.

Pre-Proposal Meeting: A pre-proposal meeting will be held virtually via Microsoft Teams on 5/16/23 at 9:00 am with an expected conclusion by 10:00 am.

Microsoft Teams meeting

Join on your computer, mobile app or room device

[Click here to join the meeting](#)

Meeting ID: 235 654 986 523

Passcode: 7fGGX9

[Download Teams](#) | [Join on the web](#)

Or call in (audio only)

[+1 253-666-4424,,532260434#](tel:+12536664424532260434) United States, Tacoma

Phone Conference ID: 532 260 434#

[Find a local number](#) | [Reset PIN](#)

[Learn More](#) | [Meeting options](#)

On Thursday, 5/18/23 there will be an onsite walk through of both Fire Stations commencing at 9:00am at Fire Station 11 (3802 E. McKinley Ave, Tacoma, WA), and followed by a second meeting at Fire Station 13 (3825 N. 25th St., Tacoma, WA) commencing at 10:30 am.

Project Scope: The Project consists of boiler replacement and HVAC installations within the Tacoma Fire Stations 11 and 13.

Estimate: \$1.1 Million

Paid Sick Leave: The City of Tacoma requires all employers to provide paid sick leave as set forth in Title 18 of the Tacoma Municipal Code and in accordance with State of Washington law.

Americans with Disabilities Act (ADA Information: The City of Tacoma, in accordance with Section 504 of the Rehabilitation Act (Section 504) and the Americans with Disabilities Act (ADA), commits to nondiscrimination on the basis of disability, in all of its programs and activities. Specification materials can be made available in an alternate format by emailing the contact listed below in the *Additional Information* section.

Title VI Information: "The City of Tacoma" in accordance with provisions of Title VI of the Civil Rights Act of 1964, (78 Stat. 252, 42 U.S.C. sections 2000d to 2000d-4) and the Regulations, hereby notifies all bidders that it will affirmatively ensure that in any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, national origin in consideration of award.

Additional Information: Requests for information regarding the specifications may be obtained by contacting Tina Eide, Senior Buyer by email to teide@cityoftacoma.org.

Protest Policy: City of Tacoma protest policy, located at www.tacomapurchasing.org, specifies procedures for protests submitted prior to and after submittal deadline.



Meeting sites are accessible to persons with disabilities. Reasonable accommodations for persons with disabilities can be arranged with 48 hours advance notice by calling 253-502-8468.

**CITY OF TACOMA
FINANCE/PURCHASING DIVISION
SPECIAL NOTICE TO BIDDERS**

Public works and improvement projects for the City of Tacoma are subject to Washington state law and Tacoma Municipal Code, including, but not limited to the following:

I. STATE OF WASHINGTON

A. RESPONSIBILITY CRITERIA – STATE OF WASHINGTON

In order to be considered a responsible bidder the bidder must meet the following mandatory state responsibility criteria contained in RCW 39.04.350:

1. Have a current certificate of registration as a contractor in compliance with chapter 18.27 RCW, which must have been in effect **at the time of bid submittal**;
2. Have a current Washington Unified Business Identifier (UBI) number;
3. If applicable:
 - a. Have Industrial Insurance (workers' compensation) coverage for the bidder's employees working in Washington, as required in Title 51 RCW;
 - b. Have a Washington Employment Security Department number, as required in Title 50 RCW;
 - c. Have a Washington Department of Revenue state excise tax registration number, as required in Title 82 RCW and;
4. Not be disqualified from bidding on any public works contract under RCW 39.06.010 (unlicensed or unregistered contractors) or 39.12.065(3) (prevailing wage).
5. Have received training on the requirements related to public works and prevailing wage under this chapter and chapter 39.12 RCW and must designate a person or persons to be trained on these requirements. The training must be provided by the department of labor and industries or by a training provider whose curriculum is approved by the department. Bidders that have completed three or more public works projects and have had a valid business license in Washington for three or more years are exempt from this subsection.

B. RECIPROCAL PREFERENCE FOR RESIDENT CONTRACTORS:

Effective March 30, 2012, RCW 39.04.380 imposes a reciprocal preference for resident contractors. Any bid received from a non-resident contractor from a state that provides an in-state percentage bidding preference is subject application of a comparable percentage disadvantage.

A non-resident contractor from a state that provides an in-state percentage bidding preference means a contractor that:

1. Is from a state that provides a percentage bid preference to its resident contractors bidding on public works projects, and
2. Does not have a physical office located in Washington at the time of bidding on the City of Tacoma public works project.

The state of residence for a non-resident contractor is the state in which the contractor was incorporated, or if not a corporation, the state in which the contractor's business entity was formed.

The City of Tacoma will evaluate all non-resident contractors for an out of state bidder preference. If the state of the non-resident contractor provides an in state contractor preference, a comparable percentage disadvantage will be applied to the non-resident contractor's bid prior to contract award. The responsive and lowest and best responsible bidder after application of any non-resident disadvantage will be awarded the contract.

The reciprocal preference evaluation does not apply to public works procured pursuant to RCW 39.04.155, RCW 39.04.280, federally funded competitive solicitations where such agencies prohibit the application of bid preferences, or any other procurement exempt from competitive bidding.

Bidders must provide the City of Tacoma with their state of incorporation or the state in which the business entity was formed and include whether the bidder has a physical office located in Washington.

The bidder shall submit documentation demonstrating compliance with above criteria on the enclosed State Responsibility and Reciprocal Bidder Information form.

C. SUBCONTRACTOR RESPONSIBILITY

1. The Contractor shall include the language of this subcontractor responsibility section in each of its first tier subcontracts, and shall require each of its subcontractors to include the same language of this section in each of their subcontracts, adjusting only as necessary the terms used for the contracting parties. The requirements of this section apply to all subcontractors regardless of tier.
2. At the time of subcontract execution, the Contractor shall verify that each of its first tier subcontractors meets the following bidder responsibility criteria:
 - a. Have a current certificate of registration as a contractor in compliance with chapter 18.27 RCW, which must have been in effect at the time of subcontract bid submittal;
 - b. Have a current Washington Unified Business Identifier (UBI) number;
 - c. If applicable, have:
 - a. Have Industrial Insurance (workers' compensation) coverage for the bidder's employees working in Washington, as required in Title 51 RCW;
 - b. A Washington Employment Security Department number, as required in Title 50 RCW;
 - c. A Washington Department of Revenue state excise tax registration number, as required in Title 82 RCW;
 - d. An electrical contractor license, if required by Chapter 19.28 RCW;
 - e. An elevator contractor license, if required by Chapter 70.87 RCW and;
3. Not be disqualified from bidding on any public works contract under RCW 39.06.010 (unlicensed or unregistered contractors) or 39.12.065(3) (prevailing wage).

II. CITY OF TACOMA

A. SUPPLEMENTAL RESPONSIBILITY CRITERIA – CITY OF TACOMA:

In order to be considered a responsible bidder, the prospective bidder shall have all of the following qualifications set forth in Tacoma Municipal Code 1.06.262:

1. Adequate financial resources or the ability to secure such resources;
2. The necessary experience, stability, organization and technical qualifications to perform the proposed contract;
3. The ability to comply with the required performance schedule, taking into consideration all existing business commitments;
4. A satisfactory record of performance, integrity, judgment and skills; and
5. Be otherwise qualified and eligible to receive an award under applicable laws and regulations.
 - a. Bidder Responsibility. Bidders shall not be in violation of 39.04.350 RCW Bidder Responsibility Criteria - Supplemental Criteria.

In addition to the mandatory bidder responsibility criteria listed immediately above, the City may, in addition to price, consider any or all of the following criteria contained in Tacoma Municipal Code Chapter 1.06.262 in determining bidder responsibility:

1. The ability, capacity, experience, stability, technical qualifications and skill of the respondent to perform the contract;
2. Whether the respondent can perform the contract within the time specified, without delay or interference;
3. Integrity, reputation, character, judgment, experience, and efficiency of the respondents, including past compliance with the City's Ethics Code;
4. Quality of performance of previous contracts;
5. Previous and existing compliance with laws and ordinances relating to contracts or services;
6. Sufficiency of the respondent's financial resources;
7. Quality, availability, and adaptability of the supplies, purchased services or public works to the particular use required;
8. Ability of the respondent to provide future maintenance and service on a timely basis;
9. Payment terms and prompt pay discounts;
10. The number and scope of conditions attached to the submittal;
11. Compliance with all applicable City requirements, including but not limited to the City's Ethics Code and its Equity in Contracting and Local Employment and Apprenticeship Training programs;
12. Other qualification criteria set forth in the specification or advertisement that the appropriate department or division head determines to be in the best interests of the City.

The City may require bidders to furnish information, sworn or certified to be true, to demonstrate compliance with the City responsibility criteria set forth above. If the city manager or director of utilities is not satisfied with the sufficiency of the information provided, or if the prospective respondent does not substantially meet all responsibility requirements, any submittal from such respondent must be disregarded.

B. ADDITIONAL SUPPLEMENTAL CRITERIA – NOT APPLICABLE

C. MODIFICATIONS TO SUPPLEMENTAL CRITERIA

Potential bidders may request modifications to the City's **supplemental criteria** by submitting a written request to the Purchasing Division via email to bids@cityoftacoma.org no later than 5:00 p.m. Pacific Time, three days prior to the submittal deadline. Please include the Specification No. and Title when submitting such requests. Requests must include justification for why certain criteria should be modified. Requests received after this date and time will not be considered.

The City will respond to a timely submitted request prior to the bid opening date. Changes to the supplemental criteria, if warranted, will be issued by addendum to the solicitation documents and posted to the City's website for the attention of all prospective bidders.

D. DETERMINATION OF BIDDER RESPONSIBILITY

If the City determines the bidder does not meet the criteria above and is therefore not a responsible bidder, the City shall notify the bidder in writing with the reasons for its determination. If the bidder disagrees, the bidder may appeal the determination in a manner consistent with the City's Protest Policy. Appeals are coordinated by the Purchasing Division heard by the Procurement and Payables Division manager for contracts less than or equal to \$500,000 and by Contracts and Awards Board for contracts greater than \$500,000.

BID PERIOD FORMS

The following forms shall be used during the bidding process to request clarifications and request substitutions. These forms are not required to be submitted with the Bid.

- Bidder Question Form
- Substitution Request Form

BIDDER QUESTION FORM

Fire Station 11 & 13 HVAC Improvements (RE-BID)

SPECIFICATION NO.: PW23-0089F

Prospective bidders must submit questions or clarifications in writing on this form allowing time for a written reply to reach all prospective bidders before the submission of the bids. Bidder questions shall be submitted on this form via e-mail to:

Tina Eide, Senior Buyer.

E-mail address: teide@cityoftacoma.org

All e-mails must be received by **Noon on Friday, May 19, 2023**. Where changes in the project documents are required, an addendum will be issued to everyone on the plan holder's list and posted on www.tacomapurchasing.org.

I have the following question(s): _____

Submitted by:

Name

Representing

Address

Fax Number

Phone Number

SUBSTITUTION REQUEST FORM

Fire Station 11 & 13 HVAC Improvements (RE-BID)

SPECIFICATION NO.: PW23-0089F

Prospective bidders may request substitutions in writing on this form. Substitutions shall be submitted on this form via e-mail to:

Tina Eide, Senior Buyer.

E-mail address: Teide@cityoftacoma.org

All e-mails must be received by **Noon on Friday, May 19, 2023**. Where changes in the project documents are required, an addendum will be issued to everyone on the plan holder's list and posted on www.tacomapurchasing.org.

Submitted By

Signature _____

Company _____

Mailing Address _____

City _____ State _____ Zip _____

Phone _____ Fax _____ E-mail _____

☐ Please check if there are attachments

1. We hereby submit for your consideration the following product instead of the specified item for the above project:

<u>Section</u>	<u>Page</u>	<u>Line/Paragraph</u>	<u>Specified Item</u>
_____	_____	_____	_____

2. Proposed Substitution. _____

3. Reason for Substitution. _____

4. Attach complete technical data, catalog cuts, drawings, samples, etc. Exact models and description of products shall be noted with any deviation noted.

5. Include complete information on changes to Drawings, and/or Specifications which proposed substitution will require for its proper installation. _____

6. Does the substitute affect dimensions shown on Drawings? _____

6a. If so, how? _____

7. Describe the effect substitution has on other trades. _____

8. Describe differences between proposed substitution and specified item. _____

9. Manufacturer's warranties of the proposed and specified items are: ☐ Same ☐ Different (explain on attachment)

The undersigned states that the function, appearance and quality are equivalent or superior to the specified item. The undersigned agrees to pay for changes to the building and systems design, including engineering and detailing costs caused by the requested substitution.

SUBSTITUTION REQUEST FORM

Fire Station 11 & 13 HVAC Improvements (RE-BID)

SPECIFICATION NO.: PW23-0089F

For Reviewer

☐ Approved for Bidding subject to review and approval of Submittals (and as noted below) ☐ Rejected - Inadequate Information

☐ Not Accepted ☐ Received Too Late

By _____ Date _____

Remarks

PROPOSAL FORMS

The following forms must be completed in their entirety and submitted with the bid. Bidders must use the forms provided. Do not modify or substitute forms. Failure to complete and submit all the forms in this section may result in the bid being declared unresponsive and rejected.

1. BID PROPOSAL
2. SIGNATURE PAGE
3. BID BOND
4. SUBCONTRACTOR CATEGORIES OF WORK
 - a. HVAC (required)
 - b. PLUMBING (required)
 - c. ELECTRICAL (required)
 - d. OTHER – as determined by bidder
5. STATE RESPONSIBILITY FORM
6. GENERAL CONTRACTOR QUALIFICATION SUBMITTAL
7. CERTIFICATION OF COMPLIANCE WITH WAGE PAYMENT STATUTES FORM

Fire Station 11 & 13 HVAC Improvements (RE-BID)

SPECIFICATION NO.: PW23-0089F

BID PROPOSAL

**City of Tacoma
Department of Public Works
Facilities Management**

Name of Firm: _____
(Write in company name)

In compliance with the contract documents, the following bid proposal is submitted:

BASE BID:

Lump sum base bid is inclusive of the Scope of Work described in the Contract Documents.

BASE BID: \$ _____

ALLOWANCE # 1: \$ _____ **\$10,000.00**

SUBTOTAL: \$ _____

WA STATE SALES TAX @ 10.3%: \$ _____

GRAND TOTAL: \$ _____

ALLOWANCE # 1: (Do not include Washington State Sales Tax)

- This allowance shall be included in all submitted bids and shall be used solely to address any unforeseen conditions not already known or present in the construction documents, specifications, contract documents, or on-site visual condition assessment performed by the contractor at the pre-proposal meeting. This allowance shall not be used to address any issue, which the contractor knew or should have known about at the time of bidding based on the evaluation of existing on-site conditions, provided construction documents, specifications, and contracts associated with the project.

BID ALTERNATES: (Do not include Washington State Sales Tax)

- The undersigned proposes to modify the contract requirements and scope of work as defined in the Contract Documents and as described in the Project Manual, for the following amounts to be added to the Base Bid. The Owner reserves the right to accept or reject any or alternates within (90) days of the bid date.
- This alternate shall be for the provision and installation of Allerton controls which will allow for the remote monitoring and manipulation of the installed mechanical system per the project manual, specifications, and drawings contained within this project.

Additive Alternate #01

\$ _____

Fire Station 11 & 13 HVAC Improvements (RE-BID)

SPECIFICATION NO.: PW23-0089F

BID PROPOSAL

UNIT PRICES: (Not used)

INTENT AND AFFIDAVIT OF WAGES PAID:

In compliance with Chapter 296-127 WAC the Contractor shall pay all fees associated with the Intent and Affidavit of Wages Paid to the Department of Labor and Industries. These costs shall be included in the base bid.

CITY OF TACOMA PROGRAMS:

The City of Tacoma's Equity in Contracting (EIC) Program will NOT be utilized on this project. There are LEAP requirements on this project, 15 percent of total labor hours. Reference the LEAP section in the project manual.

TIME FOR COMPLETION:

The undersigned hereby agrees to substantially complete all the work under the Base Bid (and accepted alternates and/or unit prices) within **104** calendar days after the Notice to Proceed.

LIQUIDATED DAMAGES:

The undersigned agrees to pay the Owner as liquidated damages the sum of \$500 for each consecutive calendar day beyond the SUBSTANTIAL COMPLETION date. Liquidated damages shall be deducted from the contract by change order.

Fire Station 11 & 13 HVAC Improvements (RE-BID)

SPECIFICATION NO.: PW23-0089F

B I D P R O P O S A L

SUSTAINABILITY:

1) Have you incorporated sustainability into your everyday business practices? **Yes / No**

Please Describe:

2) Have you taken measures to minimize impacts to the environment in the delivery of proposed goods and services? **Yes / No**

Please Describe:

3) Will you be incorporating and implementing sustainable practices during the construction of this project? **Yes / No**

Please Describe:

SIGNATURE PAGE

CITY OF TACOMA FACILITIES MANAGEMENT

All submittals must be in ink or typewritten, executed by a duly authorized officer or representative of the bidding/proposing entity, and received and time stamped as directed in the **Request for Bids page near the beginning of the specification**. If the bidder/proposer is a subsidiary or doing business on behalf of another entity, so state, and provide the firm name under which business is hereby transacted.

REQUEST FOR BIDS SPECIFICATION NO. PW23-0089F Fire Station 11 & 13 HVAC Improvements (RE-BID)

The undersigned bidder/proposer hereby agrees to execute the proposed contract and furnish all materials, labor, tools, equipment and all other facilities and services in accordance with these specifications.

The bidder/proposer agrees, by submitting a bid/proposal under these specifications, that in the event any litigation should arise concerning the submission of bids/proposals or the award of contract under this specification, Request for Bids, Request for Proposals or Request for Qualifications, the venue of such action or litigation shall be in the Superior Court of the State of Washington, in and for the County of Pierce.

Non-Collusion Declaration

The undersigned bidder/proposer hereby certifies under penalty of perjury that this bid/proposal is genuine and not a sham or collusive bid/proposal, or made in the interests or on behalf of any person or entity not herein named; and that said bidder/proposer has not directly or indirectly induced or solicited any contractor or supplier on the above work to put in a sham bid/proposal or any person or entity to refrain from submitting a bid/proposal; and that said bidder/proposer has not, in any manner, sought by collusion to secure to itself an advantage over any other contractor(s) or person(s).

Bidder/Proposer's Registered Name

Signature of Person Authorized to Enter Date
into Contracts for Bidder/Proposer

Address

Printed Name and Title

City, State, Zip

(Area Code) Telephone Number / Fax Number

Authorized Signatory E-Mail Address

State Business License Number
in WA, also known as UBI (Unified Business Identifier) Number

E.I.No. / Federal Social Security Number Used on Quarterly
Federal Tax Return, U.S. Treasury Dept. Form 941

State Contractor's License Number
(See Ch. 18.27, R.C.W.)

E-Mail Address for Communications

Addendum acknowledgement #1_____ #2_____ #3_____ #4_____ #5_____

THIS PAGE MUST BE SIGNED AND RETURNED WITH SUBMITTAL.

Herewith find deposit in the form of a cashier's check in the amount of \$_____ which amount is not less than 5-percent of the total bid.

SIGN HERE_____

BID BOND

KNOW ALL MEN BY THESE PRESENTS:

That we, _____, as Principal, and _____, as Surety, are held and firmly bound unto the City of Tacoma, as Obligee, in the penal sum of _____ dollars, for the payment of which the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, by these presents.

The condition of this obligation is such that if the Obligee shall make any award to the Principal for

according to the terms of the proposal or bid made by the Principal therefor, and the Principal shall duly make and enter into a contract with the Obligee in accordance with the terms of said proposal or bid and award and shall give bond for faithful performance thereof, with Surety or Sureties approved by the Obligee; or if the Principal shall, in case of failure to do so, pay and forfeit to the Obligee the penal amount of the deposit specified in the call for bids, then this obligation shall be null and void; otherwise it shall be and remain in full force and effect and the Surety shall forthwith pay and forfeit to the Obligee, as penalty and liquidated damages, the amount of this bond.

SIGNED, SEALED AND DATED THIS _____ DAY OF _____, 20_____.

PRINCIPAL:

SURETY:

_____, 20_____

Received return of deposit in the sum of \$ _____

List of Subcontractor Categories of Work

Project Name _____

Subcontractor(s) that are proposed to perform the work of heating, ventilation and air conditioning, and/or plumbing, as described in Chapter 18.106 RCW, and electrical as described in Chapter 19.28 RCW must be listed below. **This information must be submitted with the bid proposal or within one hour of the published bid submittal time via email to bids@cityoftacoma.org.**

Subcontractor(s) that are proposed to perform the work of structural steel installation and/or rebar installation must be listed below. **This information must be submitted with the bid proposal or within forty-eight hours of the published bid submittal time via email to bids@cityoftacoma.org.**

Failure to list subcontractors or naming more than one subcontractor to perform the same work will result in your bid being non-responsive. Contractors self-performing must list themselves below. The work to be performed is to be listed below the subcontractor(s) name.

Subcontractor Name _____
Work to be Performed _____

Subcontractor Name _____
Work to be Performed _____

Subcontractor Name _____
Work to be Performed _____

Subcontractor Name _____
Work to be Performed _____

Subcontractor Name _____
Work to be Performed _____

Specification No. _____

Name of Bidder: _____

State Responsibility and Reciprocal Bid Preference Information

Certificate of registration as a contractor
(Must be in effect at the time of bid submittal):

Number: _____

Effective Date: _____

Expiration Date: _____

Current Washington Unified Business Identifier
(UBI) Number:

Number: _____

Do you have industrial insurance (workers' compensation)
Coverage nor your employees working in Washington?

☐ Yes ☐ No
☐ Not Applicable

Washington Employment Security Department Number

Number: _____

☐ Not Applicable

Washington Department of Revenue state excise tax
Registration number:

Number: _____

☐ Not Applicable

Have you been disqualified from bidding any public
works contracts under RCW 39.06.010 or 39.12.065(3)?

☐ Yes ☐ No
If yes, provide an explanation of your
disqualification on a separate page.

Do you have a physical office located in the state of
Washington?

☐ Yes ☐ No

If incorporated, in what state were you incorporated?

State: _____ ☐ Not Incorporated

If not incorporated, in what state was your business
entity formed?

State: _____

Have you completed the training required by RCW
39.04.350, or are you on the list of exempt businesses
maintained by the Department of Labor and Industries?

☐ Yes ☐ No

Fire Station 11 & 13 HVAC Improvements (RE-BID)

SPECIFICATION NO.: PW23-0089F

General Contractor Qualification Submittal

This form shall be completed in its entirety, **submitted with the bid**, and shall be used to demonstrate the General Contractor's minimum experience. Failure to submit this form may be grounds for bid rejection.

The City shall be the sole judge in determining if the prospective Contractor meets the bidder minimum experience requirements. The City reserves the right to take whatever action it deems necessary to ascertain the ability of the bidder to perform the work satisfactorily.

Qualification of General Contractor: General Contractor shall have a minimum of five (5) projects, of similar size and scope within the last five (5) years, demonstrating an ability to meet the contract schedule and requirements. General Contractor shall meet all Local and State Certifications and License requirements prior to bidding. Copies of the required Certificates and Licenses shall be made available upon request.

Mechanical (HVAC) Contractor shall have a minimum of five (5) projects, of similar size and scope within the last five (5) years, demonstrating an ability to meet the contract schedule and requirements. Fire Protection Contractor shall meet all Local and State Certifications and License requirements prior to bidding. Copies of the required Certificates and Licenses shall be made available upon request.

Name: _____

Address: _____

Contact Person: _____ Phone: _____

Project Experience – General Contractor:

Project No. 1 Name:
Project Owner:
Owner Contact / Phone No.:
Date Work Completed:
Description of Work:

Fire Station 11 & 13 HVAC Improvements (RE-BID)

SPECIFICATION NO.: PW23-0089F

General Contractor Qualification Submittal

Project No. 2 Name:
Project Owner:
Owner Contact / Phone No.:
Date Work Completed:
Description of Work:

Project No. 3 Name:
Project Owner:
Owner Contact / Phone No.:
Date Work Completed:
Description of Work:

Project No. 4 Name:
Owner Contact / Phone No.:
Contact Person:
Date Work Completed:
Description of Work:

Fire Station 11 & 13 HVAC Improvements (RE-BID)

SPECIFICATION NO.: PW23-0089F

General Contractor Qualification Submittal

Project No. 5 Name:
Owner Contact / Phone No.:
Contact Person:
Date Work Completed:
Description of Work:

Project Experience – Mechanical (HVAC) Contractor:

Project No. 1 Name:
Project Owner:
Owner Contact / Phone No.:
Date Work Completed:
Description of Work:

Project No. 2 Name:
Project Owner:
Owner Contact / Phone No.:
Date Work Completed:
Description of Work:

Fire Station 11 & 13 HVAC Improvements (RE-BID)

SPECIFICATION NO.: PW23-0089F

General Contractor Qualification Submittal

Project No. 3 Name:
Project Owner:
Owner Contact / Phone No.:
Date Work Completed:
Description of Work:

Project No. 4 Name:
Owner Contact / Phone No.:
Contact Person:
Date Work Completed:
Description of Work:

Project No. 5 Name:
Owner Contact / Phone No.:
Contact Person:
Date Work Completed:
Description of Work:



City of Tacoma

Certification of Compliance with Wage Payment Statutes

The bidder hereby certifies that, within the three-year period immediately preceding the bid solicitation date, **May 9, 2023**, that the bidder is not a “willful” violator, as defined in RCW 49.48.082, of any provision of chapters 49.46, 49.48, or 49.52 RCW, as determined by a final and binding citation and notice of assessment issued by the Department of Labor and Industries or through a civil judgment entered by a court of limited or general jurisdiction.

I certify under penalty of perjury under the laws of the state of Washington that the foregoing is true and correct.

Bidder

Signature of Authorized Official*

Printed Name

Title

Date

City

State

Check One:

Individual ☐

Partnership ☐

Joint Venture ☐

Corporation ☐

State of Incorporation, or if not a corporation, the state where business entity was formed:

If a co-partnership, give firm name under which business is transacted:

** If a corporation, proposal must be executed in the corporate name by the president or vice-president (or any other corporate officer accompanied by evidence of authority to sign). If a co-partnership, proposal must be executed by a partner.*

CONTRACT FORMS (POST AWARD)

1. CONTRACT
2. INSURANCE CERTIFICATE REQUIREMENTS
3. PERFORMANCE BOND TO THE CITY OF TACOMA
4. PAYMENT BOND TO THE CITY OF TACOMA
5. GENERAL RELEASE TO THE CITY OF TACOMA

CONTRACT

Resolution No.
Contract No.

This Contract is made and entered into effective as of [Month], [Day], [Year] ("Effective Date") by and between the City of Tacoma, a Municipal Corporation of the State of Washington ("City"), and [supplier name as it appears in Ariba, including dbas or trade names] ("Contractor").

That in consideration of the mutual promises and obligations hereinafter set forth the Parties hereto agree as follows:

- I. Contractor shall fully execute and diligently and completely perform all work and provide all services and deliverables described herein and in the items listed below each of which are fully incorporated herein and which collectively are referred to as "Contract Documents":

 1. Specification No. [Spec Number] [Spec Title] together with all authorized addenda.
 2. Contractor's submittal [or specifically described portions thereof] dated [Enter Submittal Date] submitted in response to Specification No. [Spec Number] [Spec Title].
 3. Describe with specific detail and list separately any other documents that will make up the contract (fee schedule, work schedule, authorized personnel, etc.) or any other additional items mutually intended to be binding upon the parties.

- II. If federal funds will be used to fund, pay or reimburse all or a portion of the services provided under the Contract, the terms and conditions set forth at this Appendix A are incorporated into and made part of this Contract and CONTRACTOR will comply with all applicable provisions of Appendix A and with all applicable federal laws, regulations, executive orders, policies, procedures, and directives in the performance of this Contract.

If CONTRACTOR's receipt of federal funds under this Contract is as a sub-recipient, a fully completed Appendix B, "Sub-recipient Information and Requirements" is incorporated into and made part of this Contract.
- III. In the event of a conflict or inconsistency between the terms and conditions contained in this document entitled Contract and any terms and conditions contained the above referenced Contract Documents the following order of precedence applies with the first listed item being the most controlling and the last listed item the least controlling:
 1. Contract, inclusive of Appendices A and B.
 2. List remaining Contract Documents in applicable controlling order.
- IV. The Contract terminates on xxxxx, and may be renewed for xxxxxxxx
- V. The total price to be paid by City for Contractor's full and complete performance hereunder, including during any authorized renewal terms, may not exceed:
\$[Dollar Amount], plus any applicable taxes.
- VI. Contractor agrees to accept as full payment hereunder the amounts specified herein and in Contract Documents, and the City agrees to make payments at the times and in the manner and upon the terms and conditions specified. Except as may be otherwise provided herein or in Contract Documents Contractor shall provide and bear the expense of all equipment, work and labor of any sort whatsoever that may be required for the transfer of materials and for constructing and completing the work and providing the services and deliverables required by this Contract.
- VII. The City's preferred method of payment is by ePayables (Payment Plus), followed by credit card (aka procurement card), then Electronic Funds Transfer (EFT) by Automated Clearing House (ACH), then check or other cash equivalent. CONTRACTOR may be required to have the capability of accepting the City's ePayables or credit card methods of payment. The City of Tacoma will not accept price changes or pay additional fees when ePayables (Payment Plus) or credit card is used. The City, in its sole discretion, will determine the method of payment for this Contract.

VIII. Failure by City to identify a deficiency in the insurance documentation provided by Contractor or failure of City to demand verification of coverage or compliance by Contractor with the insurance requirements contained in the Contract Documents shall not be construed as a waiver of Contractor's obligation to maintain such insurance.

IX. Contractor and for its heirs, executors, administrators, successors, and assigns, does hereby agree to the full performance of all the requirements contained herein and in Contract Documents.

It is further provided that no liability shall attach to City by reason of entering into this Contract, except as expressly provided herein.

IN WITNESS WHEREOF, the Parties hereto have accepted and executed this Contract, as of the Effective Date stated above, which shall be Effective Date for bonding purposes as applicable.

CITY OF TACOMA:

Signature:

Name:

Title:

CONTRACTOR:

Signature:

Name:

Title:

(City of Tacoma use only - blank lines are intentional)

Director of Finance: _____

Deputy/City Attorney (approved as to form): _____

Approved By: _____

Approved By: _____

Approved By: _____

Approved By: _____

Approved By: _____

Approved By: _____

**APPENDIX A
FEDERAL FUNDING**

1. Termination for Breach

CITY may terminate this Contract in the event of any material breach of any of the terms and conditions of this Contract if CONTRACTOR's breach continues in effect after written notice of breach and 30 days to cure such breach and fails to cure such breach.

2. Prevailing Wages

1. If federal, state, local, or any applicable law requires CONTRACTOR to pay prevailing wages in connection with this Contract, and CONTRACTOR is so notified by the CITY, then CONTRACTOR shall pay applicable prevailing wages and otherwise comply with the Washington State Prevailing Wage Act (RCW 39.12) in the performance of this Contract.
2. If applicable, a Schedule of Prevailing Wage Rates and/or the current prevailing wage determination made by the Secretary of Labor for the locality or localities where the Contract will be performed is made of part of the Contract by this reference. If prevailing wages apply to the Contract, CONTRACTOR and its subcontractors shall:
 - i. Be bound by and perform all transactions regarding the Contract relating to prevailing wages and the usual fringe benefits in compliance with the provisions of Chapter 39.12 RCW, as amended, the Washington State Prevailing Wage Act and/or the Davis-Bacon Act (40 U.S.C. 3141- 3144, and 3146-3148) and the requirements of 29 C.F.R. pt. 5 as may be applicable, including the federal requirement to pay wages not less than once a week.
 - ii. Ensure that no worker, laborer or mechanic employed in the performance of any part of the Contract shall be paid less than the prevailing rate of wage specified on that Schedule and/or specified in a wage determination made by the Secretary of Labor (unless specifically preempted by federal law, the higher of the Washington state prevailing wage or federal Davis-Bacon rate of wage must be paid.
 - iii. Immediately upon award of the Contract, contact the Department of Labor and Industries, Prevailing Wages section, Olympia, Washington and/or the federal Department of Labor, to obtain full information, forms and procedures relating to these matters. Per such procedures, a Statement of Intent to Pay Prevailing Wages and/or other or additional documentation required by applicable federal law, must be submitted by CONTRACTOR and its subcontractors to the CITY, in the manner requested by the CITY, prior to any payment by the CITY hereunder, and an Affidavit of Wages Paid and/or other or additional documentation required by federal law must be received or verified by the CITY prior to final Contract payment.

3. COPELAND ANTI-KICKBACK ACT

For Contracts subject to Davis Bacon Act the following clauses will be incorporated into the Contract:

- A. CONTRACTOR shall comply with 18 U.S.C. § 874, 40 U.S.C. § 3145, and the requirements of 29 C.F.R. pt. 3 as may be applicable, which are incorporated by reference into this Contract.
- B. CONTRACTOR or subcontractor shall insert in any subcontracts the clause above and such other clauses federal agencies may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts.

The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all of these Contract clauses.

- C. Breach. A breach of the contract clauses above may be grounds for termination of the contract, and for debarment as a contractor and subcontractor as provided in 29 C.F.R. § 5.12.

4. EQUAL EMPLOYMENT OPPORTUNITY

During the performance of this Contract, CONTRACTOR will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. If the CONTRACTOR does over \$10,000 in business a year that is funded, paid or reimbursed with federal funds, CONTRACTOR will take specific and affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following:

- A. Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. CONTRACTOR agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.
- B. CONTRACTOR will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.
- C. CONTRACTOR will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the Contractor's legal duty to furnish information.
- D. CONTRACTOR will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- E. CONTRACTOR will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
- F. In the event of CONTRACTOR's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this Contract may be canceled, terminated, or suspended in whole or in part and the CONTRACTOR may be declared ineligible for further federally funded contracts in accordance with procedures

authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

- G. CONTRACTOR will include the portion of the sentence immediately preceding paragraph (A) and the provisions of paragraphs (A) through (G) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. CONTRACTOR will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance:

Provided, however, that in the event CONTRACTOR becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the CONTRACTOR may request the United States to enter into such litigation to protect the interests of the United States.

5. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

- A. Overtime requirements. Neither CONTRACTOR or subcontractor contracting for any part of the Contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.
- B. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (3)(A) of this section the CONTRACTOR and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such CONTRACTOR and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (3)(A) of this section, in the sum of \$27 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (3)(A) of this section.
- C. Withholding for unpaid wages and liquidated damages. The CITY shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the CONTRACTOR or subcontractor under any such contract or any other Federal

contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such CONTRACTOR or sub-contractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (3)(B) of this section.

- D. Subcontracts. The Contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (3)(A) through (D) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime CONTRACTOR shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (3)(A) through (D) of this section.

6. CLEAN AIR ACT

- A. CONTRACTOR agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. § 7401 et seq.
- B. CONTRACTOR agrees to report each violation to the CITY and understands and agrees that the CITY will, in turn, report each violation as required to assure notification to the Federal Emergency Management Agency, and the appropriate Environmental Protection Agency Regional Office.

CONTRACTOR agrees to include these requirements in each subcontract exceeding \$150,000 financed in whole or in part with federal funds.

7. FEDERAL WATER POLLUTION CONTROL ACT

- A. CONTRACTOR agrees to comply with all applicable standards, orders, or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq.
- B. CONTRACTOR agrees to report each violation to the CITY and understands and agrees that the CITY will, in turn, report each violation as required to assure notification to the appropriate federal agency.
- C. CONTRACTOR agrees to include these requirements in each subcontract exceeding \$150,000 financed in whole or in part with federal funding.

8. DEBARMENT AND SUSPENSION

- A. This Contract is a Covered Transaction for purposes of 2 C.F.R. pt. 180 and 2 C.F.R. pt. 3000. As such, the CONTRACTOR is required to verify that none of the contractor's principals (defined at 2 C.F.R. § 180.995) or its affiliates (defined at 2 C.F.R. § 180.905) are excluded (defined at 2 C.F.R. § 180.940) or disqualified (defined at 2 C.F.R. § 180.935).
- B. CONTRACTOR must comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, and must include a requirement to comply with these regulations in any lower tier Covered Transaction it enters into.

- C. This certification is a material representation of fact relied upon by the CITY. If it is later determined that the CONTRACTOR did not comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, in addition to remedies available to CITY, the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment.
- D. CONTRACTOR agrees to comply with the requirements of 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C throughout the period of this Contract and to include a provision requiring such compliance in its lower tier covered transactions.

9. BYRD ANTI-LOBBYING AMENDMENT

- A. Contractors who apply or bid for an award of \$100,000 or more shall file the required certification with CITY. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, officer or employee of Congress, or an employee of a Member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 U.S.C. § 1352. Each tier shall also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the recipient who in turn will forward the certification(s) to the CITY.
- B. If applicable, CONTRACTOR must sign and submit to the CITY the certification required by Appendix A to 44 CFR Part 18 contained at Appendix A-1 to this Contract.

10. PROCUREMENT OF RECOVERED MATERIALS

- A. In the performance of this Contract, CONTRACTOR shall make maximum use of products containing recovered materials that are EPA-designated items unless the product cannot be acquired:
 - i. Competitively within a timeframe providing for compliance with the contract performance schedule;
 - ii. Meeting contract performance requirements; or
 - iii. At a reasonable price.
- B. Information about this requirement, along with the list of EPA- designated items, is available at EPA's Comprehensive Procurement Guidelines web site, <https://www.epa.gov/smm/comprehensive-procurement-guideline-cpg-program>.
- C. CONTRACTOR also agrees to comply with all other applicable requirements of Section 6002 of the Solid Waste Disposal Act.

APPENDIX A-1

APPENDIX A to 44 C.F.R. PART 18 – CERTIFICATION REGARDING LOBBYING Certification for Contracts, Grants, Loans, and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

The Contractor, _____, certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. Chap.38, Administrative Remedies for False Claims and Statements, apply to this certification and disclosure, if any.

Signature of Contractor's Authorized Official

Name and Title of Contractor's Authorized Official

Date

APPENDIX B—Sub-recipient information and requirements

Pursuant to 2 CFR 200.332(a)(1) Federal Award Identification

(i) Agency Name (must match the name associated with its unique entity identifier)		(ii) Unique Entity Identifier <i>(i.e., DUNS)</i>	City of Tacoma Number for This Agreement
(iii) Federal Award Identification Number (FAIN)	(iv) Federal Award Date	(v) Federal Period of Performance Start and End Date	(vi) Federal Budget Period Start and End Date
(vii) Amount of Federal Funds <i>Obligated</i> to the agency <i>by this action</i>: \$	(viii) Total Amount of Federal Funds <i>Obligated</i> to the agency		(ix) Total Amount of the Federal Award <i>Committed</i> to the agency \$
(x) Federal Award Project Description: CORONAVIRUS STATE AND LOCAL FISCAL RECOVERY FUNDS– City of Tacoma			
(xi) Federal Awarding Agency: DEPARTMENT OF THE TREASURY	Pass-Through Entity: City of Tacoma	Awarding Official Name and Contact Information:	
(xii) Assistance Listing Number and Name (the pass-through entity must identify the dollar amount made available under each Federal award and the Assistance Listing number at time of disbursement)			(xiii) Identification of Whether the Award is R&D
(xiv) Indirect Cost Rate for the Federal Award	Award Payment Method (lump sum payment or reimbursement) REIMBURSEMENT		



CITY OF TACOMA INSURANCE REQUIREMENTS FOR CONTRACTS

The Contractor (Contractor) shall maintain at least the minimum insurance set forth below. By requiring such minimum insurance, the City of Tacoma shall not be deemed or construed to have assessed the risk that may be applicable to Contractor under this Contract. Contractor shall assess its own risks and, if it deems appropriate and/or prudent, maintain greater limits and/or broader coverage.

1. GENERAL REQUIREMENTS

The following General Requirements apply to Contractor and to Subcontractor(s) of every tier performing services and/or activities pursuant to the terms of this Contract. Contractor acknowledges and agrees to the following insurance requirements applicable to Contractor and Contractor's Subcontractor(s):

- 1.1. City of Tacoma reserves the right to approve or reject the insurance provided based upon the insurer, terms and coverage, the Certificate of Insurance, and/or endorsements.
- 1.2. Contractor shall not begin work under the Contract until the required insurance has been obtained and approved by City of Tacoma.
- 1.3. Contractor shall keep this insurance in force during the entire term of the Contract and for Thirty (30) calendar days after completion of all work required by the Contract, unless otherwise provided herein.
- 1.4. Insurance policies required under this Contract that name "City of Tacoma" as Additional Insured shall:
 - 1.4.1. Be considered primary and non-contributory for all claims.
 - 1.4.2. Contain a "Separation of Insured provision and a "Waiver of Subrogation" clause in favor of City of Tacoma.
- 1.5. Section 1.4 above does not apply to contracts for purchasing supplies only.
- 1.6. Verification of coverage shall include:
 - 1.6.1. An ACORD certificate or equivalent.
 - 1.6.2. Copies of all endorsements naming the City of Tacoma as additional insured and showing the policy number.
 - 1.6.3. A notation of coverage enhancements on the Certificate of Insurance shall not satisfy these requirements – actual endorsements must be submitted.
- 1.7. Liability insurance policies, with the exception of Professional Liability and Workers' Compensation, shall name the City of Tacoma and its officers, elected officials, employees, agents, and authorized volunteers as additional insured.
 - 1.7.1. No specific person or department should be identified as the additional insured.
 - 1.7.2. All references on certificates of insurance and endorsements shall be listed as "City of Tacoma".
 - 1.7.3. The City of Tacoma shall be additional insured for both ongoing and completed operations using Insurance Services Office (ISO) form CG 20 10 04 13 and CG 20



CITY OF TACOMA INSURANCE REQUIREMENTS FOR CONTRACTS

37 04 13 or the equivalent for the full available limits of liability maintained by the Contractor irrespective of whether such limits maintained by the Contractor are greater than those required by this Contract and irrespective of whether the Certificate of Insurance describes limits lower than those maintained by the Contractor.

- 1.8. Contractor shall provide a Certificate of Insurance for each policy of insurance meeting the requirements set forth herein when Contractor provides the signed Contract for the work to City of Tacoma. Contractor shall provide copies of any applicable Additional Insured, Waiver of Subrogation, and Primary and Non-contributory endorsements. Contract or Permit number and the City Department must be shown on the Certificate of Insurance.
- 1.9. Insurance limits shown below may be written with an excess policy that follows the form of an underlying primary liability policy or an excess policy providing the required limit.
- 1.10. Liability insurance policies shall be written on an "occurrence" form, except for Professional Liability/Errors and Omissions, Pollution Liability, and Cyber/Privacy and Security
- 1.11. If coverage is approved and purchased on a "Claims-Made" basis, Contractor warrants continuation of coverage, either through policy renewals or by the purchase of an extended reporting period endorsement as set forth below.
- 1.12. The insurance must be written by companies licensed or authorized in the State of Washington pursuant to RCW 48 with an (A-) VII or higher in the A.M. Best's Key Rating Guide www.ambest.com.
- 1.13. Contractor shall provide City of Tacoma notice of any cancellation or non-renewal of this required insurance within Thirty (30) calendar days.
- 1.14. Contractor shall not allow any insurance to be cancelled or lapse during any term of this Contract, otherwise it shall constitute a material breach of the Contract, upon which City of Tacoma may, after giving Five (5) business day notice to Contractor to correct the breach, immediately terminate the Contract or, at its discretion, procure or renew such insurance and pay any and all premiums in connection therewith; with any sums so expended to be repaid to City of Tacoma by Contractor upon demand, or at the sole discretion of City of Tacoma, offset against funds due Contractor from City of Tacoma.
- 1.15. Contractor shall be responsible for the payment of all premiums, deductibles and self-insured retentions, and shall indemnify and hold the City of Tacoma harmless to the extent such a deductible or self-insured retained limit may apply to the City of Tacoma as an additional insured. Any deductible or self-insured retained limits in excess of Twenty Five Thousand Dollars (\$25,000) must be disclosed and approved by City of Tacoma Risk Manager and shown on the Certificate of Insurance.
- 1.16. City of Tacoma reserves the right to review insurance requirements during any term of the Contract and to require that Contractor make reasonable adjustments when the scope of services has changed.



- 1.17. All costs for insurance shall be incidental to and included in the unit or lump sum prices of the Contract and no additional payment will be made by City of Tacoma to Contractor.
- 1.18. Insurance coverages specified in this Contract are not intended and will not be interpreted to limit the responsibility or liability of Contractor or Subcontractor(s).
- 1.19. Failure by City of Tacoma to identify a deficiency in the insurance documentation provided by Contractor or failure of City of Tacoma to demand verification of coverage or compliance by Contractor with these insurance requirements shall not be construed as a waiver of Contractor's obligation to maintain such insurance.
- 1.20. If Contractor is a State of Washington or local government and is self-insured for any of the above insurance requirements, a certification of self-insurance shall be attached hereto and be incorporated by reference and shall constitute compliance with this Section.

2. CONTRACTOR

As used herein, "Contractor" shall be the Supplier(s) entering a Contract with City of Tacoma, whether designated as a Supplier, Contractor, Vendor, Proposer, Bidder, Respondent, Seller, Merchant, Service Provider, or otherwise.

3. SUBCONTRACTORS

It is Contractor's responsibility to ensure that each subcontractor obtain and maintain adequate liability insurance coverage. Contractor shall provide evidence of such insurance upon City of Tacoma's request.

4. REQUIRED INSURANCE AND LIMITS

The insurance policies shall provide the minimum coverages and limits set forth below. Providing coverage in these stated minimum limits shall not be construed to relieve Contractor from liability in excess of such limits.

4.1 Commercial General Liability Insurance

Contractor shall maintain Commercial General Liability Insurance policy with limits not less than One Million Dollars (\$1,000,000) each occurrence and Two Million Dollars (\$2,000,000) annual aggregate. The Commercial General Liability Insurance policy shall be written on an Insurance Services Office form CG 00 01 04 13 or its equivalent. Products and Completed Operations shall be maintained for a period of three years following Substantial Completion of the Work related to performing construction services.

This policy shall include product liability especially when a Contract solely is for purchasing supplies. The Commercial General Liability policy shall be endorsed to include:

- 4.1.1 A per project aggregate policy limit, using ISO form CG 25 03 05 09 or an equivalent endorsement.

4.2 Commercial (Business) Automobile Liability Insurance

Contractor shall maintain Commercial Automobile Liability policy with limits not less than One Million Dollars (\$1,000,000) each accident for bodily injury and property damage and bodily injury and property damage coverage for owned (if any), non-owned, hired, or leased vehicles. Commercial Automobile Liability Insurance shall be written using ISO form CA 00 01 or



equivalent. Contractor must also maintain an MCS 90 endorsement or equivalent and a CA 99 48 endorsement or equivalent if "Pollutants" are to be transported.

4.3 Workers' Compensation

Contractor shall comply with Workers' Compensation coverage as required by the Industrial Insurance laws of the State of Washington, as well as any other similar coverage required for this work by applicable federal laws of other states. The Contractor must comply with their domicile State Industrial Insurance laws if it is outside the State of Washington.

4.4 Employers' Liability Insurance

Contractor shall maintain Employers' Liability coverage with limits not less than One Million Dollars (\$1,000,000) each employee, One Million Dollars (\$1,000,000) each accident, and One Million Dollars (\$1,000,000) policy limit.

4.5 Installation Floater Insurance

Contractor shall maintain during the term of the Contract, at its own expense, Installation Floater Insurance covering Contractor's labor, materials, and equipment to be used for completion of the work performed under this Contract against all risks of direct physical loss, excluding earthquake and flood, for an amount equal to the full amount of the Contract improvements.

4.6 Other Insurance

Other insurance may be deemed appropriate to cover risks and exposures related to the scope of work or changes to the scope of work required by City of Tacoma. The costs of such necessary and appropriate Insurance coverage shall be borne by Contractor.



PERFORMANCE BOND TO THE CITY OF TACOMA

Resolution No.
Bond No.

That we, the undersigned,

as principal, and

as a surety, are jointly and severally held and firmly bound to the CITY OF TACOMA, in the penal sum of

\$ _____, for the payment whereof Contractor and Surety bind themselves,

their executors, administrators, legal representatives, successors and assigns, jointly and severally, firmly by these presents.

This obligation is entered into in pursuance of the statutes of the State of Washington, the Ordinances of the City of Tacoma.

WHEREAS, under and pursuant to the City Charter and general ordinances of the City of Tacoma, the said City has or is about to enter with the above bounden principal, a contract, providing for

Specification No. _____

Specification Title: _____

Contract No. _____

(which contract is referenced to herein and is made a part hereof as though attached hereto), and

WHEREAS, the said principal has accepted, the said contract, and undertake to perform the work therein provided for in the manner and within the time set forth.

This statutory performance bond shall become null and void, if and when the principal, its heirs, executors, administrators, successors, or assigns shall well and faithfully perform all of the Principal's obligations under the Contract and fulfill all terms and conditions of all duly authorized modifications, additions and changes to said Contract that may hereafter be made, at the time and in the manner therein specified; and if such performance obligations have not been fulfilled, this bond shall remain in force and effect.

The Surety for value received agrees that no change, extension of time, alteration or addition to the terms of the Contract, the specifications accompanying the Contract, or to the work to be performed under the Contract shall in any way affect its obligation on this bond, and waives notice of any change, extension of time, alteration or addition to the terms of the Contract or the work performed. The Surety agrees that modifications and changes to the terms and conditions of the Contract that increase the total amount to be paid the Principal shall automatically increase the obligation of the Surety on this bond and notice to Surety is not required for such increase.

If the City shall commence suit and obtain judgment against the Surety for recovery hereunder, then the Surety, in addition to such judgement, shall pay all costs and attorney's fees incurred by the City in enforcement of its rights hereunder. Venue for any action arising out of in connection with this bond shall be in Pierce County, Washington.

Surety companies executing bonds must be authorized to transact business in the State of Washington as surety and named in the current list of "Surety Companies Acceptable in Federal Bonds" as published in the Federal Register by the Audit Staff Bureau of Accounts, U.S. Department of the Treasury.

One original bond shall be executed, and signed by the parties' duly authorized officers. This bond will only be accepted if it is accompanied by a fully executed power of attorney for the office executing on behalf of the surety.

Principal: Enter Vendor Legal Name

By: _____

Surety:

By: _____

Agent's Name: _____

Agent's Address: _____



PAYMENT BOND TO THE CITY OF TACOMA

Resolution No.
Bond No.

That we, the undersigned,

as principal, and _____
as a surety, are jointly and severally held and firmly bound to the CITY OF TACOMA, in the penal sum of,
\$ _____, for the payment whereof Contractor and Surety bind themselves,
their executors, administrators, legal representatives, successors and assigns, jointly and severally, firmly by these presents.

This obligation is entered into in pursuance of the statutes of the State of Washington, the Ordinances of the City of Tacoma.

WHEREAS, under and pursuant to the City Charter and general ordinances of the City of Tacoma, the said City has or is about to enter with the above bounden principal, a contract, providing for

Specification No. _____

Specification Title: _____

Contract No. _____

(which contract is referenced to herein and is made a part hereof as though attached hereto), and

WHEREAS, the said principal has accepted, the said contract, and undertake to perform the work therein provided for in the manner and within the time set forth.

This statutory payment bond shall become null and void, if and when the Principal, its heirs, executors, administrators, successors, or assigns shall pay all persons in accordance with RCW 39.08, 39.12, and 60.28, including all workers, laborers, mechanics, subcontractors, and materialmen, and all person who shall supply such contractor or subcontractor with provisions and supplies for the carrying on of such work, and all taxes incurred on said Contract under Titles 50 and 51 RCW and all taxes imposed on the Principal under Title 82 RCW; and if such payment obligations have not been fulfilled, this bond shall remain in full force and effect.

The Surety for value received agrees that no change, extension of time, alteration or addition to the terms of the Contract shall in any way affect its obligation on this bond, and waives notice of any changes, extension of time, alteration or addition to the terms of the Contract or the work performed. The Surety agrees that modifications and changes to the terms and conditions of the Contract that increase the total amount to be paid the Principal shall automatically increase the obligation of the Surety on this bond and notice to Surety is not required for such increased obligation.

No suit or action shall be commenced hereunder by any claimant unless claimant shall have given the written notices to the City, and where required, the Contractor, in accordance with RCW 39.08.030.

The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder, inclusive of the payment by Surety of claims which may be properly filed in accordance with RCW 39.08 whether or not suit is commenced under and against this bond.

If any claimant shall commence suit and obtain judgment against the Surety for recovery hereunder, then the Surety, in addition to such judgment and attorney fees as provided by RCW 39.08.030, shall also pay such costs and attorney fees as may be incurred by the City as a result of such suit. Venue for any action arising out of or in connection with this bond shall be in Pierce County, WA.

Surety companies executing bonds must be authorized to transact business in the State of Washington as surety and named in the current list of "Surety Companies Acceptable in Federal Bonds" as published in the Federal Register by the Audit Staff Bureau of Accounts, U.S. Department of the Treasury.

Resolution No.
Bond No.
Specification No.
Contract No.

One original bond shall be executed, and be signed by the parties' duly authorized officers. This bond will only be accepted if it is accompanied by a fully executed power of attorney for the office executing on behalf of the surety.

Principal: Enter Vendor Legal Name

By: _____

Surety:

By: _____

Agent's Name: _____

Agent's Address: _____

GENERAL RELEASE TO THE CITY OF TACOMA

The undersigned, named as the contractor for the _____ between _____ and the City of Tacoma, Contract No. _____ dated _____, 20____, hereby releases the City of Tacoma, its departmental officers and agents from any and all claim or claims whatsoever in any manner whatsoever at any time whatsoever arising out of and/or in connection with and/or relating to said contract, excepting only the equity of the undersigned in the amount now retained by the City of Tacoma under said contract, to-wit the sum of _____ excluding sales tax.

Signed at _____, Washington this _____ day of _____, 20__.

Contractor

By _____
Title _____

STATE OF WASHINGTON)
) ss
COUNTY OF)

I, _____, a Notary Public in and for the said State, do hereby certify that on this _____, day of _____, 20____, that _____, executed the within and foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said company, for the uses and purposes therein mentioned, and on oath stated that he/she was authorized to execute said instrument.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year in this certificate first above written.

Notary Public in and for the State of Washington
My appointment expires _____

WASHINGTON STATE **PREVAILING WAGE RATES**

- **STATE PREVAILING WAGE RATES FOR PIERCE COUNTY**

PREVAILING WAGE RATES

This project requires prevailing wages under [39.12 RCW](#). Any worker, laborer, or mechanic employed in the performance of any part of the work shall be paid not less than the applicable prevailing rate of wage.

The project site is located in Pierce County.

The effective date for prevailing wages on this project will be the **submittal deadline** with these exceptions:

- a. If the project is not awarded within six months of the submittal deadline, the award date is the effective date.
- b. If the project is not awarded pursuant to a competitive solicitation, the date the contract is executed is the effective date.
- c. Janitorial contracts follow WAC 296-127-023.

Except for janitorial contracts, these rates shall apply for the duration of the contract unless otherwise noted in the solicitation.

Look up prevailing rates of pay, benefits, and overtime codes from this link:

<https://secure.lni.wa.gov/wagelookup/>

REQUIRED FILINGS

The contractor and all subcontractors covered under [39.12 RCW](#) shall submit to the Department of Labor and Industries (L&I) for work provided under this contract:

1. A Statement of Intent to Pay Prevailing Wages must be filed with and approved by L&I upon award of contract.
2. An Affidavit of Wages Paid must be filed with and approved by L&I upon job completion.

Payments cannot be released by the City until verification of these filings are received by the engineer. Additional information regarding these filings can be obtained by calling the Department of Labor & Industries, Prevailing Wage at 360-902-5335, <https://www.lni.wa.gov/> or by visiting their MY L&I account.

CITY PROGRAMS

- **EQUITY IN CONTRACTING – EIC REQUIREMENTS**
- **LEAP REQUIREMENTS**



Equity In Contracting Office

Community & Economic Development Department

There are no Equity In Contracting (EIC) requirements for this solicitation.

However, the City of Tacoma is committed to equality in contracting for under-utilized minority and women-owned businesses and we encourage you to locate these firms here [Office of Minority & Women Owned Businesses](#).

In accordance with TMC 1.07.040, Equity In Contracting, The City of Tacoma Public Works capital project PW23-0089F: Fire Station 11&13 HVAC Replacement; has been granted and exception request based on the following:

- 1. The lack of certified contractors exist to create any utilization opportunities as documented using the established EIC goal setting process.**

In accordance with this application for exception Public Works staff researched 57 available firms capable of meeting the MBE/WBE/SBE/DBE goals and found the following:

1. Contacted firms many of whom do not have websites and were unreachable.
2. The firms that were reachable were not available for this project this year.
3. This project is highly specialized in HVAC and that contractor will hold majority of the work. There are few candidates within MBE/WBE/SBE/DBE that are focused in this area of construction.

Based on the preceding findings and exception request submittal was made and approved by the Equity in Contracting Office of the City of Tacoma on 4/11/2023.

In addition, the project shall maintain the LEAP requirements set forth below:

- 1. 15% Local Employment**
- 2. 15% Apprenticeship**



City of Tacoma
Community and Economic Development Department
LEAP Office
747 Market Street, Room 808
Tacoma, WA 98402
(253) 591-5826
FAX (253) 591-5232

LEAP LOCAL EMPLOYMENT AND APPRENTICESHIP TRAINING PROGRAM ABBREVIATED PROGRAM REQUIREMENTS

LEAP is a mandatory City of Tacoma program adopted to provide employment opportunities for City of Tacoma residents and residents of Economically Distressed Areas of the Tacoma Public Utilities Service Area. It requires Contractors performing qualifying public works projects or service contracts to ensure that 15 percent of the total labor hours worked on the project are performed by LEAP-Qualified Pierce County apprentices approved by the Washington State Apprenticeship Council (SAC), youth, veterans and/or residents of Tacoma. Compliance may be met through any combination LEAP-Qualified employees. The Prime Contractor shall be solely responsible for meeting the LEAP Utilization Goal requirements.

Prime Contractors may obtain further information by contacting the City of Tacoma's LEAP Program at (253) 591-5826, Fax (253) 591-5232, or e-mail carmstrong@cityoftacoma.org. The LEAP Coordinator can assist contractors in the recruitment of qualified entry-level workers to work on City of Tacoma Public Works projects. The LEAP Office is in the Tacoma Municipal Building, 747 Market Street, Rm 808.

LEAP PROGRAM REQUIREMENTS:

1. **LOCAL EMPLOYMENT GOAL:** The Contractor is required to ensure that 15 percent of the total Labor Hours worked on the project are performed by residents of the City of Tacoma or Economically Distressed ZIP Codes for the following projects:

- a) Civil Projects over \$250,000
- b) Building Projects over \$750,000

2. **APPRENTICE GOAL:** The Contractor is required to ensure that 15 percent of the total Labor Hours worked on any project over \$1,000,000 are performed by Apprentices who are residents of the Tacoma Public Utilities Service Area.

3. **SUBCONTRACTOR NOTIFICATION:** Prime Contractors shall notify all Subcontractors of the LEAP Program requirement. Subcontractor labor hours may be utilized towards achievement of the LUG. Owner/Operator hours may be used for the Local Employment Goal.

4. **FAILURE TO MEET LEAP UTILIZATION GOAL:** Contractors shall be assessed an amount for each hour that is not achieved. The amount per hour shall be based on the extent the Contractor met its goal. The amount per hour that shall be assessed shall be as follows:

- 100% achievement \$0.00 penalty
- 99% to 90% achievement \$2.00 penalty
- 89% to 75% achievement \$3.50 penalty
- 74% to 50% achievement \$5.00 penalty
- 49% to 1% achievement \$7.50 penalty
- 0% achievement \$10.00 penalty

*Penalty may be waived in the best interests of the City of Tacoma.

LEAP DOCUMENT SUBMITTALS:**

1. **PRIME CONTRACTOR LEAP UTILIZATION PLAN (PCLUP):** The Contractor is required to provide the *PCLUP* at the **Pre-Construction meeting** showing the goals to be achieved for the project. The Contractor must identify in the *PCLUP* the estimated labor hours to be worked on the project by trade/craft persons.

2. *LEAP EMPLOYEE VERIFICATION FORM*: The Contractor must provide the LEAP Office with a form for every person whom the contractor will claim credit towards meeting the LUG with at least one piece of verifying documentation.
3. *LEAP WEEKLY PAYROLL REPORT*: The Prime and Subcontractors must complete and attach this form to the front of each weekly certified payroll when submitting to the LEAP Office for review.
4. *WEEKLY CERTIFIED PAYROLL*: The Prime and Subcontractors must submit weekly Certified Payrolls that include, employee name, address, social security number, craft/trade, class, hours worked on this job, rate of pay, and gross wages paid including benefits for this job.
5. *L&I STATEMENT OF INTENT TO PAY PREVAILING WAGE FORM*: The LEAP Office shall be provided with a copy for every contractor on the project.
6. *L&I AFFIDAVIT OF WAGES PAID FORM*: The LEAP Office shall be provided with a copy for every contractor on the project.

****WITHHOLDING PROGRESS PAYMENTS**: The LEAP Coordinator may withhold progress payments for failure to submit required forms.



City of Tacoma
LEAP Office
747 Market Street, Room 900
Tacoma, WA 98402
Phone (253) 591-5826
FAX (253) 591-5232

LEAP

Document Submittal Schedule

In the attached packet, you will find the LEAP forms that are required to be submitted by the Prime and Sub Contractors.

- ❑ **LEAP Abbreviated Program Requirements:** brief overview of LEAP Program requirements
- ❑ **Prime Contractor *LEAP* Utilization Plan:** to be submitted at the Pre-Construction Meeting
(*Required by Prime Contractor Only*)
- ❑ **LEAP Employee Verification Form:** to be submitted on an ongoing basis for each qualified LEAP employee
- ❑ **LEAP Weekly Payroll Report:** must be attached and filled out to the front of each certified payroll
- ❑ **Tacoma Public Utilities Service Area Map:** for your reference on LEAP-qualified zoning areas

In addition, the City of Tacoma will also require from the Prime Contractor and all its Subcontractors:

- ❑ **Weekly Certified Payrolls:** to be submitted weekly, biweekly or monthly with the LEAP Payroll Report attached as scheduled by the Prime
- ❑ **Statement of Intent to Pay Prevailing Wages:** to be submitted prior to commencing work
- ❑ **Affidavit of Wages Paid:** to be submitted upon completion of each contractor's work
- ❑ **Local Resident/Pierce County (State – Approved) Apprentice Verification Form:** to be submitted on an ongoing basis for each qualified LEAP employee
- ❑ **Document Verification:** provide required information when requested from LEAP Office

Please submit above documents as instructed by the Project Manager.

If you have any questions or request further information, please feel free to contact the City of Tacoma's LEAP Program at (253) 591-5826, Fax (253) 591-5232, or email carmsstrong@cityoftacoma.org.

CHAPTER 1.90
LOCAL EMPLOYMENT AND APPRENTICESHIP TRAINING PROGRAM

Sections:

- 1.90.010 Purpose.
- 1.90.020 Scope.
- 1.90.030 Definitions.
- 1.90.040 LEAP goals.
- 1.90.050 *Repealed.*
- 1.90.060 Effect of program on prime contractor/subcontractor relationship.
- 1.90.070 Apprentice utilization requirements – Bidding and contractual documents.
- 1.90.080 Enforcement.
- 1.90.090 Compliance with applicable law.
- 1.90.100 Review and reporting.
- 1.90.105 Authority
- 1.90.110 Interpretation.

1.90.010 Purpose.

The purpose of this Chapter is to establish a means of providing for the development of a trained and capable workforce possessing the skills necessary to fully participate in the construction trades.

(Ord. 26301 § 1; passed Oct. 6, 1998)

1.90.020 Scope.

The provisions of this Chapter shall apply to all Public Works or Improvements funded in whole or in part with City funds or funds which the City expends or administers in accordance with the terms of a grant.

(Ord. 26301 § 1; passed Oct. 6, 1998)

1.90.030 Definitions.

As used in this chapter, the following terms shall have the following meanings:

- A. “Apprentice” shall mean a person enrolled in a course of training specific to a particular construction trade or craft, which training shall be approved by the Washington State Apprenticeship and Training Council established pursuant to RCW 49.04.010.
- B. “Building Projects” shall mean all Public Works or Improvements having an Estimated Cost greater than \$750,000.00, and for which a building permit must be issued pursuant to Chapter 1 of the current edition of the state building code (Uniform Building Code).
- C. “City” shall mean all divisions and departments of the City of Tacoma, and all affiliated agencies, provided, however, that the Tacoma Community Redevelopment Authority shall not be included within this definition.
- D. “Civil Projects” shall mean all Public Works or Improvements that are not defined as a “Building Project,” provided that those projects having an Estimated Cost of less than \$250,000.00 shall not be included in this definition.
- E. “Contractor or Service Provider” means a person, corporation, partnership, or joint venture entering into a contract with the City to construct a Public Work or Improvement.
- F. “Director” shall mean the Director of Community and Economic Development, or the Director’s Designee.
- G. “Economically Distressed ZIP Codes” shall mean ZIP codes in the Tacoma Public Utilities Service Area that meet two out of three (2/3) of the thresholds of:
 - 1. High concentrations of residents living under 200% of the federal poverty line in terms of persons per acre (69th percentile)
 - 2. High concentrations of unemployed people in terms of persons per acre (45th percentile)
 - 3. High concentrations of people 25 years or older without a college degree in terms of persons per acre (75th percentile)

Said thresholds shall be updated within 30 days following any Prevailing Wage updates issued by the Washington State Labor and Industry. All updates are to be published on the first business day in August and in February of each calendar year.

H. “Electrical Utility” and “Water Utility” shall mean, respectively, the Light Division of the Department of Public Utilities of the City of Tacoma, and shall include the electrical and telecommunications services of that Division, and the Water Division of the Department of Public Utilities of the City of Tacoma.

I. “Estimated Cost” shall mean the anticipated cost of a Public Work or Improvement, as determined by the City, based upon the expected costs of materials, supplies, equipment, and labor, but excluding taxes and contingency funds.

J. “Estimated Labor Hours” shall mean the anticipated number of Labor Hours determined by the City to be necessary to construct a Public Work or Improvement and set forth in the specifications for the project, or as may be subsequently revised due to contract or project adjustment, or pursuant to an agreed upon change order.

K. “Existing Employee” shall mean an employee whom the Contractor or Service Provider can demonstrate was actively employed by the Contractor or Service Provider for at least 1000 hours in the calendar year prior to bid opening plus one month following bid opening, and who was performing work in the construction trades.

L. “Labor Hours” shall mean the actual number of hours worked by workers receiving an hourly wage who are employed on the site of a Public Work or Improvement, and who are subject to state or federal prevailing wage requirements. The term “Labor Hours” shall include hours performed by workers employed by the Contractor or Service Provider and all Subcontractors, and shall include additional hours worked as a result of a contract or project adjustment or pursuant to an agreed upon change order. The term “Labor Hours” shall not include hours worked by workers who are not subject to the prevailing wage requirements set forth in either RCW 39.12 or the Davis-Bacon Act - 40 U.S.C. 276 (a).

M. “LEAP Coordinator” shall mean the City of Tacoma staff member who administers LEAP.

N. “LEAP Program” or “Program” shall mean the City of Tacoma’s Local Employment and Apprenticeship Training Program, as described in this chapter.

O. “LEAP Regulations” or “Regulations” shall mean the rules and practices established in this document.

P. “LEAP Utilization Plan” shall mean the document submitted by the Contractor to the LEAP Coordinator which outlines how the associated goals will be met on the project.

Q. “Priority Hire Resident” shall mean any resident within the Economically Distressed ZIP Codes.

R. “Project Engineer” shall mean the City employee who directly supervises the engineering or administration of a particular construction project subject to this chapter.

S. “Public Work or Improvement” shall have the same meaning as provided in Section 39.04.010 RCW, as that Section may now exist or hereafter be amended.

T. “Resident of Tacoma” shall mean any person, not defined as a Resident of the Community Empowerment Zone, who continues to occupy a dwelling within the boundaries of the City of Tacoma, has a present intent to continue residency within the boundaries of the City, and who demonstrates the genuineness of that intent by producing evidence that the person’s presence is more than merely transitory in nature.

U. “Service Area - Electrical” or “Electrical Service Area” shall mean that area served with retail sales by the Electrical Utility of the City of Tacoma at the time a bid is published by the Electrical Utility for a Public Work or Improvement to be performed primarily for the Electrical Utility.

V. “Service Area - Water” or “Water Service Area” shall mean that area served with retail sales by the water utility of the City of Tacoma at the time a bid is published by the water utility for a Public Work or Improvement to be performed primarily for the water utility.

W. “Service Contract” shall mean all City contracts relating to a Public Work or Improvement which utilize labor at a City site and which are not within the exceptions to nor defined as “Building Projects” or “Civil Projects.”

X. “Subcontractor” means a person, corporation, partnership, or joint venture that has contracted with the Contractor or Service Provider to perform all or part of the work to construct a Public Work or Improvement by a Contractor.

Y. “Tacoma Public Utilities” means the City of Tacoma, Department of Public Utilities.

Z. “Tacoma Public Utilities Service Area” shall mean every ZIP code listed by Tacoma Public Utilities as an area that either receives services or maintains infrastructure to provide services.

AA. Washington State Labor and Industry Prevailing Wage shall mean the hourly wage, usual benefits and overtime, paid in the largest city in each county, to the majority of workers, laborers, and mechanics. Prevailing wages are established, by the Department of Labor & Industries, for each trade and occupation employed in the performance of public work. They are established separately for each county, and are reflective of local wage conditions.

(Ord. 28520 Ex. A; passed Jul. 17, 2018; Ord. 28147 Ex. B; passed May 7, 2013; Ord. 28110 Ex. C; passed Dec. 4, 2012; Ord. 27815 Ex. A; passed Jun. 30, 2009; Ord. 27368 § 1; passed Jun. 21, 2005; Ord. 26698 § 1; passed Sept. 12, 2000; Ord. 26301 § 1; passed Oct. 6, 1998)

1.90.040 LEAP goals.

A. Utilization Goals.

1. All Contractors constructing Civil Projects or Building Projects, and all Service Providers involved with the construction of a Public Work or Improvement, shall ensure that at least 15 percent of the total Labor Hours actually worked on the Project are performed by persons having their residence within the boundaries of the City of Tacoma or Economically Distressed ZIP Codes, whether or not any such person is an Apprentice.

a. The thresholds for this section shall be \$250,000.00 for Civil Projects and \$750,000.00 for Building Projects.

2. Fifteen percent (15%) of the Total Labor Hours on contracts above one-million dollars (\$1,000,000.00) shall have work performed by Apprentices who are residents of the Tacoma Public Utilities Service Area consistent with RCW 39.04.320(1)(a), subject to waiver based on exceptions as specified in RCW 39.04.320(2)(a), (b), and (c).

3. Labor Hours performed by non-residents of the State of Washington will be deducted from a project's total Labor Hours for purposes of determining compliance with the requirements of this chapter.

4. All Contractors and Service Providers shall submit a LEAP Utilization Plan as provided for in the regulations adopted under this chapter, and shall meet with the LEAP Coordinator to review said Plan prior to being issued a Notice to Proceed. Failure to submit a LEAP Utilization Plan may be grounds for the City to withhold remittance of a progress payment until such Plan is received from the responsible Contractor or Provider. A meeting with the LEAP Coordinator prior to issuance of a Notice to Proceed shall be excused only when the LEAP Coordinator is unavailable to meet prior to the scheduled date for issuance of the Notice to Proceed and the Contractor and the LEAP Coordinator have otherwise scheduled a meeting for the coordinator to review the Contractor's or Provider's plan.

The Contractor or Service Provider shall be responsible for meeting the LEAP utilization goal requirements of the contract, including all amendments and change orders thereto, and shall be responsible for overall compliance for all hours worked by Subcontractors. To the extent possible, the Contractor or Service Provider shall recruit Apprentices from multiple trades or crafts.

B. Failure to Meet Utilization Goal.

1. Contracts for the construction of Building projects or Civil projects and Service Contracts shall provide that Contractors or Service Providers failing to meet the LEAP utilization goals shall be assessed an amount for each hour that is not achieved. The amount per hour shall be based on the extent the Contractor or Service Provider met its goal. The amount per hour that shall be assessed shall be as follows:

Percent of Goal Met	Assessment per unmet hour
100%	\$ 0.00
90% - 99%	\$ 2.00
75% to 89%	\$ 3.50
50% to 74%	\$ 5.00
1% to 49%	\$ 7.50
0%	\$10.00

When determining the percent of goal that is met, all rounding shall be down to the nearest whole percent. No penalty shall be waived by the City unless it is determined by the Director to be in the best interests of the City, which determination shall be made after consultation with the LEAP Coordinator.

2. Deposit of Assessments. All assessments imposed pursuant to this section shall be deposited into a separate account and utilized to support the City's pre-apprenticeship and training program. The policies and regulations adopted by the City Manager and Director of Utilities pursuant to this chapter shall address issues pertaining to a Contractor's existing workforce. Contributions need not be made for Labor Hours that have been adjusted in accordance with Section 1.90.040(E).

C. LEAP Reports.

Notwithstanding the provisions of TMC 1.90.100, the Director shall, not less than annually, publish a LEAP report setting forth Contractor compliance with this chapter. Said report shall include information on all contracts and all Contractors to which this chapter applies, and shall detail the level and nature of LEAP participation by contract and by Contractor, The

Director's LEAP report may include such other information as may be helpful to assuring fair and accurate representation of the contracts, Contractors or projects covered in the report. The Director's LEAP reports may be considered by the Board of Contracts and Awards in its determinations as to bidder responsibility.

D. LEAP Goal Adjustments.

1. LEAP utilization goals may be adjusted prior to bid opening and/or as a result of a contract amendment or change order on a Building Project, Civil Project, or Service Contract.

a. If LEAP utilization goals are adjusted prior to bid opening, they shall be set forth in the bid or Request For Proposal advertisement and specification documents or in an addendum timely provided to prospective bidders, provided that such adjustment shall be based upon a finding by the Project Engineer that the reasonable and necessary requirements of the contract render LEAP utilization unfeasible at the required levels. The Director shall concur with the Project Engineer's finding, provided that should the Project Engineer and the Director fail to reach agreement on the Project Engineer's finding, then in that circumstance the matter shall be referred to the City Manager or the Director of Utilities, as appropriate, for ultimate resolution. Notwithstanding any other provision of this chapter to the contrary, the decision of the City Manager or the Director of Utilities with regard to LEAP goal adjustment may not be appealed.

b. If LEAP utilization goals are adjusted due to contract amendment or change order, the amount of adjustment shall be consistent with the utilization goals set forth in this chapter and shall be determined pursuant to regulations adopted pursuant to this chapter for administration of LEAP utilization goal adjustments.

2. The methodology of determining the appropriate adjustments to LEAP utilization goals shall be determined in consultation with the LEAP Advisory Committee, established pursuant to this ordinance for so long as the LEAP Advisory Committee remains in existence.

3. LEAP utilization goals shall not apply to those portions of a project that are funded by sources other than (a) City funds, or (b) funds which the City expends or administers in accordance with the terms of a grant to the City, provided that the Project Engineer shall notify the Director of such non-application prior to bid advertisement. For the purposes of this paragraph, credits extended by another entity for the purpose of providing project funding shall not be considered to be City funds.

E. Utilization - Electrical Projects Outside Electrical Service Area.

Civil Projects or Building Projects that are constructed primarily for the benefit or use by the City's Electrical Utility, which are wholly situated outside the Electrical Service Area, and for which the estimated cost is less than \$1,000,000.00, are exempt from the requirements of this chapter.

F. Utilization - Water Projects Outside Water Service Area.

Civil Projects or Building Projects that are constructed primarily for the benefit or use by the City's water utility, which are wholly situated outside the Water Service Area, and for which the estimated cost is less than \$1,000,000.00 are exempt from the requirements of this chapter.

G. Utilization - Projects Outside Tacoma Public Utilities Service Area.

Civil Projects or Building Projects that are constructed primarily for the benefit or use by Tacoma Public Utilities, which are wholly situated outside the retail service area of the Tacoma Public Utilities Service Area, and for which the estimated cost is less than \$1,000,000.00 are exempt from the requirements of this chapter. Projects wholly situated outside the Tacoma Public Utilities Service Area, and for which the estimated cost is more than \$1,000,000.00, shall be exempt from 15% utilization goal specified in subsection A1. of this section. The 15% utilization goal specified in subsection A2. of this section may be met if project work is performed by Apprentices who are enrolled in a course of training specific to a particular construction trade or craft, provided such training has been approved by the Washington State Apprenticeship and Training Council in accordance with Chapter 49.04, RCW.

H. Emergency.

This chapter shall not apply in the event of an Emergency. For the purposes of this section, an "Emergency" means unforeseen circumstances beyond the control of the City that either: (a) present a real, immediate threat to the proper performance of essential functions; or (b) will likely result in material loss or damage to property, bodily injury, or loss of life if immediate action is not taken.

I. Conflict with State or Federal Requirements.

If any part of this chapter is found to be in conflict with federal or state requirements which are a prescribed condition to the allocation of federal or state funds to the City, then the conflicting part of this chapter is inoperative solely to the extent of the conflict and with respect to the City departments directly affected. This provision does not affect the operation of the

remainder of this chapter. Administrative rules or regulations adopted under this chapter shall meet federal and state requirements which are a necessary condition to the receipt of federal or state funds by the City.

(Ord. 28520 Ex. A; passed Jul. 17, 2018: Ord. 28147 Ex. B; passed May 7, 2013: Ord. 27815 Ex. A; passed Jun. 30, 2009: Ord. 27368 § 2; passed Jun. 21, 2005: Ord. 26992 § 1; passed Oct. 15, 2002: Ord. 26698 § 2; passed Sept. 12, 2000: Ord. 26301 § 1; passed Oct. 6, 1998)

1.90.050 Repealed by Ord. 27368. Good faith efforts.

(Ord. 27368 § 3; passed Jun. 21, 2005: Ord. 26698 § 3; passed Sept. 12, 2000: Ord. 26301 § 1; passed Oct. 6, 1998)

1.90.060 Effect of program on prime contractor/service provider - subcontractor relationship.

The LEAP Program shall not be construed so as to modify or interfere with any relationship between any Contractor or Service Provider and Subcontractor. The LEAP Program shall not grant the City any authority to control the manner or method of accomplishing any construction work that is additional to any authority retained by the City in a Public Works contract.

(Ord. 26698 § 4; passed Sept. 12, 2000: Ord. 26301 § 1; passed Oct. 6, 1998)

1.90.070 Apprentice utilization requirements – Bidding and contractual documents.

All packages of bid documents for every Building Project and every Civil Project shall incorporate provisions satisfactory to the City Attorney so as to allow enforcement of the provisions contained in this Chapter. Such contractual provisions may include liquidated damages, calculated to reimburse the City for the Contractor's breach of these performance requirements, which shall be published with the City's call for bids.

(Ord. 26301 § 1; passed Oct. 6, 1998)

1.90.080 Enforcement.

A. The Director shall review the Contractor's or Service Provider's and all Subcontractor's employment practices during the performance of the work for compliance with LEAP Program requirements. On-site visits may be conducted as necessary to verify compliance with the requirements of the LEAP Program. The Contractor, Service Provider, or Subcontractors shall not deny to the City the right to interview its employees, provided that the Director shall make reasonable efforts to coordinate employee interviews with employers.

B. Any knowing failure or refusal to cooperate in compliance monitoring may disqualify the defaulting Contractor, Service Provider, or Subcontractor from eligibility for other City contracts.

C. The making of any material misrepresentation may disqualify the defaulting Contractor, Service Provider, or Subcontractor from eligibility for other City contracts.

D. Any action by the City, its officers and employees, under the provisions of this Chapter may be reviewed by the Board of Contracts and Awards, upon written application of the party so affected. Application shall be made within twenty (20) days of the date of the action upon which the appeal is based, and provided to the City by certified mail or by personal service. Any action taken by the Board of Contracts and Awards may be appealed to the City Council or Public Utility Board, as appropriate, and thereafter if desired, to the Superior Court of Pierce County, Washington, within fifteen (15) days of the previous decision.

(Ord. 26698 § 5; passed Sept. 12, 2000; Ord. 26301 § 1; passed Oct. 6, 1998)

1.90.090 Compliance with applicable law.

Nothing in this Chapter shall excuse a Prime Contractor, Service Provider, or Subcontractor from complying with all relevant federal, state, and local laws.

(Ord. 26698 § 6; passed Sept. 12, 2000; Ord. 26301 § 1; passed Oct. 6, 1998)

1.90.100 Review and reporting.

The City Manager and Director of Utilities shall review the Program on or before January 1, 2000, and every two (2) years thereafter, and shall report to the City Council and Public Utility Board the Manager's and Director's findings, conclusions, and recommendations as to the continued need for the Program, and any revisions thereto that should be considered by the Council and Board.

(Ord. 26301 § 1; passed Oct. 6, 1998)

1.90.105 Authority.

The City Manager and the Director of Utilities shall have authority to jointly adopt policies and regulations consistent with this chapter to implement the LEAP program.

(Ord. 26698 § 7; passed Sept. 12, 2000; Ord. 26301 § 1; passed Oct. 6, 1998)

1.90.110 Interpretation.

This Chapter shall not be interpreted or construed so as to conflict with any state or federal law, nor shall this Chapter be enforced such that enforcement results in the violation of any applicable judicial order.

(Ord. 26301 § 1; passed Oct. 6, 1998)

LOCAL EMPLOYMENT AND APPRENTICESHIP TRAINING PROGRAM (LEAP)

LEAP REQUIREMENTS & PROCEDURES:

The LEAP office enforces post-award mandatory requirements. Bidders do not have to submit any information in the bid submittal package to be in compliance with LEAP.

Post-award Submittals:

- ***LEAP Employee Verification Form.* This form is to be completed for employees who may be LEAP-Qualified and may be able to help meet the LEAP Goals.**
- ***LEAP Weekly Payroll Report.* This form is to be completed and submitted with each certified payroll.**

The City of Tacoma's LEAP office enforces two mandatory requirements on City projects based on certain monetary thresholds.

Local Employment Utilization Goal - the Prime Contractor performing a qualifying public works project must ensure that 15 percent of the total labor hours worked on the project are performed by residents of the City of Tacoma or Economically Distressed Zip Codes, whether or not any such person is an apprentice.

Apprenticeship Utilization Goal – for contracts above one-million dollars, the Prime Contractor performing a qualifying public works project must ensure that 15 percent of the total labor hours worked on the project are performed by Apprentices who are residents of the City of Tacoma or Tacoma Public Utilities Service Area. The accompanying LEAP Regulations, forms, and maps are included in these specifications.

***Exceptions:** If the project is located outside of the retail service area of the Tacoma Public Utilities Service Area, then Apprentices may come from the county in which the work is performed.

This project is above \$1 million and is thusly subject to the:

1. 15% Local Employment Utilization Goal
2. 15% Apprentice Utilization Goal

LEAP staff can assist contractors in the recruitment, screening and selection of qualified City of Tacoma residents, Economically Distressed Area residents, and Apprentices. Contractors may obtain further information by contacting the City's LEAP Office at (253) 316-3057 or (253) 591-5590. The LEAP Office is located in the Tacoma Municipal Building, 747 Market Street, Room 900, Tacoma, WA 98402. www.cityoftacoma.org/leap

No Work Performed (NWP) Report

Prime/Sub Contractor: _____

Specification Number: _____

Project Description: _____

Payroll Week Ending Date: _____ Payroll Number: _____

NO WORK PERFORMED

I, the undersigned, do hereby certify under penalty of perjury, that the information contained herein is true and correct.

Signature of Responsible Officer

Title

Date



City of Tacoma LEAP Office
747 Market Street, Room 900
Tacoma, WA 98402
(253) 591-5590 or leap@cityoftacoma.org
www.cityoftacoma.org/leap

LEAP EMPLOYEE VERIFICATION FORM

Contractor/Sub: _____ Specification Number: _____

Project Description: _____

Employee Name: _____ Craft: _____

Ethnic Group (*optional*): ☐ Asian/Pac Isl. ☐ Black ☐ Hispanic ☐ Native American ☐ White ☐ Other

Gender (*optional*): ☐ MALE ☐ FEMALE

Complete Physical Address (No PO Boxes): _____

City: _____ State: _____ Zip: _____ Telephone: _____ Date of Hire: _____

Apprenticeship County: _____ Apprentice Registration I.D. (*if applicable*): _____

Age: _____ Copy of DD-214: _____

*******Please fill out entire form for tracking LEAP performance*******

LEAP qualified employee categories: (check all that apply and provide evidence for each check)

_____ a. Resident (journey level or certified apprentice) within the geographic boundaries of the City of Tacoma

_____ b. Resident (journey level or certified apprentice) within Economically Distressed ZIP Codes of the Tacoma Public Utilities Service Area

_____ c. WA State Approved Apprentice living in the Tacoma Public Utilities Service Area (Only valid for projects over \$1,000,000)

_____ d. WA State Approved Apprentice *(Only valid for contracts where 100% of work is performed outside of Pierce County)

Signature of Employee: _____ Date: _____

Contractor Representative: _____ Date: _____

LEAP EMPLOYEE VERIFICATION FORM

To be Completed by Contractor or Subcontractor

Please attach a legible copy of one or more of the following document(s) showing the address of residence as proof of local (Tacoma) and/or Economically Distressed Area and/or TPU Service Areas residency. For youth, see first line and for veteran status, see second line.

.....

_____ For Youth - Copy of Birth Certificate or WA State ID or
_____ WA Driver's License (projects advertised after 05-20-13)

_____ For Veterans – Copy of DD-214(Projects advertised after
_____ 05-20-13)

_____ Driver's License with current address

_____ Utility Bill/Phone Bill/Cell Bill/Cable Bill with current
_____ address

_____ Copy of current tax form W-4

_____ Rental Agreement/Lease (residential)

_____ Computer Printout From Other Government Agencies

_____ Property Tax Records

_____ Apprentice Registration I.D.

_____ Food Stamp Award Letter

_____ Housing Authority Verification

_____ Insurance Policy (Residence/Auto)

*Any of the above must have a complete physical address verified by the www.govme.org website.

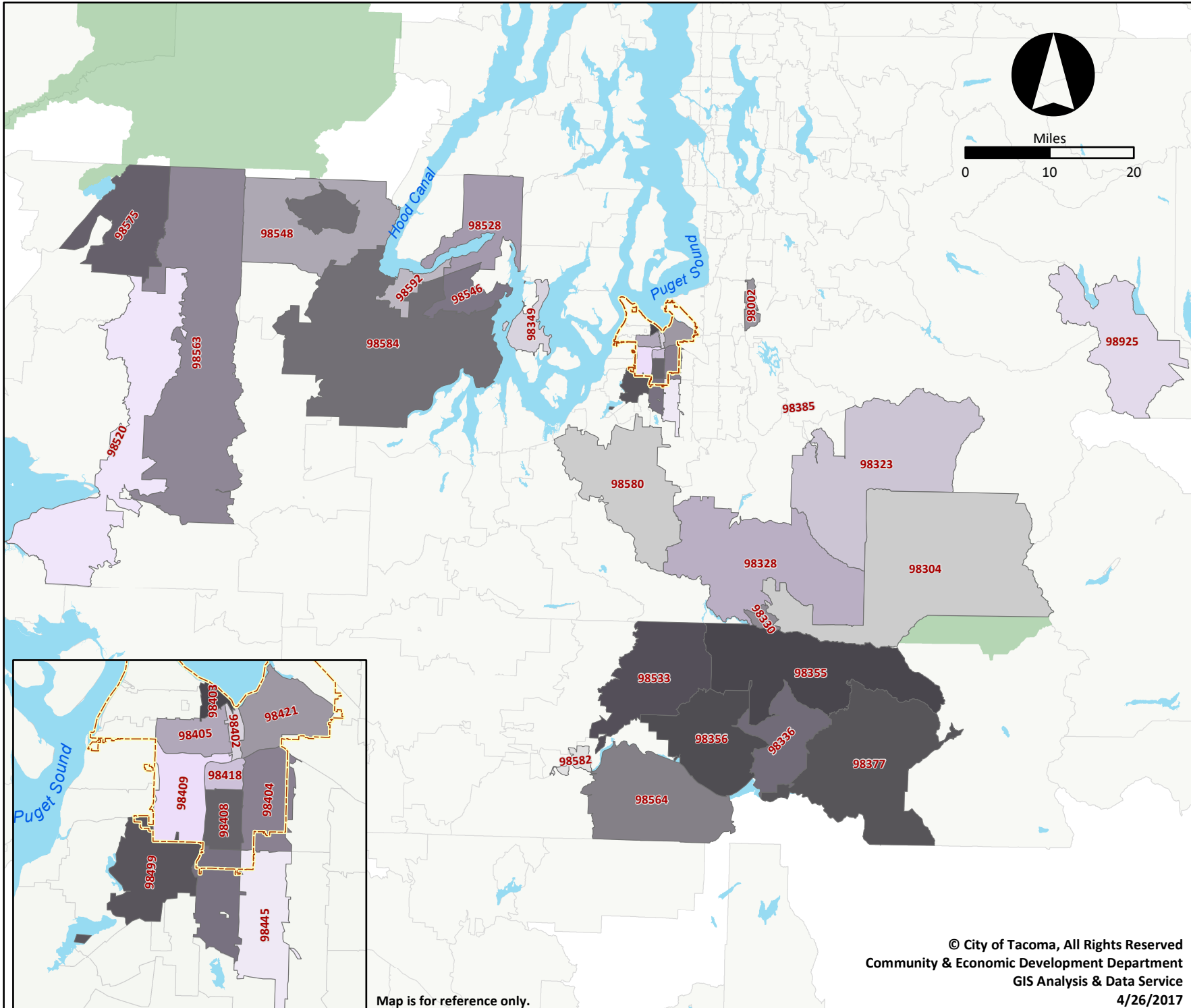
No PO Boxes

Contractor Representative:_____

Date:_____

Title:_____

Appendix C: Economically Distressed ZIP Codes Map



City Limits

- 98002
- 98304
- 98323
- 98328
- 98330
- 98336
- 98349
- 98355
- 98356
- 98377
- 98385
- 98520
- 98528
- 98533
- 98546
- 98548
- 98563
- 98564
- 98575
- 98580
- 98582
- 98584
- 98592
- 98925
- 98402
- 98403
- 98408
- 98409
- 98418
- 98421
- 98444
- 98445
- 98499

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Community & Economic Development Department
GIS Analysis & Data Service
4/26/2017

Map is for reference only.

Tacoma Public Utilities Infrastructure and Service Area (Apprentice Utilization)

98001	Auburn	0.00%
98002	Auburn	0.00%
98003	Federal Way	0.00%
98010	Black Diamond	0.00%
98022	Enumclaw	0.00%
98023	Federal Way	0.00%
98030	Kent	0.00%
98032	Kent	0.00%
98038	Maple Valley	0.00%
98042	Kent	0.00%
98045	North Bend	0.00%
98051	Ravensdale	0.00%
98070	Vashon	0.00%
98092	Auburn	0.00%
98198	Seattle	0.00%
98304	Ashford	0.00%
98321	Buckley	0.27%
98323	Carbonado	0.05%
98327	DuPont	0.00%
98328	Eatonville	2.92%
98329	Gig Harbor	0.24%
98330	Elbe	0.00%
98332	Gig Harbor	0.00%
98333	Fox Island	0.00%
98335	Gig Harbor	0.05%
98336	Glenoma	0.00%
98338	Graham	0.79%
98349	Lakebay	0.06%
98354	Milton	0.01%
98355	Mineral	0.00%

98356	Morton	0.17%
98360	Orting	0.54%
98371	Puyallup	0.12%
98372	Puyallup	1.33%
98373	Puyallup	1.42%
98374	Puyallup	0.15%
98375	Puyallup	0.29%
98377	Randle	0.00%
98385	South Prairie	0.00%
98387	Spanaway	0.68%
98388	Spanaway	0.00%
98390	Sumner	0.12%
98391	Bonney	1.83%
98402	Tacoma	0.46%
98403	Tacoma	3.31%
98404	Tacoma	10.15%
98405	Tacoma	4.97%
98406	Tacoma	3.51%
98407	Tacoma	4.38%
98408	Tacoma	12.58%
98409	Tacoma	8.88%
98416	UPS	0.00%
98418	Tacoma	1.98%
98421	Tacoma	0.00%
98422	Tacoma	0.67%
98424	Tacoma	0.98%
98430	Camp Murray	0.00%
98433	Tacoma	0.00%
98438	McChord	0.00%
98439	Lakewood	0.00%

98443	Tacoma	0.00%
98444	Tacoma	7.20%
98445	Tacoma	2.09%
98446	Tacoma	0.17%
98447	PLU	0.00%
98465	Tacoma	0.44%
98466	Tacoma	0.06%
98467	University Place	0.09%
98498	Lakewood	0.05%
98499	Lakewood	0.26%
98520	Aberdeen	0.00%
98524	Allyn	0.97%
98528	Belfair	0.31%
98533	Cinebar	0.00%
98546	Grapeview	0.00%
98548	Hoodspport	0.00%
98555	Lilliwaup	0.00%
98563	Montesano	0.21%
98564	Mossyrock	0.00%
98575	Quinalt	0.20%
98580	Roy	2.02%
98582	Salkum	0.00%
98584	Shelton	10.31%
98585	Silver Creek	0.00%
98591	Toledo	1.93%
98592	Union	0.00%
98597	Yelm	0.00%
98925	Easton	0.00%

Economically Distressed ZIP Codes (Journeyman AND Apprentice)

Zip Code	200% Pov	Unemployed	25+ College	Area
98002	Y		Y	Auburn
98304	Y		Y	Ashford/Rainier
98323	Y	Y	Y	Carbonado
98328	Y		Y	Eatonville
98330	Y		Y	Elbe
98336	Y		Y	Glenoma
98349	Y	Y		Lakebay
98355		Y	Y	Mineral
98356	Y	Y	Y	Morton
98377	Y	Y	Y	Randle
98385		Y	Y	South Prairie
98402	Y	Y		Downton
98403	Y	Y		Stadium/St. Helens
98404	Y	Y		Eastside
98405	Y	Y		Hilltop/Central
98408	Y		Y	South End
98409	Y	Y		South Tacoma
98418	Y		Y	Lincoln/South End
98421	Y	Y	Y	Port
98439	Y	Y		McChord AFB
98444	Y	Y		Parkland
98445	Y		Y	Midland
98499	Y	Y		Lakewood
98520	Y	Y	Y	Aberdeen
98528	Y		Y	Belfair
98533		Y	Y	Cinebar
98546	Y	Y	Y	Grapeview
98548	Y	Y	Y	Hoodsport
98563	Y	Y	Y	Montesano
98564	Y	Y	Y	Mossyrock
98575	Y		Y	Quinault
98580	Y		Y	Roy
98582	Y		Y	Salkum
98584	Y		Y	Shelton
98591	Y		Y	Toledo
98592		Y	Y	Union
98925	Y		Y	Easton

GENERAL CONDITIONS AND OTHER CONTRACT TERMS & CONDITIONS

1. CITY OF TACOMA, GENERAL PROVISIONS
2. MODIFICATIONS TO THE GENERAL CONDITIONS,
AS MODIFIED BY THE CITY OF TACOMA
3. GENERAL CONDITIONS FOR WASHINGTON STATE FACILITY
CONSTRUCTION

GENERAL PROVISIONS

(Revised December 15, 2020)

SECTION I - BIDDING REQUIREMENTS

SECTION I REQUIREMENTS ARE BINDING ON ALL RESPONDENTS.

1.01 USE AND COMPLETION OF CITY PROPOSAL SHEETS

A. Respondent's Proposal

Each Respondent must bid exactly as specified on the Proposal sheets. All proposals must remain open for acceptance by the City for a period of at least 60 calendar days from the date of opening of the bids.

B. Alterations of Proposals Not Allowed

Proposals that are incomplete or conditioned in any way contain alternatives or items not called for in the General Provisions and Specifications, or not in conformity with law may be rejected as being nonresponsive. The City cannot legally accept any proposal containing a substantial deviation from these Specifications.

C. Filling Out City Proposal Sheets

All proposals must be completed using the proposal sheets and forms included with this specification, and the prices must be stated in figures either written in ink or typewritten. No proposal having erasures or interlineations will be accepted unless initialed by the Respondent in ink.

1.02 CLARIFICATION OF PROPOSAL FOR RESPONDENT

If a prospective Respondent has any questions concerning any part of the Proposal, he/she may submit a written request for answer of his/her questions. Any interpretation of the Proposal will be made by an Addendum duly issued and mailed or delivered to each prospective Respondent. Such addendum must be acknowledged in the proposal. The City of Tacoma will not be responsible for any other explanation or interpretation of the bid documents.

1.03 RESPONDENT'S BOND OR CERTIFIED CHECK

Each bid for construction must be accompanied either by a certified or cashier's check for 5 percent of the total amount bid, including tax, payable to the City Treasurer, or an approved bid bond, by a surety company authorized to do business in the State of Washington, for 5 percent of the total amount bid. The person legally authorized to sign the bid must sign all bid bonds. The approved bid bond form attached to these Specifications should be used: no substantial variations from the language thereof will be accepted.

If a bid bond is used, the 5 percent may be shown either in dollars and cents, or the bid bond may be filled in as follows, "5 percent of the total amount of the accompanying proposal."

The check of the successful Respondent will be returned after award of the Contract, acceptance of the Payment and Performance Bond and City's receipt of the signed Contract. The checks of all other Respondents will be returned immediately upon the award of the Contract. Bid bonds will not be returned.

1.04 DELIVERY OF PROPOSALS TO THE CITY'S PURCHASING OFFICE

- A.** Proposal packages must be received by the City's Procurement and Payables Division in SAP Ariba (unless another form of delivery is stated), prior to the scheduled time and date stated in the Solicitation.
- B.** Supplier is solely responsible for timely delivery of its Submittal.
- C.** Submittals received after the time stated in the solicitation will not be accepted.
- D.** For purposes of determining whether a Submittal has been timely received in SAP Ariba, the City's Procurement and Payables Division will rely on the submittal clock in SAP Ariba.

1.05 LICENSES/PERMITS

- A.** Suppliers, if applicable, must have a Washington state business license at the time of Submittal and throughout the term of the Contract. Failure to include a Washington state business license may be grounds for rejection of the Submittal or cancellation of contract award. Information regarding Washington state business licenses may be obtained at <http://bls.dor.wa.gov>.
- B.** Upon award, it is the responsibility of the Supplier to register with the City of Tacoma's Tax and License Division, 733 South Market Street, Room 21, Tacoma, WA 98402-3768, 253-591-5252, https://www.cityoftacoma.org/government/city_departments/finance/tax_and_license/. Supplier shall obtain a business license as is required by Tacoma Municipal Code Subtitle 6C.20.
- C.** During the term of the Contract, Supplier, at its expense, shall obtain and keep in force any and all necessary licenses and permits.

1.06 CONTRACTOR'S STATE REGISTRATION NUMBER

Contractors for construction or public works construction are required to be licensed by the state. If the provisions of Chapter 18.27 of the Revised Code of Washington apply to the Respondent, then the Respondent's Washington State Contractor's Registration No. must accompany the bid.

1.07 BID IS NONCOLLUSIVE

The Respondent represents by the submission of the Proposal that the prices in this Bid are neither directly nor indirectly the result of any formal or informal agreement with another Respondent.

1.08 EVALUATION OF BID

A. Price, Experience, Delivery Time and Responsibility

In the evaluation of bids, the Respondent's experience, delivery time, quality of performance or product, conformance to the specifications and responsibility in performing other contracts (including satisfying all safety requirements) may be considered in addition to price. In addition, the bid evaluation factors set forth in City Code Section 1.06.262 may be considered by the City. Respondents who are inexperienced or who fail to properly perform other contracts may have their bids rejected for such cause.

B. Prequalified Electrical Contractor

Certain types of electrical construction require special expertise, experience, and prequalification of the Contractor (or subcontractor) by the City. In such cases, the Respondent must be prequalified or the Respondent must subcontract with a City prequalified electrical contractor for the specialty work.

C. Insertions of Material Conflicting with Specifications

Only material inserted by the Respondent to meet requirements of the Specifications will be considered. Any other material inserted by the Respondent will be disregarded as being nonresponsive and may be grounds for rejection of the Respondent's Proposal.

D. Correction of Ambiguities and Obvious Errors

The City reserves the right to correct obvious errors in the Respondent's proposal. In this regard, if the unit price does not compute to the extended total price, the unit price shall govern.

1.09 WITHDRAWAL OF BID

A. Prior to Bid Opening

Any Respondent may withdraw his/her Proposal prior to the scheduled bid opening time by delivering a written notice to the City's Procurement and Payables Office. The notice may be submitted in person or by mail; however, it must be received by the City's Procurement and Payables Office prior to the time of bid opening.

B. After Bid Opening

No Respondent will be permitted to withdraw his/her Proposal after the time of bid opening, as set forth in the Call for Bids, and before the actual award of the Contract, unless the award of Contract is delayed more than sixty (60) calendar days after the date set for bid opening. If a delay of more than 60 calendar days does occur, then the Respondent must submit written notice withdrawing his/her Proposal to the Purchasing Manager.

1.10 OPENING OF BIDS

At the time and place set for the opening of bids, all Proposals, unless previously withdrawn, will be publicly opened and read aloud, irrespective of any irregularities or informalities in such Proposal.

1.11 CITY COUNCIL/PUBLIC UTILITY BOARD FINAL DETERMINATION

The City Council or Public Utility Board of the City of Tacoma shall be the final judge as to which is the lowest and best bid in the interest of the City of Tacoma. The City reserves the right to reject any and all bids, waive minor deviations or informalities, and if necessary, call for new bids.

1.12 RESPONDENT'S REFUSAL TO ENTER INTO CONTRACT

Any Respondent who refuses to enter into a Contract after it has been awarded to the Respondent will be in breach of the agreement to enter the Contract and the Respondent's certified or cashier's check or bid bond shall be forfeited.

1.13 TAXES

A. Include In Proposal All Taxes

Respondent shall include in his/her Proposal all applicable local, city, state, and federal taxes. It is the Respondent's obligation to state on his/her Proposal sheet the correct percentage and total applicable Washington State and local sales tax. The total cost to the City including all applicable taxes may be the basis for determining the low Respondent.

B. Federal Excise Tax

The City of Tacoma is exempt from federal excise tax. Where applicable, the City shall furnish a Federal Excise Tax Exemption certificate.

C. City of Tacoma Business and Occupation Tax

Sub-Title 6A of the City of Tacoma Municipal Code (TMC) provides that transactions with the City of Tacoma, may be subject to the City of Tacoma's Business and Occupation Tax. It is the responsibility of the Respondent awarded the Contract to register with the City of Tacoma's Department of Tax and License, 733 South Market Street, Room 21, Tacoma, WA 98402-3768, telephone 253-591-5252. The City's Business and Occupation Tax amount shall not be shown separately but shall be included in the unit and/or lump sum prices bid.

1.14 FIRM PRICES/ESCALATION

Except as specifically allowed by the Special Provisions, only firm prices will be accepted.

1.15 AWARD

A. Construction and/or Labor Contracts

Unless specifically noted in the Special Provisions or Proposal sheets, all construction and/or labor contracts will be awarded to only one Respondent.

B. Supply/Equipment Contracts

The City reserves the right to award an equipment or supply contract for any or all items to one or more Respondents as the interests of the City will be best satisfied.

1.16 INCREASE OR DECREASE IN QUANTITIES

The City of Tacoma reserves the right to increase or decrease the quantities of any items under this Contract and pay according to the unit prices quoted in the Proposal (with no adjustments for anticipated profit).

1.17 EXTENSION OF CONTRACT

Contracts resulting from this specification shall be subject to extension by mutual agreement per the same prices, terms and conditions.

1.18 PAYMENT TERMS

- A. Prices will be considered as net 30 calendar days if no cash discount is shown. Payment discount periods of twenty (20) calendar days or more if offered in the submittal, will be considered in determining the apparent lowest responsible submittal. Discounts will be analyzed in context of their overall cumulative effect. Invoices will not be processed for payment nor will the period of cash discount commence until receipt of a properly completed invoice and until all invoiced items are received and satisfactory performance of the Contractor has been attained. If an adjustment in payment is necessary due to damage or dispute, the cash discount period shall commence on the date final approval for payment is authorized.
- B. ePayable/Credit Card Acceptance. Submittals offering ePayable/Credit card acceptance may be compared against submittals offering a prompt payment discount to evaluate the overall cumulative effect of the discount against the advantage to the City of the ePayable/Credit card acceptance, and may be considered in determining the apparent lowest responsible submittal.

1.19 PAYMENT METHOD – EPAYABLES – CREDIT CARD ACCEPTANCE – EFT/ACH ACCEPTANCE

- A. Payment methods include:
- EPayables (Payment Plus). This is payment made via a virtual, single use VISA card number provided by the City's commercial card provider. Suppliers accepting this option will receive "due immediately" payment terms. Two options for acceptance are available to suppliers. Both are accompanied by an emailed advice containing complete payment details:
 - Straight-through processing (buyer initiated). Immediate, exact payments directly deposited to supplier accounts by the City's provider bank; the supplier does not need to know card account details.
 - Supplier retrieves card account through the secure, on-line portal provided via email notifications sent by the City's commercial card provider.
 - Credit card. Tacoma's VISA procurement card program is supported by standard bank credit suppliers and requires that merchants abide by the VISA merchant operating rules. It provides "due immediately" payment terms.
 - Suppliers must be PCI-DSS compliant (secure credit card data management) and federal FACTA (sensitive card data display) compliant.
 - Suppliers must be set up by their card processing equipment provider (merchant acquirer) as a minimum of a Level II merchant with the ability to pass along tax, shipping and merchant references information.
 - Electronic Funds Transfer (EFT) by Automated Clearing House (ACH). Standard terms are net 30 for this payment method.
 - Check or other cash equivalent. Standard terms are net 30 for this payment method.
- B. The City's preferred method of payment is by ePayables (Payment Plus) followed by credit card (aka procurement card). Suppliers may be required to have the capability of accepting the City's ePayables or credit card methods of payment. **The City of Tacoma will not accept price changes or pay additional fees when ePayables (Payment Plus) or credit card is used.**
- C. The City, in its sole discretion, will determine the method of payment for goods and/or services as part of the Contract.

1.20 COOPERATIVE PURCHASING

The Washington State Interlocal Cooperative Act RCW 39.34 provides that other governmental agencies may purchase goods and services on this solicitation or contract in accordance with the terms and prices indicated therein if all parties are agreeable.

1.21 PUBLIC DISCLOSURE: PROPRIETARY OR CONFIDENTIAL INFORMATION

- A. Respondent's Submittals, all documents and records comprising any Contract awarded to Respondent, and all other documents and records provided to the City by Respondent are deemed public records subject to disclosure under the Washington State Public Records Act, Chapter 42.56 RCW (Public Records Act). Thus, City may be required, upon request, to disclose the Contract and documents or records related to it unless an exemption under the Public Records Act or other laws applies. In the event CITY receives a request for such disclosure, determines in its legal judgment that no applicable exemption to disclosure applies; and Respondent has complied with the requirements to mark records considered confidential or proprietary

as such requirements are stated below, City agrees to provide Respondent 10 days written notice of impending release. Should legal action thereafter be initiated by Respondent to enjoin or otherwise prevent such release, all expense of any such litigation shall be borne by Respondent, including any damages, attorneys' fees or costs awarded by reason of having opposed disclosure. City shall not be liable for any release where notice was provided and Respondent took no action to oppose the release of information.

B. If Respondent provides City with records or information that Respondent considers confidential or proprietary, Respondent must mark all applicable pages or sections of said record(s) as "Confidential" or "Proprietary." Further, in the case of records or information submitted in response to a Request for Proposals, an index must be provided indicating the affected pages or sections and locations of all such material identified Confidential or Proprietary. Information not included in the required index will not be reviewed for confidentiality or as proprietary before release. If Supplier fails to so mark or index Submittals and related records, then the City, upon request, may release said record(s) without the need to satisfy the requirements of subsection A above; and Respondent expressly waives its right to allege any kind of civil action or claim against the City pertaining to the release of said record(s). Submission of materials in response to City's Solicitation shall constitute assent by Respondent to the foregoing procedure and Respondent shall have no claim against the City on account of actions taken pursuant to such procedure.

1.22 FEDERAL AID PROJECTS

The City of Tacoma in accordance with Title VI of the Civil Rights Act of 1964, 78 Stat. 252, 42 U.S.C. 2000d to 2000d-4 and Title 49, Code of Federal Regulations, Department of Transportation, subtitle A, Office of the Secretary, part 21, nondiscrimination in federally assisted programs of the Department of Transportation issued pursuant to such Act, hereby notifies all bidders that it will affirmatively insure that in any contract entered into pursuant to this advertisement, disadvantaged business enterprises as defined at 49 CFR, part 26, will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, national origin, or sex in consideration for an award.

SECTION II - CONTRACT REQUIREMENTS

2.01 CONTRACTOR'S RESPONSIBILITY

A. Contract Documents

The Respondent to whom the Contract is awarded, hereinafter called the Contractor, shall enter into a Contract with the City of Tacoma, , within 10 days after receipt from the City of Tacoma of a properly prepared Contract. In addition, the Contractor will do all things required to promptly perform this Contract pursuant to the terms of this Contract. Certain contracts for supplies, goods or equipment may use the City Purchase Order in place of a formal contract document.

B. Surety Bonds

Except as modified by the Special Provisions, the Respondent to whom the Contract is awarded shall provide a payment and performance bond, including power of attorney, for 100 percent of the amount of his/her bid (including sales taxes), to insure complete performance of the Contract including the guarantee. The bonds must be executed by a surety company licensed to do business in the State of Washington. For a supply-type contract, a cashier's check or cash may be substituted for the bonds; however, this cash or cashier's check must remain with the City through the guarantee period and any interest on said amount shall accrue to the City.

C. Independent Contractor

Contractor is an independent contractor; no personnel furnished by the Contractor shall be deemed under any circumstances to be the agent or servant of the City. Contractor shall be fully responsible for all acts or omissions of Subcontractors and its and their suppliers and of persons employed by them, and shall be specifically responsible for sufficient and competent supervision and inspection to assure compliance in every respect with the Contract. There shall be no contractual relationship between any Subcontractors or supplier and the City arising out of or by virtue of this agreement. No provision of the Contract is intended or is to be construed to be for the benefit of any third party.

2.02 CONFLICTS IN SPECIFICATIONS

Anything mentioned in the Specifications and not shown on the Drawings and anything on the Drawings and not mentioned in the Specifications shall be of like effect and shall be understood to be shown and/or mentioned in both. In case of differences between Drawings and Specifications, the Specifications shall govern. In addition, in the event of any conflict between these General Provisions, the Special Provisions, the Technical Provisions and/or the Proposal pages, the following order of precedence shall control:

1. Proposal pages prevail if they conflict with the General, Special or Technical Provisions.
2. Special Provisions prevail if they conflict with the General Provisions and/or Technical Provisions.
3. Technical Provisions prevail if they are in conflict with the General Provisions.

In case of discrepancy of figures between Drawings, Specifications or both, the matter shall immediately be submitted to the Engineer for determination. Failure to submit the discrepancy issue to the Engineer shall result in the Contractor's actions being at his/her own risk and expense. The Engineer shall furnish from time to time such detailed drawings and other information as he/she may consider necessary.

2.03 INSPECTION

A. Of the Work

All materials furnished and work done shall be subject to inspection.

The Inspector administering the Contract shall at all times have access to the work wherever it is in progress or being performed, and the Contractor shall provide proper facilities for such access and inspection. Such inspection shall not relieve the Contractor of the responsibility of performing the work correctly, utilizing the best labor and materials in strict accordance with the Specifications of this Contract. All material or work approved and later found to be defective shall be replaced without cost to the City of Tacoma.

B. Inspector's Authority

The inspector shall have power to reject materials or workmanship which do not fulfill the requirements of these Specifications, but in case of dispute the Contractor may appeal to the Director or Superintendent, whose decision shall be final. The word "Director" means the Director of the City of Tacoma General Government department that is administering the contract. The word "Superintendent" means the Superintendent of the City of Tacoma, Department of Public Utilities Division that is administering the contract.

The Contract shall be carried out under the general control of the representative of the particular City Department or Division administering the Contract, who may exercise such control over the conduct of the work as may be necessary, in his or her opinion, to safeguard the interest of the City of Tacoma. The Contractor shall comply with all orders and instructions given by the representative of the particular Department or Division administering the Contract in accordance with the terms of the Contract.

Provided, that for the purposes of construction contracts, such control shall only apply (a) to the extent necessary to ensure compliance with the provisions of this contract, and (b) to the extent necessary to fulfill any nondelegable duty of the City for the benefit of third parties not engaged in promoting the activity of this contract.

Nothing herein contained, however, shall be taken to relieve the Contractor of his/her obligations or responsibilities under the Contract.

2.04 FEDERAL, STATE AND MUNICIPAL REGULATIONS

All federal, state, municipal and/or local regulations shall be satisfied in the performance of all portions of this Contract. The Contractor shall be solely responsible for all violations of the law from any cause in connection with work performed under this Contract.

2.05 INDEMNIFICATION

A. Indemnification

Contractor acknowledges that pursuant to the terms of this agreement, Contractor is solely and totally responsible for the safety of all persons and property in the performance of this Contract. To the greatest extent allowed by law, Contractor assumes the risk of all damages, loss, cost, penalties and expense and agrees to indemnify, defend and hold harmless the City of Tacoma, from and against any and all liability which may accrue to or be sustained by the City of Tacoma on account of any claim, suit or legal action made or brought against the City of Tacoma for the death of or injury to persons (including Contractor's or subcontractor's employees) or damage to property involving Contractor, or subcontractor(s) and their employees or agents, arising out of and in connection with or incident to the performance of the Contract including if the City is found to have a nondelegable duty to see that work is performed with requisite care, except for injuries or damages caused by the sole negligence of the City. In this regard, Contractor recognizes that Contractor is waiving immunity under industrial Insurance Law, Title 51 RCW. This indemnification extends to the officials, officers and employees of the City and also includes attorney's fees and the cost of establishing the right to indemnification hereunder in favor of the City of Tacoma. In addition, within the context of competitive bidding laws, it is agreed that this indemnification has been mutually negotiated. Provided however, this provision is intended to be applicable to the parties to this agreement and it shall not be interpreted to allow a Contractor's employee to have a claim or cause of action against Contractor.

B. Limitation of Liability for Primarily Supply-Type Contracts

In all contracts where the total cost of the supply of materials and/or equipment constitute at least 70 percent of the total contract price (as determined by the City), the City agrees that it will not hold the contractor, supplier or manufacturer liable for consequential damages for that part of the contract related to the manufacture and/or design of the equipment, materials or supplies.

2.06 CONTRACTOR'S INSURANCE

A. During the course and performance of a Contract, Contractor will provide proof and maintain the insurance coverage in the amounts and in the manner specified in the City of Tacoma Insurance Requirements as is applicable to the services, products, and deliverables provided under the Contract. The City of Tacoma Insurance Requirements document, if issued, is fully incorporated into the Contract by reference.

B. Failure by City to identify a deficiency in the insurance documentation provided by Contractor or failure of City to demand verification of coverage or compliance by Contractor with these insurance requirements shall not be construed as a waiver of Contractor's obligation to maintain such insurance.

2.07 ASSIGNMENT AND SUBLETTING OF CONTRACT

C. Assignment

The Contract shall not be assigned except with the consent of the Superintendent or his/her designee.

Requests for assignment of this contract must be in writing with the written consent of the surety, and the request must show the proposed person or organization to which the contract is assigned is capable, experienced and equipped to perform such work. The proposed substitute person or organization may be required to submit to the City information as to his/her experience, financial ability and give statements covering tools, equipment, organization, plans and methods to fulfill any portion of the Contract prior to approval of assignment.

D. Subletting

The Contract shall not be sublet except with the written consent of the Superintendent or his/her designee. In the event that a prequalified electrical contractor is necessary to perform certain portions of the work, such work may be subcontracted with a City prequalified electrical contractor for the type of work involved.

Requests for subletting of this Contract must be in writing with the written consent of the Surety, and the request must show the proposed person or organization to which the Contract is sublet is capable, experienced and equipped to perform such work. The proposed substitute person or organization may be required to submit to the City information as to his experience, financial ability and give statements covering tools, equipment, organization, plans and methods to fulfill any portion of the Contract prior to approval of subletting.

The written consent approving the subletting of the Contract shall not be construed to relieve the Contractor of his/her responsibility for the fulfillment of the Contract. The Subcontractor shall be considered to be the agent of the Contractor and the Contractor agrees to be responsible for all the materials, work and indebtedness incurred by the agent.

A subcontractor shall not sublet any portion of a subcontract for work with the City without the written consent of the City.

2.08 DELAY

E. Extension of Time

With the written approval of the Superintendent or his/her designee, the Contractor may be granted additional time for completion of the work required under this Contract, if, in the Superintendent's opinion the additional time requested arises from unavoidable delay.

F. Unavoidable Delay

Unavoidable delays in the prosecution of the work shall include only delays from causes beyond the control of the Contractor and which he/she could not have avoided by the exercise of due care, prudence, foresight and diligence. Delay caused by persons other than the Contractor, Subcontractors or their employees will be considered unavoidable delays insofar as they necessarily interfere with the Contractor's completion of the work, and such delays are not part of this Contract.

Unavoidable delay will not include delays caused by weather conditions, surveys, measurements, inspections and submitting plans to the Engineer of the particular Division involved in administering this Contract.

2.09 GUARANTEE

A. Guarantee for Construction, Labor or Services Contract

Neither the final certificate of payment or any provision in the Contract Documents, nor partial or entire occupancy of the premises by the City, shall constitute an acceptance of work not done in accordance with the Contract Documents or relieve the Contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship. The Contractor shall remedy any defects in the work and pay for any damage to other work resulting therefrom, which shall appear within a period of one year from the date of final acceptance of the work unless a longer period is specified. The City will give notice of observed defects with reasonable promptness.

If it has been discovered, before payment is required under the terms of the Contract, that there is a failure to comply with any of the terms and provisions of this Contract, the City has the right and may withhold payment.

In case of a failure of any part of the work, materials, labor and equipment furnished by the Contract or to fully meet all of the requirements of the Contract, the Contractor shall make such changes as may be necessary to fully meet all of the specifications and requirements of this Contract. Such changes shall be made at the Contractor's sole cost and expense without delay and with the least practicable inconvenience to the City of Tacoma. Rejected material and equipment shall be removed from the City's property by and at the expense of the Contractor.

B. Guarantee for Supply Contracts

Unless a longer period is specified, the supplier and/or manufacturer of the supplies, materials and/or equipment furnished pursuant to this Contract agrees to correct any defect or failure of the supplies, materials and/or equipment which occurs within one year from the date of: (1) test energization if electrical or mechanical equipment; (2) commencement of use if supplies or materials, provided, however, said guarantee period shall not extend beyond eighteen months after date of receipt by the City. All of the costs (including shipping, dismantling and reinstallation) of repairs and/or corrections of defective or failed equipment, supplies and/or material is the responsibility of the supplier and/or manufacturer.

When the supplier is not the manufacturer of the item of equipment, supplier agrees to be responsible for this guarantee and supplier is not relieved by a manufacturer's guarantee.

C. Guarantee Period Extension

The Contract guarantee period shall be suspended from the time a significant defect is first documented by the City until the work or equipment is repaired or replaced by Contractor and accepted by the City. In addition, in the event less than ninety (90) days remain on the guarantee period (after recalculating), the guarantee period shall be extended to allow for at least ninety (90) days from the date the work or equipment is repaired or replaced and accepted by the City.

2.10 DEDUCTIONS FOR UNCORRECTED WORK

If the City of Tacoma deems it expedient to correct work not done in accordance with the terms of this Contract, an equitable deduction from the Contract price shall be made.

2.11 CITY OF TACOMA'S RIGHT TO TERMINATE CONTRACT

A. Termination for Convenience

1. Supplies. The City may terminate a Contract for supplies at any time upon prior written notice to Contractor. Upon the effective date of termination specified in such notice, and payment by the City, all conforming supplies, materials, or equipment previously furnished hereunder shall become its property.
2. Services. The City may terminate a Contract for services at any time, with or without cause, by giving 10-business day's written notice to Supplier. In the event of termination, all finished and unfinished work prepared by Supplier pursuant to the Contract shall be provided to the City. In the event City terminates the Contract due to the City's own reasons and without cause due to Supplier's actions or omissions, the City shall pay Supplier the amount due for actual work and services necessarily performed under the Contract up to the effective date of termination, not to exceed the total compensation set forth in the Contract.

B. Termination for Cause

1. The City may terminate a Contract for either services or supplies in the event of any material breach of any of the terms and conditions of the Contract if the Contractor's breach continues in effect after written notice of breach and 30 days to cure such breach and fails to cure such breach
2. Bankruptcy. If the Contractor should be adjudged as bankrupt, or makes a general assignment for the benefit of creditors, or a receiver should be appointed on account of his/her insolvency, or if he/she or any of his/her subcontractors should violate any of the provisions of the Contract, or if the work is not being properly and diligently performed, the City of Tacoma may serve written notice upon the Contractor and Surety, executing the Payment and Performance Bond, of its intention to terminate the Contract; such notice will contain the reasons for termination of the Contract, and unless within 10 days after the serving of such notice, such violation shall cease and an arrangement satisfactory to the City of Tacoma for correction thereof shall be made, the Contract shall, upon the expiration of said 10 days, cease and terminate and all rights of the Contractor hereunder shall be forfeited. In the event the Contract is terminated for cause, Contractor shall not be entitled to any lost profits resulting therefrom.
3. Notice. In the event of any such termination for cause, the City of Tacoma shall immediately send (by regular mail or other method) written notice thereof to the Surety and the Contractor. Upon such termination the Surety shall have the right to take over and perform the Contract, provided however, the Surety must provide written notice to the City of its intent to complete the work within 15 calendar days of its receipt of the original written notice (from the City) of the intent to terminate. Upon termination and if the Surety does not perform the work, the City of Tacoma may take over the work and prosecute the same to completion by any method it may deem advisable, for the account of and at the expense of the Contractor, and the Contractor and the Surety shall be liable to the City of Tacoma for all cost occasioned to the City of Tacoma thereby. The City of Tacoma may without liability for doing so, take possession of and utilize in completing the work, such materials, equipment, plant and other property belonging to the Contractor as may be on the site of the work and necessary therefore.

2.12 LIENS

In the event that there are any liens on file against the City of Tacoma, the City of Tacoma shall be entitled to withhold final or progress payments to the extent deemed necessary by the City of Tacoma to properly protect the outstanding lien claimants until proper releases have been filed with the City Clerk.

2.13 LEGAL DISPUTES

A. General

Washington law shall govern the interpretation of the Contract. The state or federal courts located in Pierce County Washington shall be the sole venue of any mediation, arbitration, or litigation arising out of the Contract.

Respondents providing submittals from outside the legal jurisdiction of the United States of America will be subject to Tacoma's City Attorney's Office (CAO) opinion as to the viability of possible litigation pursuant to a contract resulting from this Specification. If it is the opinion of the CAO that any possible litigation would be beyond reasonable cost and/or enforcement, the submittal may be excluded from evaluation.

B. Attorney Fees

For contracts up to \$250,000, which become the subject of litigation or arbitration, the substantially prevailing party may be entitled to reasonable attorney fees, as provided in RCW 39.04.240. Provided, however, the attorney fee hourly rate for the City of Tacoma's assistant city attorneys is agreed to be \$150 per hour or the same as the hourly rate for Contractor's legal counsel, whichever is greater.

2.14 DELIVERY

Prices must be quoted F.O.B. destination, freight prepaid and allowed with risk of loss during transit remaining with Contractor/Supplier (unless otherwise stated in these Specifications) to the designated address set forth in these Specifications.

Deliveries shall be between 9:00 a.m. and 3:30 p.m.; Monday through Friday only (except legal holidays of the City of Tacoma).

Legal holidays of the City of Tacoma are:

New Year's Day	January 1
Martin Luther King's Birthday	3rd Monday in January
Washington's Birthday	3rd Monday in February
Memorial Day	Last Monday in May
Independence Day	July 4
Labor Day	1st Monday in September
Veteran's Day	November 11
Thanksgiving Day	4th Thursday of November
Day after Thanksgiving	4th Friday of November
Christmas Day	December 25

When any of these holidays occur on Saturday or Sunday, the preceding Friday or the following Monday, respectively, is a legal holiday for the City of Tacoma.

2.15 PACKING SLIPS AND INVOICES

A. Packing slips and shipping notices shall be sent to the specific City Division or Department receiving the item(s) at the address stated in City's Solicitation or as otherwise stated in the Contract and include complete description of items, contents of items if crated or cased, quantity, shipping point, carrier, bill of lading number and City of Tacoma purchase order.

B. Each invoice shall show City of Tacoma purchase order number, release number if applicable, quantity, unit of measure, item description, unit price and extended price for each line if applicable, services and deliverables provided if applicable. Line totals shall be summed to give a grand total to which sales tax shall be added, if applicable.

1. For transactions conducted in SAP Ariba, invoices shall be submitted through Ariba.
2. For invoices paid by ACH or by check, unless stated otherwise, invoices shall be electronically submitted by email with corresponding PO number listed in the subject line to accountspayable@cityoftacoma.org.

3. For invoices paid by credit card, invoices shall also display the last name of the cardholder and last four digits (only) of the card number (e.g., Jones/6311). Unless stated otherwise, invoices shall be electronically submitted by email with corresponding PO number listed in the subject line to (do not combine different POs into one invoice or charge) to pcardadmin@cityoftacoma.org.

2.16 APPROVED EQUALS

A. Unless an item is indicated as "No substitute", special brands, when named, are intended to describe the standard of quality, performance or use desired. Equal items will be considered by the City, provided that the respondent specifies the brand and model, and provides all descriptive literature, independent test results, product samples, local servicing and parts availability to enable the City to evaluate the proposed "equal".

B. The decision of the City as to what items are equal shall be final and conclusive. If the City elects to purchase a brand represented by the respondent to be an "equal", the City's acceptance of the item is conditioned on the City's inspection and testing after receipt. If, in the sole judgment of the City, the item is determined not to be an equal, the item shall be returned at the respondent's expense.

C. When a brand name or level of quality is not stated by the respondent, it is understood the offer is exactly as specified. If more than one brand name is specified, respondents must clearly indicate the brand and model/part number being bid.

2.17 ENTIRE AGREEMENT

This written contract represents the entire Agreement between the parties and supersedes any prior oral statements, discussions or understandings between the parties.

2.18 CODE OF ETHICS

The City's Code of Ethics, Chapter 1.46, Tacoma Municipal Code, provides ethical standards for City personnel and prohibits certain unethical conduct by others including respondents and contractors. Violation of the City's Code of Ethics will be grounds for termination of this contract.

2.19 FEDERAL FINANCIAL ASSISTANCE

If federal funds, including FEMA financial assistance to the City of Tacoma, will be used to fund, pay or reimburse all or a portion of the Contract, Contractor will comply with all applicable Federal law, regulations, executive orders, FEMA policies, procedures, and directives and the following clauses will be incorporated into the Contract:

A. EQUAL EMPLOYMENT OPPORTUNITY During the performance of this Contract, Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, gender identity, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, sexual orientation, gender identity, or national origin. Such action shall include, but not be limited to the following:

1. Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.
2. The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, or national origin.
3. The contractor will not discharge or in any other manner discriminate against any employee or applicant for employment because such employee or applicant has inquired about, discussed, or disclosed the compensation of the employee or applicant or another employee or applicant. This provision shall not apply to instances in which an employee who has access to the compensation information of other employees or applicants as a part of such employee's essential job functions discloses the compensation of such other

employees or applicants to individuals who do not otherwise have access to such information, unless such disclosure is in response to a formal complaint or charge, in furtherance of an investigation, proceeding, hearing, or action, including an investigation conducted by the employer, or is consistent with the contractor's legal duty to furnish information.

4. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
5. The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
6. The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
7. In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
8. The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (8) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance:

Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

B. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.
2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (B)(1) of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (B)(1) of this section, in the sum of \$27 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b)(1) of this section.

3. Withholding for unpaid wages and liquidated damages. The City shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (B)(2) of this section.
4. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (B)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (B)(1) through (4) of this section.

C. CLEAN AIR ACT

1. Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 U.S.C. § 7401 et seq.
2. Contractor agrees to report each violation to the City and understands and agrees that the City will, in turn, report each violation as required to assure notification to the Federal Emergency Management Agency, and the appropriate Environmental Protection Agency Regional Office.
3. Contractor agrees to include these requirements in each subcontract exceeding \$150,000 financed in whole or in part with Federal assistance provided by FEMA.

D. FEDERAL WATER POLLUTION CONTROL ACT

1. Contractor agrees to comply with all applicable standards, orders, or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq.
2. Contractor agrees to report each violation to the City, understands, and agrees that the City will, in turn, report each violation as required to assure notification to the Federal Emergency Management Agency, and the appropriate Environmental Protection Agency Regional Office.
3. Contractor agrees to include these requirements in each subcontract exceeding \$150,000 financed in whole or in part with Federal assistance provided by FEMA.

E. DEBARMENT AND SUSPENSION

1. This contract is a covered transaction for purposes of 2 C.F.R. pt. 180 and 2 C.F.R. pt. 3000. As such, the contractor is required to verify that none of the contractor's principals (defined at 2 C.F.R. § 180.995) or its affiliates (defined at 2 C.F.R. § 180.905) are excluded (defined at 2 C.F.R. § 180.940) or disqualified (defined at 2 C.F.R. § 180.935).
2. Contractor must comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into.
3. This certification is a material representation of fact relied upon by the City. If it is later determined that the contractor did not comply with 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C, in addition to remedies available to (insert name of recipient/subrecipient/applicant), the Federal Government may pursue available remedies, including but not limited to suspension and/or debarment.
4. Contractor agrees to comply with the requirements of 2 C.F.R. pt. 180, subpart C and 2 C.F.R. pt. 3000, subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions.

F. BYRD ANTI-LOBBYING AMENDMENT

1. Contractors who apply or bid for an award of \$100,000 or more shall file the required certification with City. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, officer or employee of Congress, or an employee of a Member of Congress in connection with obtaining any Federal contract, grant, or any other award covered by 31 U.S.C. § 1352. Each tier shall also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the recipient who in turn will forward the certification(s) to the City.
2. If applicable, Contractor must sign and submit to the City the following certification:

APPENDIX A, 44 C.F.R. PART 18 – CERTIFICATION REGARDING LOBBYING

Certification for Contracts, Grants, Loans, and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

The Contractor, _____, certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. Chap.38, Administrative Remedies for False Claims and Statements, apply to this certification and disclosure, if any.

Signature of Contractor's Authorized Official

Name and Title of Contractor's Authorized Official

Date

G. PROCUREMENT OF RECOVERED MATERIALS

1. In the performance of this contract, the Contractor shall make maximum use of products containing recovered materials that are EPA-designated items unless the product cannot be acquired:
 - a. Competitively within a timeframe providing for compliance with the contract performance schedule;
 - b. Meeting contract performance requirements; or
 - c. At a reasonable price.
2. Information about this requirement, along with the list of EPA- designated items, is available at EPA's Comprehensive Procurement Guidelines web site, <https://www.epa.gov/smm/comprehensive-procurement-guideline-cpg-program>.
3. Contractor also agrees to comply with all other applicable requirements of Section 6002 of the Solid Waste Disposal Act.

[Section III is for contracts that involve construction and/or labor, and are not applicable to contracts solely for material/supply purchases.]

GENERAL PROVISIONS

SECTION III - CONSTRUCTION AND/OR LABOR CONTRACTS

SECTION III REQUIREMENTS APPLY ONLY TO CONSTRUCTION AND/OR LABOR CONTRACTS AND ARE IN ADDITION TO APPLICABLE REQUIREMENTS CONTAINED IN SECTION II CONTRACT REQUIREMENTS.

3.01 RESPONDENT'S DUTY TO EXAMINE

The Respondent agrees to be responsible for examining the site(s) and to have compared them with the Specifications and Contract Drawings, and to be satisfied as to the facilities and difficulties attending the execution of the proposed Contract (such as uncertainty of weather, floods, nature and condition of materials to be handled and all other conditions, obstacles and contingencies) before the delivery of his/her Proposal. No allowance will be subsequently made by the City on behalf of the Respondent by reason of any error or neglect on Respondent's part, for such uncertainties as aforesaid.

3.02 PERMITS

Except when modified by the Special Provisions, the Contractor shall procure and pay for all permits and licenses necessary for the completion of this Contract including those permits required by the City of Tacoma. The City will obtain county or state road crossing permits if required. In the event a necessary permit is not obtained, the Contractor will not be permitted to work on items subject to said permit and any delays caused thereby will not be subject to extra compensation or extensions.

3.03 NOTIFICATION OF OTHER GOVERNMENTAL AGENCIES AND UTILITIES WHEN UNDERGROUND WORK IS INVOLVED

The Contractor shall notify all other affected governmental agencies and utilities whenever underground work is done under the terms of this Contract. The Contractor is required to obtain permission of the appropriate public and private utilities and governmental agencies before performing underground work pursuant to the terms of this Contract. The Contractor is required to call "one call" at 1-800-424-5555 for all work involving excavation or digging more than 12 inches beneath ground or road surface.

The City may have indicated on the plans and specifications the existence of certain underground facilities that are known to the City department responsible for this Contract. It is the Contractor's responsibility to fully comply with the Underground Utility Locate Law, Chapter 19.122 RCW. If the site conditions are "changed or differing" as defined by RCW 19.122.040(l), the Contractor may pursue the party responsible for not properly marking or identifying the underground facility. The Contractor agrees not to file any claim or legal action against the City (department responsible for this Contract) for said "changed or differing" conditions unless said City department is solely responsible for the delay or damages that the Contractor may have incurred.

3.04 TRENCH EXCAVATION BID ITEM

In the event that "trench excavation" in excess of four feet requires a safety system pursuant to Washington State law and safety shoring, sloping, sheeting, or bracing is used, a separate bid item should be set forth in the Proposal for this work. If a separate bid item is not set forth in the Proposal pages, said installed safety system shall be paid at \$3.00 per lineal foot of trench, which unit price includes both sides of the trench.

3.05 SAFETY

A. General

The Contractor shall, at all times, exercise adequate precautions for the safety of all persons, including its employees and the employees of a Subcontractor, in the performance of this Contract and shall comply with all applicable provisions of federal, state, county and municipal safety laws and regulations. It is the Contractor's responsibility to furnish safety equipment or to contractually require Subcontractors to furnish adequate safety equipment relevant to their responsibilities.

The Contractor shall obtain the necessary line clearance from the inspector before performing any work in, above, below or across energized Light Division circuits.

The Inspector and/or Engineer may advise the Contractor and the Safety Officer of any safety violations. It is the Contractor's responsibility to make the necessary corrections. Failure to correct safety violations is a breach of this Contract and, as such, shall be grounds for an order from the Safety Officer, Inspector or Engineer to cease further work and remove from the job site until the condition is corrected. Time and wages lost due to such safety shutdowns shall not relieve the Contractor of any provisions of Section 3.14 of this Specification and shall be at the sole cost of the Contractor. The purpose of this authority to stop work is to enforce the contract and not to assume control except to the extent necessary to ensure compliance with the provisions of this contract.

Any of the above actions by employees of the City of Tacoma shall in no way relieve the Contractor of his/her responsibility to provide for the safety of all persons, including his/her employees.

B. Work Hazard Analysis Report

The Contractor will be required to complete a work hazard analysis report. This report shall outline how the Contractor proposes to satisfy all safety laws and regulations involved in performing the work. This report shall be completed and submitted to the City Safety Officer before the pre-construction conference. A copy of the report shall be maintained at the work site (accessible to the supervisor).

3.06 PROTECTION OF WORKERS AND PROPERTY

The Contractor shall erect and maintain good and sufficient guards, barricades and signals at all unsafe places at or near the work and shall, in all cases, maintain safe passageways at all road crossings, and crosswalks, and shall do all other things necessary to prevent accident or loss of any kind.

The Contractor shall protect from damage all utilities, improvements, and all other property that is likely to become displaced or damaged by the execution of the work under this Contract.

The Contractor is responsible for all roads and property damaged by his/her operations as shall be determined by the Engineer administering this Contract. The Contractor shall be responsible for repairing all damage to roads caused by his/her operations to the satisfaction of the particular governmental body having jurisdiction over the road.

3.07 CONTRACTOR - SUPERVISION AND CHARACTER OF EMPLOYEES

A. Superintendent to Supervise Contractor's Employees

The Contractor shall keep on his/her work, during its progress, a competent superintendent and any necessary assistants, all of whom must be satisfactory to the City of Tacoma. The Contractor's superintendent shall not be changed except with the consent of the City of Tacoma, unless the Contractor's superintendent proves to be unsatisfactory to the Contractor and ceases to be in his/her employ. The Contractor's superintendent shall represent the Contractor in his/her absence and all directions given to him/her shall be binding as if given to the Contractor directly. The Contractor shall give efficient supervision to the work, using his/her best skill and attention.

B. Character of Contractor's Employees

The Contractor shall employ only competent, skillful, faithful and orderly persons to do the work, and whenever the Engineer administering the Contract shall notify the Contractor in writing that any person on the work is, in his or her opinion, incompetent, unfaithful, disorderly or otherwise unsatisfactory, the Contractor shall forthwith discharge such persons from the work and shall not again employ him or her on this Contract.

3.08 CONTRACTOR'S COMPLIANCE WITH THE LAW

A. Hours of Labor

The Contractor and Subcontractors shall be bound by the provisions of RCW Chapter 49.28 (as amended) relating to hours of labor. Except as set forth in the Special Provisions, eight (8) hours in any calendar day shall constitute a day's work on a job performed under this Contract.

In the event that the work is not performed in accordance with this provision and in accordance with the laws of the State of Washington, then this Contract may be terminated by the City of Tacoma for the reason that the same is not performed in accordance with the public policy of the State of Washington as defined in said statutes.

B. Prevailing Wages

If federal, state, local, or any applicable law requires Supplier to pay prevailing wages in connection with a Contract, and Supplier is so notified by the City, then Supplier shall pay applicable prevailing wages.

If applicable, a Schedule of Prevailing Wage Rates and/or the current prevailing wage determination made by the Secretary of Labor for the locality or localities where the Contract will be performed is attached and made of part of the Contract by this reference. If prevailing wages do apply to the Contract, Supplier and its subcontractors shall:

1. Be bound by and perform all transactions regarding the Contract relating to prevailing wages and the usual fringe benefits in compliance with the provisions of Chapter 39.12 RCW, as amended, the Washington State Prevailing Wage Act and/or the Davis-Bacon Act (40 U.S.C. 3141- 3144, and 3146-3148) and the requirements of 29 C.F.R. pt. 5 as may be applicable, including the federal requirement to pay wages not less than once a week,
2. Ensure that no worker, laborer or mechanic employed in the performance of any part of the Contract shall be paid less than the prevailing rate of wage specified on that Schedule and/or specified in a wage determination made by the Secretary of Labor (unless specifically preempted by federal law, the higher of the Washington state prevailing wage or federal Davis-Bacon rate of wage must be paid) and Additionally, in compliance with applicable federal law, contractors are required to pay wages not less than once a week.
3. Immediately upon award of the Contract, contact the Department of Labor and Industries, Prevailing Wages section, Olympia, Washington and/or the federal Department of Labor, to obtain full information, forms and procedures relating to these matters. Per such procedures, a Statement of Intent to Pay Prevailing Wages and/or other or additional documentation required by applicable federal law, must be submitted by Contractor and its subcontractors to the City, in the manner requested by the City, prior to any payment by the City hereunder, and an Affidavit of Wages Paid and/or other or additional documentation required by federal law must be received or verified by the City prior to final Contract payment. In the event any dispute arises as to what are the prevailing rates of wages for work of a similar nature and such dispute cannot be adjusted by the parties in interest, including labor and management representatives, the matter shall be referred for arbitration to the Director of the State of Washington, Department of Labor and industries whose decision shall be final, conclusive and binding on all parties involved in the dispute.

3.09 COPELAND ANTI-KICKBACK ACT

For contracts subject to Davis Bacon Act the following clauses will be incorporated into the Contract:

A. Contractor. The contractor shall comply with 18 U.S.C. § 874, 40 U.S.C. § 3145, and the requirements of 29 C.F.R. pt. 3 as may be applicable, which are incorporated by reference into this contract.

B. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clause above and such other clauses as FEMA may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all of these contract clauses.

C. Breach. A breach of the contract clauses above may be grounds for termination of the contract, and for debarment as a contractor and subcontractor as provided in 29 C.F.R. § 5.12.

3.10 CHANGES

A. In Plans or Quantities

The City of Tacoma, without invalidating this Contract, or any part of this Contract, may order extra work or make reasonable changes by altering, adding to or deducting from the materials, work and labor and the Contract sum will be adjusted accordingly. All such work and labor shall be executed under the conditions of the original Contract except that any claim for extension of time caused thereby shall be adjusted at the time of ordering such change. When work or bid items are deducted, reduced or eliminated, it is agreed that no payment will be made to Contractor for anticipated profit.

B. Extra Work

Any claim or order for extra materials, work and labor made necessary by alterations or additions to the plans or by other reasons for which no price is provided in this Contract, shall not be valid unless the Contractor and Engineer administering the Contract have agreed upon a price prior to commencing extra work, and the agreement has been signed by the Contractor and approved by the Superintendent or his/her designee, and approved by the payment and performance bond surety.

C. Extra Work - No Agreed Price

If it is impracticable to fix an increase in price definitely in advance, the order may fix a maximum price which shall not under any circumstances, be exceeded, and subject to such limitation, such alteration, modification, or extra shall be paid for at the actual necessary cost as determined by the City of Tacoma, which cost (including an allowance for profit) shall be determined as the sum of the following items (1) to (7) inclusive:

- (1) Labor, computed at regular wage scale, including premium on compensation insurance and charge for social security taxes, and other taxes, pertaining to labor; no charge for premium pay shall be allowed unless authorized by the Engineer administering the Contract;
- (2) The proportionate cost of premiums on comprehensive general liability and other insurance applicable to the extra work involved and required under this Contract;
- (3) Material, including sales taxes pertaining to materials;
- (4) Plant and equipment rental, to be agreed upon in writing before the work is begun; no charge for the cost of repairs to plant or equipment will be allowed;
- (5) Superintendence, general expense and profit computed at 20 percent of the total of paragraphs (1) to (4) inclusive;
- (6) The proportionate cost of premiums on bonds required by this Contract, computed by 1 1/2 percent of the total of paragraphs (1) to (5) inclusive.
- (7) The City of Tacoma reserves the right to furnish such materials as it may deem expedient, and no allowance will be made for profit thereon.

Whenever any extra work is in progress, for which the definite price has not been agreed on in advance, the Contractor shall each day, report to the Engineer the amount and cost of the labor and material used, and any other expense incurred in such extra work on the preceding day, and no claim for compensation for such extra work will be allowed unless such report shall have been made.

The above-described methods of determining the payment for work and materials shall not apply to the performance of any work or the furnishing of any material, which, in the judgment of the Engineer administering the Contract, may properly be classified under items for which prices are established in the Contract.

D. Claims for Extra Work

If the Contractor claims that any instructions by drawings or otherwise, involve extra cost under this Contract, he/she shall give the City of Tacoma written notice thereof within 30 days after receipt of such instruction, and in any event before proceeding to execute the work, except in an emergency endangering life or property, and the procedures governing the same shall be as provided for immediately above in this paragraph. The method in these paragraphs is the only method available to the Contractor for payment of claims for extra work performed under the terms of this Contract.

3.11 CLEANING UP

The Contractor shall at all times, at his/her own expense, keep the premises free from accumulation of waste materials or debris caused by any workers or the work, at the completion of the work the Contractor shall remove all his waste materials from and about the site and all his/her equipment, sanitary facilities and surplus materials. In the case of dispute, the City of Tacoma may remove the debris and charge the cost to the Contractor as the City of Tacoma shall determine to be just. All material that is deposited or placed elsewhere than in places designated or approved by the Engineer administering the Contract will not be paid for and the Contractor may be required to remove such material and deposit or place it where directed.

3.12 PROGRESS PAYMENT

Progress payments will be made up to the amount of ninety-five percent (95%) of the actual work completed as shall be determined by the Engineer administering the Contract.

The Contractor may request that an escrow account be established as permitted by law, in which event the Contractor will earn interest on the retained funds.

When the time for construction, services and/or installation will exceed thirty (30) days, the Contractor may request, by invoice, to be paid a progress payment based on percentage of work completed. The Engineer will review and approve the progress payment request on a monthly basis.

3.13 FINAL PAYMENT

The final payment of five percent (5%) of the Contract price shall be approved on final acceptance of the work under this Contract by the Superintendent or his/her designee. In addition, before final payment is made, the Contractor shall be required to:

- A. Provide a certificate from the Washington State Department of Revenue that all taxes due from the Contractor have been paid or are collectible in accordance with the provisions of Chapter 60.28 and Title 82 of the Revised Code of Washington;
- B. Provide the General Release to the City of Tacoma on the form set forth in these Contract documents;
- C. Provide a release of any outstanding liens that have been otherwise filed against any monies held or retained by the City of Tacoma;
- D. File with the City Director of Finance, and with the Director of the Washington State Department of Labor and Industries, on the state form to be provided, an affidavit of wages paid;
- E. File with the City Director of Finance, on the state form to be provided, a statement from the State of Washington, Department of Labor and Industries, certifying that the prevailing wage requirements have been satisfied.
- F. File with the City Director of Finance, on the state form to be provided, a statement of release from the Public Works Contracts Division of the State of Washington, Department of Labor and Industries, verifying that all industrial insurance and medical aid premiums have been paid.

If there is a fee assessed to the City for any certificate, release or other form required by law, the contractor agrees that the fee amount may be passed on to the Contractor and deducted from the monies paid to the Contractor.

3.14 FAILURE TO COMPLETE THE WORK ON TIME

Should the completion of the work required under the Contract be delayed beyond the expiration of the period herein set for the completion of said work, or such extension of said period as may be allowed by reason of unavoidable delays, there shall be deducted from the total Contract price of work, for each calendar day by which such completion shall be delayed beyond said period of such extension thereof the sum of \$300 or a sum of money as set forth hereinafter in these Specifications, as the amount of such deduction per calendar day.

Said sum shall be considered not as a penalty, but as liquidated damages, which the City will suffer by reason of the failure of the Contractor to perform and complete the work within the period, herein fixed or such extensions of said period as may be allowed by reason of unavoidable delays.

Any money due or to become due the Contractor may be retained by the City to cover said liquidated damages, and should such money not be sufficient to cover such damages, the City shall have the right to recover the balance from the Contractor or his/her Sureties.

The filing of any bid for the work herein contemplated shall constitute acknowledgment by the Respondent that he/she understands, agrees and has ascertained that the City will actually suffer damages to the amount hereinabove fixed for each and every calendar day during which the completion of the work herein required shall be delayed beyond the expiration of the period herein fixed for such completion or such extension of said period as may be allowed by reason of unavoidable delays.

3.15 CITY RESERVES RIGHT TO USE FACILITIES PRIOR TO ACCEPTANCE

The City of Tacoma hereby reserves the right to use the facilities herein contracted prior to final acceptance under this Contract. The use of said facilities, as mentioned herein, shall not be construed as a waiver or relinquishment of any rights that the City of Tacoma has under this Contract.

3.16 LIST OF SUBCONTRACTORS

Bid proposals for construction, alteration or repair of any building or other public works that may exceed \$1,000,000 including tax shall satisfy the following requirement: Respondent shall submit as part of the bid, the names of the subcontractors, with whom the respondent, if awarded the contract, will subcontract performance of the work of heating, ventilation and air conditioning, plumbing as described in chapter 18.106 RCW, and electrical as described in chapter 19.28 RCW, or to name itself for the work. The respondent shall not list more than one subcontractor for each category of work identified, unless subcontractors vary with bid alternates, in which case the respondent must indicate which subcontractor will be used for which alternate. Failure to comply with this provision or the naming of two or more subcontractors to perform the same work shall require the City (pursuant to state law RCW 39.30.060) to determine that respondent's bid is nonresponsive; therefore, the bid will be rejected.

CITY OF TACOMA MODIFICATIONS TO THE
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**CITY OF TACOMA MODIFICATIONS TO THE
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PART 1 GENERAL PROVISIONS

1.01 DEFINITIONS

Replace the following article in Section 1.01:

- Q. "Owner" means the City or its authorized representative with the authority to enter into, administer, and/or terminate the Work in accordance with the Contract Documents and make related determinations and findings.

Add the following articles to Section 1.01:

- AC. "Abbreviations" refer to trade association names and titles of general standards are frequently abbreviated. Where such acronyms or abbreviations are used in the specifications or other contract documents, they mean recognized name of the trade association, standards generating organization, authority having jurisdiction, or other entity applicable to the context of the text provision. Refer to the "Encyclopedia of Associations," published by Gale Research Co., available in most libraries.
- AD. "Alternate Bid" (or Alternate) is an amount stated in the Bid to be added or deducted from the amount of the base Bid if the corresponding change in project scope or materials or methods of construction described in the Bidding Documents is accepted.
- AE. "Base Bid" is the sum stated in the Bid for which the Bidder offers to perform the work described as the base, to which work may be added or deducted for sums stated in Alternate Bids and Unit Prices. The base bid does not include Allowances, Force Account work and Washington State Sales taxes. Owner shall pay Contractor the Contract Sum plus state sales tax for performance of the Work, in accordance with the Contract Documents.
- AF. "Contracting Agency" (or Owner) is the City of Tacoma.
- AG. "Contract Provisions" is the publication addressing the work required for an individual project. At the time of the call for bids, the contract provisions may include, for a specific individual project, the general conditions, supplements to the general conditions, the special provisions, a listing of the applicable standard plans, the prevailing minimum hourly wage rates, contract forms, LEAP and EIC requirements.
- AH. "Furnish" is used to mean supply and deliver to the project site, ready for unloading, unpacking, assembly, installation and other.
- AI. "Indicated" refers to graphic representations, notes or schedules on the drawings, or other paragraphs or schedules in the specifications, and similar requirements in the contract documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used, it is to help the reader locate the reference; no limit on location is intended.
- AJ. "Install" is used to describe operations at the project site including the actual unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

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- AK. “Installer” is the contractor or an entity engaged by the contractor, either as an employee, subcontractor, or contractor of lower tier for performance of a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.
- AL. “Provide” means to furnish and install, complete and ready for intended use.
- AN. “Unit Price” is an amount stated in the Bid as a price per unit of measurement for materials or services as described in the Contract Documents.

1.03 EXECUTION AND INTENT

Add the following to Section 1.03:

The intent of the contract is to be prescribing a complete work. Omissions from the contract of details of work, which are necessary to carry out the contract, shall not relieve the Contractor from performing the omitted work.

1.04 OBJECTIONS TO APPLICATION OF PRODUCTS

Add the following new Section 1.04:

Bidders for this project are required to thoroughly familiarize themselves with specified products and installation procedures and submit to the Senior Buyer any questions or objections (in writing) no later than **the date specified on the “Bidder Question Form.”** Submittal of Bid constitutes acceptance of products and procedures specified.

1.05 DISQUALIFICATION OF BIDDERS

Add the following new Section 1.05:

A bidder may be deemed not responsible, and the proposal rejected by the Owner for any of the following:

- A. More than one bid proposal is submitted for the same project from a bidder under the same or different names;
- B. Evidence of collusion exists with any other bidder. Participants in collusion will be restricted from submitting future bids;
- C. A bidder is not pre-qualified for the work or to the full extent of the bid;
- D. An unsatisfactory performance record exists based on past or current work;
- E. There is incomplete work which may hinder or prevent the prompt completion of the work bid upon;
- F. The bidder failed to settle bills for labor or materials on past or current contracts;
- G. The bidder has failed to complete a written public contract or has been convicted of a crime arising from a previous public contract;
- H. The bidder is unable, financially or otherwise, to perform the work;
- I. A bidder is not authorized to do business in the state of Washington;
- J. Failure by the contractor to properly review the project documents and/or site;
- K. The bid proposal was not received by the submittal deadline;

**CITY OF TACOMA MODIFICATIONS TO THE
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- L. The contractor fails to meet the LEAP or EIC requirements as described in these documents;
- M. Receipt of addenda is not acknowledged; or
- N. There are any other reasons deemed proper by the Owner.

1.06 PRE-AWARD INFORMATION

Add the following new Section 1.06:

Before awarding any contract, the Owner may require one or more of these items or actions of the apparent lowest responsible bidder:

1. A complete statement of the origin, composition, and manufacture of any or all materials to be used,
2. Samples of these materials for quality and fitness tests,
3. A progress schedule (in a form the Owner requires) showing the order of and time required for the various phases of the work,
4. A breakdown of costs assigned to any bid item,
5. Attendance at a conference with the Engineer or representatives of the Engineer,
6. Bid evaluation submittals related to the contractors ability to perform the work including experience on similar projects, project personnel and equipment, and financial resources, or
7. Any other information or action taken that is deemed necessary to ensure that the bidder is the lowest responsible bidder.

PART 2 INSURANCE AND BONDS

2.01 CONTRACTOR'S LIABILITY INSURANCE

Replace the entire Section 2.01 with the following:

Insurance shall be per the City's standard "City of Tacoma Insurance Requirements" provided in the Contract Forms section of the Project Manual.

2.02 COVERAGE LIMITS

Replace the entire Section 2.02 with the following:

Insurance shall be per the City's standard "City of Tacoma Insurance Requirements" provided in the Contract Forms section of the Project Manual.

**CITY OF TACOMA MODIFICATIONS TO THE
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2.03 INSURANCE COVERAGE CERTIFICATES

Replace the entire Section 2.03 with the following:

Insurance shall be per the City's standard "City of Tacoma Insurance Requirements" provided in the Contract Forms section of the Project Manual.

2.04 PAYMENT AND PERFORMANCE BONDS

Add the following to Section 2.04:

For contracts of \$150,000 or less, the Contractor may, at the Contractor's option authorize the Contracting Agency to retain 10% of the contract amount in lieu of furnishing a performance and/or payment bond. For contracts over \$150,000, a Payment Bond and Performance Bond shall be obtained by the Contractor utilizing the forms entitled "Payment Bond to the City of Tacoma" and "Performance Bond to the City of Tacoma" as found at the front of the Project Manual under "Contract Forms".

2.06 BUILDER'S RISK

Replace the entire Section 2.06 with the following:

Insurance shall be per the City's standard "City of Tacoma Insurance Requirements" provided in the Contract Forms section of the Project Manual.

PART 3 TIME AND SCHEDULE

3.07 DAMAGES FOR FAILURE TO ACHIEVE TIMELY COMPLETION

Delete Section 3.07 B – Actual Damages.

PART 5 PERFORMANCE

5.04 PREVAILING WAGES

Replace Section 5.04 G with the following.

- G. Certified Payrolls: Consistent with WAC 296-127-320, the contractor and any subcontractor shall submit a certified copy of payroll records monthly. All certified payrolls must be filed with L&I's online reporting system consistent with RCW 31.12.120 with a copy of such filings being provided to the City of Tacoma per and in accordance with the project documents unless specified by owner in writing. Any contractor or subcontractor failing to comply with this requirement will be in violation of RCW 39.12.050.

5.14 AVAILABILITY AND USE OF UTILITY SERVICES

Delete Section 5.14 A – Owner to provide and charge for utilities.

**CITY OF TACOMA MODIFICATIONS TO THE
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5.15 TESTS AND INSPECTIONS

Replace Section 5.15 A with the following.

A. Testing and inspection of work:

Contractor shall maintain an adequate testing and inspection program and perform such tests and inspections as are necessary or required to ensure that the Work conforms to the requirements of the Contract Documents. Contractor shall be responsible for inspection and quality surveillance of all its Work and all Work performed by any Subcontractor. Unless otherwise provided, Contractor shall make arrangements for such tests, inspections, and approvals or entity acceptable to Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. Contractor shall give Owner timely notice of when and where tests and inspections are to be made. Contractor shall maintain complete inspection records and make them available to Owner.

Owner will contract separately with an independent testing laboratory for code required special inspections, if applicable. Contractor shall give Owner timely notice of when and where special inspections are to be made.

5.20 SUBCONTRACTORS AND SUPPLIERS

Delete Section 5.20 E – Automatic assignment of subcontracts.

10.11 DIVERSE BUSINESS PARTICIPTION

Replace Section 10.11 with the following:

The City of Tacoma requires participation by Diverse Businesses in its' contracts as supported by the City's Equity in Contracting office, Municipal code TMC 1.07.040, RCW chapters 39, 43, and WAC326. Refer to the City Programs section of the contract documents for specific project requirements.

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PART 1 - GENERAL PROVISIONS

1.01 DEFINITIONS

- A. "Application for Payment" means a written request submitted by Contractor to A/E for payment of Work completed in accordance with the Contract Documents and approved Schedule of Values, supported by such substantiating data as Owner or A/E may require.
- B. "Architect," "Engineer," or "A/E" means a person or entity lawfully entitled to practice architecture or engineering, representing Owner within the limits of its delegated authority.
- C. "Change Order" means a written instrument signed by Owner and Contractor stating their agreement upon all of the following: (1) a change in the Work; (2) the amount of the adjustment in the Contract Sum, if any, and (3) the extent of the adjustment in the Contract Time, if any.
- D. "Claim" means Contractor's exclusive remedy for resolving disputes with Owner regarding the terms of a Change Order or a request for equitable adjustment, as more fully set forth in Part 8.
- E. "Contract Award Amount" is the sum of the Base Bid and any accepted Alternates.
- F. "Contract Documents" means the Advertisement for Bids, Instructions for Bidders, completed Bid Form, General Conditions, Modifications to the General Conditions, Supplemental Conditions, Public Works Contract, other Special Forms, Drawings and Specifications, and all addenda and modifications thereof.
- G. "Contract Sum" is the total amount payable by Owner to Contractor, for performance of the Work in accordance with the Contract Documents, including all taxes imposed by law and properly chargeable to the Work, except Washington State sales tax.
- H. "Contract Time" is the number of calendar days allotted in the Contract Documents for achieving Substantial Completion of the Work.
- I. "Contractor" means the person or entity who has agreed with Owner to perform the Work in accordance with the Contract Documents.
- J. "Day(s):" Unless otherwise specified, day(s) shall mean calendar day(s)."
- K. "Drawings" are the graphic and pictorial portions of the Contract Documents showing the design, location, and dimensions of the Work, and may include plans, elevations, sections, details, schedules, and diagrams.
- L. "Final Acceptance" means the written acceptance issued to Contractor by Owner after Contractor has completed the requirements of the Contract Documents, as more fully set forth in Section 6.09 B.
- M. "Final Completion" means that the Work is fully and finally complete in accordance with the Contract Documents, as more fully set forth in Section 6.09 A.
- N. "Force Majeure" means those acts entitling Contractor to request an equitable adjustment in the Contract Time, as more fully set forth in paragraph 3.05A.
- O. "Notice" means a written notice that has been delivered to the authorized representative or officer of the addressed party by registered or certified mail, or by email as a PDF attachment. Notices should clearly identify the project number and date of notice.

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- P. "Notice to Proceed" means a notice from Owner to Contractor that defines the date on which the Contract Time begins to run.
- Q. "Owner" means the state agency, institution, or its authorized representative with the authority to enter into, administer, and/or terminate the Work in accordance with the Contract Documents and make related determinations and findings.
- R. "Person" means a corporation, partnership, business association of any kind, trust, company, or individual.
- S. "Prior Occupancy" means Owner's use of all or parts of the Project before Substantial Completion, as more fully set forth in Section 6.08 A.
- T. "Progress Schedule" means a schedule of the Work, in a form satisfactory to Owner, as further set forth in Section 3.02.
- U. "Project" means the total construction of which the Work performed in accordance with the Contract Documents may be the whole or a part and which may include construction by Owner or by separate contractors.
- V. "Project Record" means the separate set of Drawings and Specifications as further set forth in paragraph 4.02A.
- W. "Schedule of Values" means a written breakdown allocating the total Contract Sum to each principal category of Work, in such detail as requested by Owner.
- X. "Specifications" are that portion of the Contract Documents consisting of the written requirements for materials, equipment, construction systems, standards and workmanship for the Work, and performance of related services.
- Y. "Subcontract" means a contract entered into by Subcontractor for the purpose of obtaining supplies, materials, equipment, or services of any kind for or in connection with the Work.
- Z. "Subcontractor" means any person, other than Contractor, who agrees to furnish or furnishes any supplies, materials, equipment, or services of any kind in connection with the Work.
- AA. "Substantial Completion" means that stage in the progress of the Work when the construction is sufficiently complete, as more fully set forth in Section 6.07.
- AB. "Work" means the construction and services required by the Contract Documents, and includes, but is not limited to, labor, materials, supplies, equipment, services, permits, and the manufacture and fabrication of components, performed, furnished, or provided in accordance with the Contract Documents.

1.02 ORDER OF PRECEDENCE

Any conflict or inconsistency in the Contract Documents shall be resolved by giving the documents precedence in the following order:

1. Signed Public Works Contract, including any Change Orders.
2. Supplemental Conditions.
3. Modifications to the General Conditions.
4. General Conditions.
5. Specifications. Provisions in Division 1 shall take precedence over provisions of any other Division.

6. Drawings. In case of conflict within the Drawings, large-scale drawings shall take precedence over small-scale drawings.
7. Signed and Completed Bid Form.
8. Instructions to Bidders.
9. Advertisement for Bids.

1.03 **EXECUTION AND INTENT**

Contractor Representations: Contractor makes the following representations to Owner:

1. Contract Sum reasonable: The Contract Sum is reasonable compensation for the Work and the Contract Time is adequate for the performance of the Work, as represented by the Contract Documents;
2. Contractor familiar with project: Contractor has carefully reviewed the Contract Documents, visited and examined the Project site, become familiar with the local conditions in which the Work is to be performed, and satisfied itself as to the nature, location, character, quality and quantity of the Work, the labor, materials, equipment, goods, supplies, work, services and other items to be furnished and all other requirements of the Contract Documents, as well as the surface and subsurface conditions and other matters that may be encountered at the Project site or affect performance of the Work or the cost or difficulty thereof;
3. Contractor financially capable: Contractor is financially solvent, able to pay its debts as they mature, and possesses sufficient working capital to complete the Work and perform Contractor's obligations required by the Contract Documents; and
4. Contractor can complete Work: Contractor is able to furnish the plant, tools, materials, supplies, equipment and labor required to complete the Work and perform the obligations required by the Contract Documents and has sufficient experience and competence to do so.

PART 2 – INSURANCE AND BONDS

2.01 **CONTRACTOR'S LIABILITY INSURANCE**

General insurance requirements: Prior to commencement of the Work, Contractor shall obtain all the insurance required by the Contract Documents and provide evidence satisfactory to Owner that such insurance has been procured. Review of the Contractor's insurance by Owner shall not relieve or decrease the liability of Contractor. Companies writing the insurance to be obtained by this part shall be licensed to do business under Chapter 48 RCW or comply with the Surplus Lines Law of the State of Washington. Contractor shall include in its bid the cost of all insurance and bond costs required to complete the base bid work and accepted alternates. Insurance carriers providing insurance in accordance with the Contract Documents shall be acceptable to Owner, and its A.M. Best rating shall be indicated on the insurance certificates.

- A. Term of insurance coverage: Contractor shall maintain the following insurance coverage during the Work and for one year after Final Acceptance. Contractor shall also maintain the following insurance coverage during the performance of any corrective Work required by Section 5.16.
 1. General Liability Insurance: Commercial General Liability (CGL) on an Occurrence Form. Coverage shall include, but not be limited to:
 - a. Completed operations/products liability;
 - b. Explosion, collapse, and underground; and
 - c. Employer's liability coverage.

2. Automobile Liability Insurance: Automobile liability
- B. Industrial Insurance compliance: Contractor shall comply with the Washington State Industrial Insurance Act and, if applicable, the Federal Longshoremen's and Harbor Workers' Act and the Jones Act.
- C. Insurance to protect for the following: All insurance coverages shall protect against claims for damages for personal and bodily injury or death, as well as claims for property damage, which may arise from operations in connection with the Work whether such operations are by Contractor or any Subcontractor.
- D. Owner as Additional Insured: All insurance coverages shall be endorsed to include Owner as an additional named insured for Work performed in accordance with the Contract Documents, and all insurance certificates shall evidence the Owner as an additional insured.

2.02 COVERAGE LIMITS

A. Insurance Coverage Certificates and Policies

The Contractor shall furnish acceptable proof of insurance coverage on the state of Washington Certificate of Insurance form SF500A, dated 07/02/92 or ACORD form, as well as copies of insurance policies.

B. Required Insurance Coverages

1. For a contract less than \$100,000.00, the coverage required is:

- a. Comprehensive General Liability Insurance – The Contractor shall at all times during the term of this contract, at its cost and expense, carry and maintain general public liability insurance, including contractual liability, against claims for bodily injury, personal injury, death or property damage occurring or arising out of services provided under this contract. This insurance shall cover claims caused by any act, omission, or negligence of the Contractor or its officers, agents, representatives, assigns or servants. The limits of liability insurance, which may be increased as deemed necessary by the contracting parties, shall be:

Each Occurrence	\$1,000,000.00
General Aggregate Limits (other than products – commercial operations)	\$1,000,000.00
Products – Commercial Operations Limit	\$1,000,000.00
Personal and Advertising Injury Limit	\$1,000,000.00
Fire Damage Limit (any one fire)	\$50,000.00
Medical Expense Limit (any one person)	\$5,000.00

- b. If the contract is for underground utility work, then the Contractor shall provide proof of insurance for that above in the form of Explosion, Collapse and Underground (XCU) coverage.
- c. Employers Liability on an occurrence basis in an amount not less than \$1,000,000.00 per occurrence.
2. For contracts over \$100,000.00 but less than \$5,000,000.00 the contractor shall obtain the coverage limits as listed for contracts below \$100,000.00 and General Aggregate and Products – Commercial Operations Limit of not less than \$2,000,000.00.

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3. Coverage for Comprehensive General Bodily Injury Liability Insurance for a contract over \$5,000,000.00 is:

Each Occurrence	\$2,000,000.00
General Aggregate Limits (other than products – commercial operations)	\$4,000,000.00
Products – Commercial Operations limit	\$4,000,000.00
Personal and Advertising Injury Limit	\$2,000,000.00
Fire Damage Limit (any one fire)	\$50,000.00
Medical Expense Limit (any one Person)	\$5,000.00

4. For all Contracts – Automobile Liability: in the event that services delivered pursuant to this contract involve the use of vehicles or the transportation of clients, automobile liability insurance shall be required. If Contractor-owned personal vehicles are used, a Business Automobile Policy covering at a minimum Code 2 “owned autos only” must be secured. If Contractor employee’s vehicles are used, the Contractor must also include under the Business Automobile Policy Code 9, coverage for non-owned autos. The minimum limits for automobile liability is: \$1,000,000.00 per occurrence, using a combined single limit for bodily injury and property damage.
5. For Contracts for Hazardous Substance Removal (Asbestos Abatement, PCB Abatement, etc.)
- a. In addition to providing insurance coverage for the project as outlined above, the Contractor shall provide Pollution Liability insurance for the hazardous substance removal as follows:

<u>EACH OCCURRENCE</u>	<u>AGGREGATE</u>
\$500,000.00	\$1,000,000.00

or \$1,000,000.00 each occurrence/aggregate bodily injury and property damage combined single limit.

- i. Insurance certificate must state that the insurer is covering hazardous substance removal.
- ii. Should this insurance be secured on a “claims made” basis, the coverage must be continuously maintained for one year following the project’s “final completion” through official completion of the project, plus one year following.

For Contracts where hazardous substance removal is a subcomponent of contracted work, the general contractor shall provide to the Owner a certificate of insurance for coverage as defined in 5a. above. The State of Washington must be listed as an additional insured. This certificate of insurance must be provided to the Owner prior to commencing work.

2.03 INSURANCE COVERAGE CERTIFICATES

- A. Certificate required: Prior to commencement of the Work, Contractor shall furnish to Owner a completed certificate of insurance coverage.
- B. List Project info: All insurance certificates shall name Owner’s Project number and Project title.
- C. Cancellation provisions: All insurance certificates shall specifically require 45 Days prior notice to Owner of cancellation or any material change, except 30 Days for surplus line insurance.

2.04 PAYMENT AND PERFORMANCE BONDS

Conditions for bonds: Payment and performance bonds for 100% of the Contract Award Amount, plus state sales tax, shall be furnished for the Work, using the Payment Bond and Performance Bond form published by and available from the American Institute of Architects (AIA) – form A312. Prior to execution of a Change Order that, cumulatively with previous Change Orders, increases the Contract Award Amount by 15% or more, the Contractor shall provide either new payment and performance bonds for the revised Contract Sum, or riders to the existing payment and performance bonds increasing the amount of the bonds. The Contractor shall likewise provide additional bonds or riders when subsequent Change Orders increase the Contract Sum by 15% or more.

No payment or performance bond is required if the Contract Sum is \$150,000 or less and the Contractor or General Contractor/Construction Manager agrees that Owner may, in lieu of the bond, retain 10% of the Contract Sum for the period allowed by RCW 39.08.010.

2.05 ALTERNATIVE SURETY

When alternative surety required: Contractor shall promptly furnish payment and performance bonds from an alternative surety as required to protect Owner and persons supplying labor or materials required by the Contract Documents if:

- A. Owner has a reasonable objection to the surety; or
- B. Any surety fails to furnish reports on its financial condition if required by Owner.

2.06 BUILDER'S RISK

- A. Contractor to buy Property Insurance: Contractor shall purchase and maintain property insurance in the amount of the Contract Sum including all Change Orders for the Work on a replacement cost basis until Substantial Completion. For projects not involving New Building Construction, "Installation Floater" is an acceptable substitute for the Builder's Risk Insurance. The insurance shall cover the interest of Owner, Contractor, and any Subcontractors, as their interests may appear.
- B. Losses covered: Contractor property insurance shall be placed on an "all risk" basis and insure against the perils of fire and extended coverage and physical loss or damage including theft, vandalism, malicious mischief, collapse, false work, temporary buildings, debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for A/E's services and expenses required as a result of an insured loss.
- C. Waiver of subrogation rights: Owner and Contractor waive all subrogation rights against each other, any Subcontractors, A/E, A/E's subconsultants, separate contractors described in Section 5.20, if any, and any of their subcontractors, for damages caused by fire or other perils to the extent covered by property insurance obtained pursuant to this section or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by Owner as fiduciary. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

PART 3 – TIME AND SCHEDULE

3.01 PROGRESS AND COMPLETION

Contractor to meet schedule: Contractor shall diligently prosecute the Work, with adequate forces, achieve Substantial Completion within the Contract Time, and achieve Final Completion within a reasonable period thereafter.

3.02 CONSTRUCTION SCHEDULE

- A. Preliminary Progress Schedule: Unless otherwise provided in Division 1, Contractor shall, within 14 Days after issuance of the Notice to Proceed, submit a preliminary Progress Schedule. The Progress Schedule shall show the sequence in which Contractor proposes to perform the Work, and the dates on which Contractor plans to start and finish major portions of the Work, including dates for shop drawings and other submittals, and for acquiring materials and equipment.
- B. Form of Progress Schedule: The Progress Schedule shall be in the form of a Critical Path Method (CPM) logic network or, with the approval of the Owner, a bar chart schedule may be submitted. The scheduling of construction is the responsibility of the Contractor and is included in the contract to assure adequate planning and execution of the work. The schedule will be used to evaluate progress of the work for payment based on the Schedule of Values. The schedule shall show the Contractor's planned order and interdependence of activities, and sequence of work. As a minimum the schedule shall include:
1. Date of Notice to Proceed;
 2. Activities (resources, durations, individual responsible for activity, early starts, late starts, early finishes, late finishes, etc.);
 3. Utility Shutdowns;
 4. Interrelationships and dependence of activities;
 5. Planned vs. actual status for each activity;
 6. Substantial completion;
 7. Punch list;
 8. Final inspection;
 9. Final completion, and
 10. Float time

The Schedule Duration shall be based on the Contract Time of Completion listed on the Bid Form. The Owner shall not be obligated to accept any Early Completion Schedule suggested by the Contractor. The Contract Time for Completion shall establish the Schedule Completion Date.

If the Contractor feels that the work can be completed in less than the Specified Contract Time, then the Surplus Time shall be considered Project Float. This Float time shall be shown on the Project Schedule. It shall be available to accommodate changes in the work and unforeseen conditions.

Neither the Contractor nor the Owner have exclusive right to this Float Time. It belongs to the project.

- C. Owner comments on Progress Schedule: Owner shall return comments on the preliminary Progress Schedule to Contractor within 14 Days of receipt. Review by Owner of Contractor's schedule does not constitute an approval or acceptance of Contractor's construction means, methods, or sequencing, or its ability to complete the Work within the Contract Time. Contractor shall revise and resubmit its schedule, as necessary. Owner may withhold a portion of progress payments until a Progress Schedule has been submitted which meets the requirements of this section.

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- D. Monthly updates and compliance with Progress Schedule: Contractor shall utilize and comply with the Progress Schedule. On a monthly basis, or as otherwise directed by Owner, Contractor shall submit an updated Progress Schedule at its own expense to Owner indicating actual progress. If, in the opinion of Owner, Contractor is not in conformance with the Progress Schedule for reasons other than acts of Force Majeure as identified in Section 3.05, Contractor shall take such steps as are necessary to bring the actual completion dates of its work activities into conformance with the Progress Schedule, and if directed by Owner, Contractor shall submit a corrective action plan or revise the Progress Schedule to reconcile with the actual progress of the Work.
- E. Contractor to notify Owner of delays: Contractor shall promptly notify Owner in writing of any actual or anticipated event which is delaying or could delay achievement of any milestone or performance of any critical path activity of the Work. Contractor shall indicate the expected duration of the delay, the anticipated effect of the delay on the Progress Schedule, and the action being or to be taken to correct the problem. Provision of such notice does not relieve Contractor of its obligation to complete the Work within the Contract Time.

3.03 OWNER'S RIGHT TO SUSPEND THE WORK FOR CONVENIENCE

- A. Owner may suspend Work: Owner may, at its sole discretion, order Contractor, in writing, to suspend all or any part of the Work for up to 90 Days, or for such longer period as mutually agreed.
- B. Compliance with suspension; Owner's options: Upon receipt of a written notice suspending the Work, Contractor shall immediately comply with its terms and take all reasonable steps to minimize the incurrence of cost of performance directly attributable to such suspension. Within a period up to 90 Days after the notice is delivered to Contractor, or within any extension of that period to which the parties shall have agreed, Owner shall either:
1. Cancel the written notice suspending the Work; or
 2. Terminate the Work covered by the notice as provided in the termination provisions of Part 9.
- C. Resumption of Work: If a written notice suspending the Work is cancelled or the period of the notice or any extension thereof expires, Contractor shall resume Work.
- D. Equitable Adjustment for suspensions: Contractor shall be entitled to an equitable adjustment in the Contract Time, or Contract Sum, or both, for increases in the time or cost of performance directly attributable to such suspension, provided Contractor complies with all requirements set forth in Part 7.

3.04 OWNER'S RIGHT TO STOP THE WORK FOR CAUSE

- A. Owner may stop Work for Contractor's failure to perform: If Contractor fails or refuses to perform its obligations in accordance with the Contract Documents, Owner may order Contractor, in writing, to stop the Work, or any portion thereof, until satisfactory corrective action has been taken.
- B. No Equitable Adjustment for Contractor's failure to perform: Contractor shall not be entitled to an equitable adjustment in the Contract Time or Contract Sum for any increased cost or time of performance attributable to Contractor's failure or refusal to perform or from any reasonable remedial action taken by Owner based upon such failure.

3.05 DELAY

- A. Force Majeure actions not a default; Force Majeure defined: Any delay in or failure of performance by Owner or Contractor, other than the payment of money, shall not constitute a default hereunder if and to the extent the cause for such delay or failure of performance was unforeseeable and beyond the control of the party ("Force Majeure"). Acts of Force Majeure include, but are not limited to:
1. Acts of God or the public enemy;
 2. Acts or omissions of any government entity;
 3. Fire or other casualty for which Contractor is not responsible;
 4. Quarantine or epidemic;
 5. Strike or defensive lockout;
 6. Unusually severe weather conditions which could not have been reasonably anticipated; and
 7. Unusual delay in receipt of supplies or products which were ordered and expedited and for which no substitute reasonably acceptable to Owner was available.
- B. Contract Time adjustment for Force Majeure: Contractor shall be entitled to an equitable adjustment in the Contract Time for changes in the time of performance directly attributable to an act of Force Majeure, provided it makes a request for equitable adjustment according to Section 7.03. Contractor shall not be entitled to an adjustment in the Contract Sum resulting from an act of Force Majeure.
- C. Contract Time or Contract Sum adjustment if Owner at fault: Contractor shall be entitled to an equitable adjustment in Contract Time, and may be entitled to an equitable adjustment in Contract Sum, if the cost or time of Contractor's performance is changed due to the fault or negligence of Owner, provided the Contractor makes a request according to Sections 7.02 and 7.03.
- D. No Contract Time or Contract Sum adjustment if Contractor at fault: Contractor shall not be entitled to an adjustment in Contract Time or in the Contract Sum for any delay or failure of performance to the extent such delay or failure was caused by Contractor or anyone for whose acts Contractor is responsible.
- E. Contract Time adjustment only for concurrent fault: To the extent any delay or failure of performance was concurrently caused by the Owner and Contractor, Contractor shall be entitled to an adjustment in the Contract Time for that portion of the delay or failure of performance that was concurrently caused, provided it makes a request for equitable adjustment according to Section 7.03, but shall not be entitled to an adjustment in Contract Sum.
- F. Contractor to mitigate delay impacts: Contractor shall make all reasonable efforts to prevent and mitigate the effects of any delay, whether occasioned by an act of Force Majeure or otherwise.

3.06 NOTICE TO OWNER OF LABOR DISPUTES

- A. Contractor to notify Owner of labor disputes: If Contractor has knowledge that any actual or potential labor dispute is delaying or threatens to delay timely performance in accordance with the Contract Documents, Contractor shall immediately give notice, including all relevant information, to Owner.

- B. Pass through notification provisions to Subcontractors: Contractor agrees to insert a provision in its Subcontracts and to require insertion in all sub-subcontracts, that in the event timely performance of any such contract is delayed or threatened by delay by any actual or potential labor dispute, the Subcontractor or Sub-subcontractor shall immediately notify the next higher tier Subcontractor or Contractor, as the case may be, of all relevant information concerning the dispute.

3.07 DAMAGES FOR FAILURE TO ACHIEVE TIMELY COMPLETION

A. Liquidated Damages

1. Reason for Liquidated Damages: Timely performance and completion of the Work is essential to Owner and time limits stated in the Contract Documents are of the essence. Owner will incur serious and substantial damages if Substantial Completion of the Work does not occur within the Contract Time. However, it would be difficult if not impossible to determine the exact amount of such damages. Consequently, provisions for liquidated damages are included in the Contract Documents.
2. Calculation of Liquidated Damages amount: The liquidated damage amounts set forth in the Contract Documents will be assessed not as a penalty, but as liquidated damages for breach of the Contract Documents. This amount is fixed and agreed upon by and between the Contractor and Owner because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the Owner would in such event sustain. This amount shall be construed as the actual amount of damages sustained by the Owner, and may be retained by the Owner and deducted from periodic payments to the Contractor.
3. Contractor responsible even if Liquidated Damages assessed: Assessment of liquidated damages shall not release Contractor from any further obligations or liabilities pursuant to the Contract Documents.

B. Actual Damages

Calculation of Actual Damages: Actual damages will be assessed for failure to achieve Final Completion within the time provided. Actual damages will be calculated on the basis of direct architectural, administrative, and other related costs attributable to the Project from the date when Final Completion should have been achieved, based on the date Substantial Completion is actually achieved, to the date Final Completion is actually achieved. Owner may offset these costs against any payment due Contractor.

PART 4 – SPECIFICATIONS, DRAWINGS, AND OTHER DOCUMENTS

4.01 DISCREPANCIES AND CONTRACT DOCUMENT REVIEW

- A. Specifications and Drawings are basis of the Work: The intent of the Specifications and Drawings is to describe a complete Project to be constructed in accordance with the Contract Documents. Contractor shall furnish all labor, materials, equipment, tools, transportation, permits, and supplies, and perform the Work required in accordance with the Drawings, Specifications, and other provisions of the Contract Documents.
- B. Parts of the Contract Documents are complementary: The Contract Documents are complementary. What is required by one part of the Contract Documents shall be binding as if required by all. Anything mentioned in the Specifications and not shown on the Drawings, or shown on the Drawings and not mentioned in the Specifications, shall be of like effect as if shown or mentioned in both.

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- C. Contractor to report discrepancies in Contract Documents: Contractor shall carefully study and compare the Contract Documents with each other and with information furnished by Owner. If, during the performance of the Work, Contractor finds a conflict, error, inconsistency, or omission in the Contract Documents, it shall promptly and before proceeding with the Work affected thereby, report such conflict, error, inconsistency, or omission to A/E in writing.
- D. Contractor knowledge of discrepancy in documents – responsibility: Contractor shall do no Work without applicable Drawings, Specifications, or written modifications, or Shop Drawings where required, unless instructed to do so in writing by Owner. If Contractor performs any construction activity, and it knows or reasonably should have known that any of the Contract Documents contain a conflict, error, inconsistency, or omission, Contractor shall be responsible for the performance and shall bear the cost for its correction.
- E. Contractor to perform Work implied by Contract Documents: Contractor shall provide any work or materials the provision of which is clearly implied and is within the scope of the Contract Documents even if the Contract Documents do not mention them specifically.
- F. Interpretation questions referred to A/E: Questions regarding interpretation of the requirements of the Contract Documents shall be referred to the A/E.

4.02 PROJECT RECORD

- A. Contractor to maintain Project Record Drawings and Specifications: Contractor shall legibly mark in ink on a separate set of the Drawings and Specifications all actual construction, including depths of foundations, horizontal and vertical locations of internal and underground utilities and appurtenances referenced to permanent visible and accessible surface improvements, field changes of dimensions and details, actual suppliers, manufacturers and trade names, models of installed equipment, and Change Order Proposals (COP). This separate set of Drawings and Specifications shall be the "Project Record."
- B. Update Project Record weekly and keep on site: The Project Record shall be maintained on the project site throughout the construction and shall be clearly labeled "PROJECT RECORD." The Project Record shall be updated at least weekly noting all changes and shall be available to Owner at all times.
- C. Final Project Record to A/E before Final Acceptance: Contractor shall submit the completed and finalized Project Record to A/E prior to Final Acceptance.

4.03 SHOP DRAWINGS

- A. Definition of Shop Drawings: "Shop Drawings" means documents and other information required to be submitted to A/E by Contractor pursuant to the Contract Documents, showing in detail: the proposed fabrication and assembly of structural elements; and the installation (i.e. form, fit, and attachment details) of materials and equipment. Shop Drawings include, but are not limited to, drawings, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data, samples, and similar materials furnished by Contractor to explain in detail specific portions of the Work required by the Contract Documents. For materials and equipment to be incorporated into the Work, Contractor submittal shall include the name of the manufacturer, the model number, and other information concerning the performance, capacity, nature, and rating of the item. When directed, Contractor shall submit all samples at its own expense. Owner may duplicate, use, and disclose Shop Drawings provided in accordance with the Contract Documents.
- B. Approval of Shop Drawings by Contractor and A/E: Contractor shall coordinate all Shop Drawings, and review them for accuracy, completeness, and compliance with the Contract Documents and shall indicate its approval thereon as evidence of such coordination and review.

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Where required by law, Shop Drawings shall be stamped by an appropriate professional licensed by the state of Washington. Shop Drawings submitted to A/E without evidence of Contractor's approval shall be returned for resubmission. Contractor shall review, approve, and submit Shop Drawings with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of Owner or separate contractors. Contractor's submittal schedule shall allow a reasonable time for A/E review. A/E will review, approve, or take other appropriate action on the Shop Drawings. Contractor shall perform no portion of the Work requiring submittal and review of Shop Drawings until the respective submittal has been reviewed and the A/E has approved or taken other appropriate action. Owner and A/E shall respond to Shop Drawing submittals with reasonable promptness. Any Work by Contractor shall be in accordance with reviewed Shop Drawings. Submittals made by Contractor which are not required by the Contract Documents may be returned without action.

- C. Contractor not relieved of responsibility when Shop Drawings approved: Approval, or other appropriate action with regard to Shop Drawings, by Owner or A/E shall not relieve Contractor of responsibility for any errors or omissions in such Shop Drawings, nor from responsibility for compliance with the requirements of the Contract Documents. Unless specified in the Contract Documents, review by Owner or A/E shall not constitute an approval of the safety precautions employed by Contractor during construction, or constitute an approval of Contractor's means or methods of construction. If Contractor fails to obtain approval before installation and the item or work is subsequently rejected, Contractor shall be responsible for all costs of correction.
- D. Variations between Shop Drawings and Contract Documents: If Shop Drawings show variations from the requirements of the Contract Documents, Contractor shall describe such variations in writing, separate from the Shop Drawings, at the time it submits the Shop Drawings containing such variations. If A/E approves any such variation, an appropriate Change Order will be issued. If the variation is minor and does not involve an adjustment in the Contract Sum or Contract Time, a Change Order need not be issued; however, the modification shall be recorded upon the Project Record.
- E. Contractor to submit 5 copies of Shop Drawings: Unless otherwise provided in Division 1, Contractor shall submit to A/E for approval 5 copies of all Shop Drawings. Unless otherwise indicated, 3 sets of all Shop Drawings shall be retained by A/E and 2 sets shall be returned to Contractor.

4.04 ORGANIZATION OF SPECIFICATIONS

Specification organization by trade: Specifications are prepared in sections which conform generally with trade practices. These sections are for Owner and Contractor convenience and shall not control Contractor in dividing the Work among the Subcontractors or in establishing the extent of the Work to be performed by any trade.

4.05 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS, AND OTHER DOCUMENTS

- A. A/E, not Contractor, owns Copyright of Drawings and Specifications: The Drawings, Specifications, and other documents prepared by A/E are instruments of A/E's service through which the Work to be executed by Contractor is described. Neither Contractor nor any Subcontractor shall own or claim a copyright in the Drawings, Specifications, and other documents prepared by A/E, and A/E shall be deemed the author of them and will, along with any rights of Owner, retain all common law, statutory, and other reserved rights, in addition to the copyright. All copies of these documents, except Contractor's set, shall be returned or suitably accounted for to A/E, on request, upon completion of the Work.
- B. Drawings and Specifications to be used only for this Project: The Drawings, Specifications, and other documents prepared by the A/E, and copies thereof furnished to Contractor, are for use solely with respect to this Project. They are not to be used by Contractor or any Subcontractor

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on other projects or for additions to this Project outside the scope of the Work without the specific written consent of Owner and A/E. Contractor and Subcontractors are granted a limited license to use and reproduce applicable portions of the Drawings, Specifications, and other documents prepared by A/E appropriate to and for use in the execution of their Work.

- C. Shop Drawing license granted to Owner: Contractor and all Subcontractors grant a non-exclusive license to Owner, without additional cost or royalty, to use for its own purposes (including reproduction) all Shop Drawings, together with the information and diagrams contained therein, prepared by Contractor or any Subcontractor. In providing Shop Drawings, Contractor and all Subcontractors warrant that they have authority to grant to Owner a license to use the Shop Drawings, and that such license is not in violation of any copyright or other intellectual property right. Contractor agrees to defend and indemnify Owner pursuant to the indemnity provisions in Section 5.03 and 5.22 from any violations of copyright or other intellectual property rights arising out of Owner's use of the Shop Drawings hereunder, or to secure for Owner, at Contractor's own cost, licenses in conformity with this section.
- D. Shop Drawings to be used only for this Project: The Shop Drawings and other submittals prepared by Contractor, Subcontractors of any tier, or its or their equipment or material suppliers, and copies thereof furnished to Contractor, are for use solely with respect to this Project. They are not to be used by Contractor or any Subcontractor of any tier, or material or equipment supplier, on other projects or for additions to this Project outside the scope of the Work without the specific written consent of Owner. The Contractor, Subcontractors of any tier, and material or equipment suppliers are granted a limited license to use and reproduce applicable portions of the Shop Drawings and other submittals appropriate to and for use in the execution of their Work under the Contract Documents.

PART 5 – PERFORMANCE

5.01 CONTRACTOR CONTROL AND SUPERVISION

- A. Contractor responsible for Means and Methods of construction: Contractor shall supervise and direct the Work, using its best skill and attention, and shall perform the Work in a skillful manner. Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences, and procedures and for coordinating all portions of the Work, unless the Contract Documents give other specific instructions concerning these matters. Contractor shall disclose its means and methods of construction when requested by Owner.
- B. Competent Superintendent required: Performance of the Work shall be directly supervised by a competent superintendent who has authority to act for Contractor. The superintendent must be satisfactory to the Owner and shall not be changed without the prior written consent of Owner. Owner may require Contractor to remove the superintendent from the Work or Project site, at no cost to the Owner for delay or any other claim, if Owner reasonably deems the superintendent incompetent, negligent, or otherwise objectionable, provided Owner has first notified Contractor in writing and allowed a reasonable period for transition. Noncompliance with the Owner's request to remove and replace the superintendent for a material reason shall also be grounds for terminating the Contract for cause.
- C. Contractor responsible for acts and omissions of self and agents: Contractor shall be responsible to Owner for acts and omissions of Contractor, Subcontractors, and their employees and agents.
- D. Contractor to employ competent and disciplined workforce: Contractor shall enforce strict discipline and good order among all of the Contractor's employees and other persons performing the Work. Contractor shall not permit employment of persons not skilled in tasks assigned to them. Contractor's employees shall at all times conduct business in a manner which assures fair, equal, and nondiscriminatory treatment of all persons. Owner may, by written notice, require

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Contractor to remove from the Work or Project site, at no cost to the Owner for delay or any other claim, any employee Owner reasonably deems incompetent, negligent, or otherwise objectionable. Noncompliance with the Owner's request to remove and replace personnel at any level for a material reason shall also be grounds for terminating the Contract for cause.

- E. Contractor to keep project documents on site: Contractor shall keep on the Project site a copy of the Drawings, Specifications, addenda, reviewed Shop Drawings, and permits and permit drawings.
- F. Contractor to comply with ethical standards: Contractor shall ensure that its owner(s) and employees, and those of its Subcontractors, comply with the Ethics in Public Service Act RCW 42.52, which, among other things, prohibits state employees from having an economic interest in any public works contract that was made by, or supervised by, that employee. Contractor shall remove, at its sole cost and expense, any of its, or its Subcontractors' employees, if they are in violation of this act.

5.02 PERMITS, FEES, AND NOTICES

- A. Contractor to obtain and pay for permits: Unless otherwise provided in the Contract Documents, Contractor shall pay for and obtain all permits, licenses, and inspections necessary for proper execution and completion of the Work. Prior to Final Acceptance, the approved, signed permits shall be delivered to Owner.
- B. Allowances for permit fees: The actual cost of the general building permit (only) and the public utility hook-up fees will be a direct reimbursement to the Contractor or paid directly to the permitting agency by the Owner. ***Fees for these permits should not be included by the Contractor in his bid amount.***
- C. Contractor to comply with all applicable laws: Contractor shall comply with and give notices required by all federal, state, and local laws, ordinances, rules, regulations, and lawful orders of public authorities applicable to performance of the Work.
- D. Contractor to submit copies: The General Contractor shall submit copies of each valid permit required on the project to the Owner's representative. Nothing in this part shall be construed as imposing a duty upon the Owner or A/E to secure permits.

5.03 PATENTS AND ROYALTIES

Payment, indemnification, and notice: Contractor is responsible for, and shall pay, all royalties and license fees. Contractor shall defend, indemnify, and hold Owner harmless from any costs, expenses, and liabilities arising out of the infringement by Contractor of any patent, copyright, or other intellectual property right used in the Work; however, provided that Contractor gives prompt notice, Contractor shall not be responsible for such defense or indemnity when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents. If Contractor has reason to believe that use of the required design, process, or product constitutes an infringement of a patent or copyright, it shall promptly notify Owner of such potential infringement.

5.04 PREVAILING WAGES

- A. Contractor to pay Prevailing Wages or applicable Federal Wages: Contractor shall pay the prevailing rate of wages to all workers, laborers, or mechanics employed in the performance of any part of the Work in accordance with RCW 39.12 and the rules and regulations of the Department of Labor and Industries (L&I). The schedule of prevailing wage rates for the locality or localities of the Work, is determined by the Industrial Statistician of the Department of Labor and Industries. It is the Contractor's responsibility to verify the applicable prevailing wage rate. If applicable, the Contractor shall comply with all Federal Funding requirements of the Davis

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Bacon Act that will be addressed in a separate "DIVISION 00 SPECIAL CONDITIONS" specification section that will be based on the specific requirements of the funding source.

- B. Statement of Intent to Pay Prevailing Wages: Before payment is made by the Owner to the Contractor for any work performed by the Contractor and subcontractors whose work is included in the application for payment, the Contractor shall submit, or shall have previously submitted to the Owner for the Project, a Statement of Intent to Pay Prevailing Wages, approved by the L&I, certifying the rate of hourly wage paid and to be paid each classification of laborers, workers, or mechanics employed upon the Work by Contractor and Subcontractors. Such rates of hourly wage shall not be less than the prevailing wage rate.
- C. Affidavit of Wages Paid: Prior to release of retainage, the Contractor shall submit to the Owner an Affidavit of Wages Paid, approved by the L&I, for the Contractor and every subcontractor, of any tier, that performed work on the Project.
- D. Disputes: Disputes regarding prevailing wage rates shall be referred for arbitration to the Director of the L&I. The arbitration decision shall be final and conclusive and binding on all parties involved in the dispute as provided for by RCW 39.12.060.
- E. Statement with pay application; Post Statements of Intent at job site: Each Application for Payment submitted by Contractor shall state that prevailing wages have been paid in accordance with the prefiled statement(s) of intent, as approved. Copies of the approved intent statement(s) shall be posted on the job site with the address and telephone number of the Industrial Statistician of the L&I where a complaint or inquiry concerning prevailing wages may be made.
- F. Contractor to pay for Statements of Intent and Affidavits: In compliance with chapter 296-127 WAC, Contractor shall pay to the L&I the currently established fee(s) for each statement of intent and/or affidavit of wages paid submitted to the L&I for certification.
- G. Certified Payrolls: Consistent with RCW 31.12.120, contractors, subcontractors, or employers shall file a copy of its certified payroll records using the L&I' online system at least once per month. If the L&I' online system is not used, a contractor, subcontractor, or employer shall file a copy of its certified payroll records directly with the L&I in a format approved by the L&I at least once per month. A contractor, subcontractor, or employer's noncompliance with this section constitutes a violation of RCW 39.12.050.
- H. Compliance with Federal Funding requirements: If applicable, the Contractor shall comply with all Federal Funding requirements of the Davis Bacon Act that will be addressed in a separate "DIVISION 00 SPECIAL CONDITIONS" specification section that will be based on the specific requirements of the funding source.

5.05 HOURS OF LABOR

- A. Overtime: Contractor shall comply with all applicable provisions of RCW 49.28 and they are incorporated herein by reference. Pursuant to that statute, no laborer, worker, or mechanic employed by Contractor, any Subcontractor, or any other person performing or contracting to do the whole or any part of the Work, shall be permitted or required to work more than eight hours in any one calendar day, provided, that in cases of extraordinary emergency, such as danger to life or property, the hours of work may be extended, but in such cases the rate of pay for time employed in excess of eight hours of each calendar day shall be not less than one and one-half times the rate allowed for this same amount of time during eight hours of service.
- B. 4-10 Agreements: Notwithstanding the preceding paragraph, RCW 49.28 permits a contractor or subcontractor in any public works contract subject to those provisions, to enter into an agreement with its employees in which the employees work up to ten hours in a calendar day. No such agreement may provide that the employees work ten-hour days for more than four

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calendar days a week. Any such agreement is subject to approval by the employees. The overtime provisions of RCW 49.28 shall not apply to the hours, up to forty hours per week, worked pursuant to any such agreement.

5.06 NONDISCRIMINATION

- A. Discrimination prohibited by applicable laws: The Contractor and all Subcontractors shall comply with all applicable federal and state non-discrimination laws, regulations, and policies. No person shall, on the grounds of age, race, creed, color, sex, sexual orientation, religion, national origin, marital status, honorably discharged veteran or military status, or disability (physical, mental, or sensory) be denied the benefits of, or otherwise be subjected to discrimination under any project, program, or activity, funded, in whole or in part, under this Agreement
- B. During performance of the Work:
1. Protected Classes: Contractor shall not discriminate against any employee or applicant for employment because of race, creed, color, national origin, sex, age, marital status, or the presence of any physical, sensory, or mental disability, Vietnam era veteran status, or disabled veteran status, nor commit any other unfair practices as defined in RCW 49.60.
 2. Advertisements to state nondiscrimination: Contractor shall, in all solicitations or advertisements for employees placed by or for it, state that all qualified applicants will be considered for employment, without regard to race, creed, color, national origin, sex, age, marital status, or the presence of any physical, sensory, or mental disability.
 3. Contractor to notify unions and others of nondiscrimination: Contractor shall send to each labor union, employment agency, or representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice advising the labor union, employment agency, or workers' representative of Contractor's obligations according to the Contract Documents and RCW 49.60.
 4. Owner and State access to Contractor records: Contractor shall permit access to its books, records, and accounts, and to its premises by Owner, and by the Washington State Human Rights Commission, for the purpose of investigation to ascertain compliance with this section of the Contract Documents.
 5. Pass through provisions to Subcontractors: Contractor shall include the provisions of this section in every Subcontract.

5.07 SAFETY PRECAUTIONS

- A. In performing this contract, the Contractor shall provide for protecting the lives and health of employees and other persons; preventing damage to property, materials, supplies, and equipment; and avoid work interruptions. For these purposes, the Contractor shall:
1. Follow Washington Industrial Safety and Health Act (WISHA) regional directives and provide a site-specific safety program that will require an accident prevention and hazard analysis plan for the contractor and each subcontractor on the work site. The Contractor shall submit a site-specific safety plan to the Owner's representative prior to the initial scheduled construction meeting.
 2. Provide adequate safety devices and measures including, but not limited to, the appropriate safety literature, notice, training, permits, placement and use of barricades, signs, signal lights, ladders, scaffolding, staging, runways, hoist, construction elevators, shoring, temporary lighting, grounded outlets, wiring, hazardous materials, vehicles, construction

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processes, and equipment required by all applicable state, federal, and local laws and regulations.

3. Comply with the State Environmental Policy Act (SEPA), Clean Air Act, Shoreline Management Act, and other applicable federal, state, and local statutes and regulations dealing with the prevention of environmental pollution and the preservation of public natural resources.
 4. Post all permits, notices, and/or approvals in a conspicuous location at the construction site.
 5. Provide any additional measures that the Owner determines to be reasonable and necessary for ensuring a safe environment in areas open to the public. Nothing in this part shall be construed as imposing a duty upon the Owner or A/E to prescribe safety conditions relating to employees, public, or agents of the Contractors.
- B. Contractor safety responsibilities: In carrying out its responsibilities according to the Contract Documents, Contractor shall protect the lives and health of employees performing the Work and other persons who may be affected by the Work; prevent damage to materials, supplies, and equipment whether on site or stored off-site; and prevent damage to other property at the site or adjacent thereto. Contractor shall comply with all applicable laws, ordinances, rules, regulations, and orders of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury, or loss; shall erect and maintain all necessary safeguards for such safety and protection; and shall notify owners of adjacent property and utilities when prosecution of the Work may affect them.
- C. Contractor to maintain safety records: Contractor shall maintain an accurate record of exposure data on all incidents relating to the Work resulting in death, traumatic injury, occupational disease, or damage to property, materials, supplies, or equipment. Contractor shall immediately report any such incident to Owner. Owner shall, at all times, have a right of access to all records of exposure.
- D. Contractor to provide HazMat training: Contractor shall provide all persons working on the Project site with information and training on hazardous chemicals in their work at the time of their initial assignment, and whenever a new hazard is introduced into their work area.
1. Information. At a minimum, Contractor shall inform persons working on the Project site of:
 - a. WAC: The requirements of chapter 296-62 WAC, General Occupational Health Standards;
 - b. Presence of hazardous chemicals: Any operations in their work area where hazardous chemicals are present; and
 - c. Hazard communications program: The location and availability of written hazard communication programs, including the required list(s) of hazardous chemicals and material safety data sheets required by chapter 296-62 WAC.
 2. Training. At a minimum, Contractor shall provide training for persons working on the Project site which includes:
 - a. Detecting hazardous chemicals: Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.);

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- b. Hazards of chemicals: The physical and health hazards of the chemicals in the work area;
 - c. Protection from hazards: The measures such persons can take to protect themselves from these hazards, including specific procedures Contractor, or its Subcontractors, or others have implemented to protect those on the Project site from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used; and
 - d. Hazard communications program: The details of the hazard communications program developed by Contractor, or its Subcontractors, including an explanation of the labeling system and the material safety data sheet, and how employees can obtain and use the appropriate hazard information.
- E. Hazardous, toxic or harmful substances: Contractor's responsibility for hazardous, toxic, or harmful substances shall include the following duties:
- 1. Illegal use of dangerous substances: Contractor shall not keep, use, dispose, transport, generate, or sell on or about the Project site, any substances now or hereafter designated as, or which are subject to regulation as, hazardous, toxic, dangerous, or harmful by any federal, state or local law, regulation, statute or ordinance (hereinafter collectively referred to as "hazardous substances"), in violation of any such law, regulation, statute, or ordinance, but in no case shall any such hazardous substance be stored more than 90 Days on the Project site.
 - 2. Contractor notifications of spills, failures, inspections, and fines: Contractor shall promptly notify Owner of all spills or releases of any hazardous substances which are otherwise required to be reported to any regulatory agency and pay the cost of cleanup. Contractor shall promptly notify Owner of all failures to comply with any federal, state, or local law, regulation, or ordinance; all inspections of the Project site by any regulatory entity concerning the same; all regulatory orders or fines; and all responses or interim cleanup actions taken by or proposed to be taken by any government entity or private party on the Project site.
- F. Public safety and traffic: All Work shall be performed with due regard for the safety of the public. Contractor shall perform the Work so as to cause a minimum of interruption of vehicular traffic or inconvenience to pedestrians. All arrangements to care for such traffic shall be Contractor's responsibilities. All expenses involved in the maintenance of traffic by way of detours shall be borne by Contractor.
- G. Contractor to act in an emergency: In an emergency affecting the safety of life or the Work or of adjoining property, Contractor is permitted to act, at its discretion, to prevent such threatened loss or injury, and Contractor shall so act if so authorized or instructed.
- H. No duty of safety by Owner or A/E: Nothing provided in this section shall be construed as imposing any duty upon Owner or A/E with regard to, or as constituting any express or implied assumption of control or responsibility over, Project site safety, or over any other safety conditions relating to employees or agents of Contractor or any of its Subcontractors, or the public.

5.08 OPERATIONS, MATERIAL HANDLING, AND STORAGE AREAS

- A. Limited storage areas: Contractor shall confine all operations, including storage of materials, to Owner-approved areas.
- B. Temporary buildings and utilities at Contractor expense: Temporary buildings (e.g., storage sheds, shops, offices) and utilities may be provided by Contractor only with the consent of Owner

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and without expense to Owner. The temporary buildings and utilities shall be removed by Contractor at its expense upon completion of the Work.

- C. Roads and vehicle loads: Contractor shall use only established roadways or temporary roadways authorized by Owner. When materials are transported in prosecuting the Work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by federal, state, or local law or regulation.
- D. Ownership and reporting by Contractor of demolished materials: Ownership and control of all materials or facility components to be demolished or removed from the Project site by Contractor shall immediately vest in Contractor upon severance of the component from the facility or severance of the material from the Project site. Contractor shall be responsible for compliance with all laws governing the storage and ultimate disposal. Contractor shall provide Owner with a copy of all manifests and receipts evidencing proper disposal when required by Owner or applicable law.
- E. Contractor responsible for care of materials and equipment on-site: Contractor shall be responsible for the proper care and protection of its materials and equipment delivered to the Project site. Materials and equipment may be stored on the premises subject to approval of Owner. When Contractor uses any portion of the Project site as a shop, Contractor shall be responsible for any repairs, patching, or cleaning arising from such use.
- F. Contractor responsible for loss of materials and equipment: Contractor shall protect and be responsible for any damage or loss to the Work, or to the materials or equipment until the date of Substantial Completion, and shall repair or replace without cost to Owner any damage or loss that may occur, except damages or loss caused by the acts or omissions of Owner. Contractor shall also protect and be responsible for any damage or loss to the Work, or to the materials or equipment, after the date of Substantial Completion, and shall repair or replace without cost to Owner any such damage or loss that might occur, to the extent such damages or loss are caused by the acts or omissions of Contractor, or any Subcontractor.

5.09 PRIOR NOTICE OF EXCAVATION

- A. Excavation defined; Use of locator services: "Excavation" means an operation in which earth, rock, or other material on or below the ground is moved or otherwise displaced by any means, except the tilling of soil less than 12 inches in depth for agricultural purposes, or road ditch maintenance that does not change the original road grade or ditch flow line. Before commencing any excavation, Contractor shall provide notice of the scheduled commencement of excavation to all owners of underground facilities or utilities, through locator services.

5.10 UNFORESEEN PHYSICAL CONDITIONS

- A. Notice requirement for concealed or unknown conditions: If Contractor encounters conditions at the site which are subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents, or unknown physical conditions of an unusual nature which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, then Contractor shall give written notice to Owner promptly and in no event later than 7 Days after the first observance of the conditions. Conditions shall not be disturbed prior to such notice.
- B. Adjustment in Contract Time and Contract Sum: If such conditions differ materially and cause a change in Contractor's cost of, or time required for, performance of any part of the Work, the Contractor may be entitled to an equitable adjustment in the Contract Time or Contract Sum, or both, provided it makes a request therefore as provided in Part 7.

5.11 PROTECTION OF EXISTING STRUCTURES, EQUIPMENT, VEGETATION, UTILITIES AND IMPROVEMENTS

- A. Contractor to protect and repair property: Contractor shall protect from damage all existing structures, equipment, improvements, utilities, and vegetation: at or near the Project site; and on adjacent property of a third party, the locations of which are made known to or should be known by Contractor. Contractor shall repair any damage, including that to the property of a third party, resulting from failure to comply with the requirements of the Contract Documents or failure to exercise reasonable care in performing the Work. If Contractor fails or refuses to repair the damage promptly, Owner may have the necessary work performed and charge the cost to Contractor.
- B. Tree and vegetation protection: Contractor shall only remove trees when specifically authorized to do so, and shall protect vegetation that will remain in place.

5.12 LAYOUT OF WORK

- A. Advanced planning of the Work: Contractor shall plan and lay out the Work in advance of operations so as to coordinate all work without delay or revision.
- B. Layout responsibilities: Contractor shall lay out the Work from Owner-established baselines and bench marks indicated on the Drawings, and shall be responsible for all field measurements in connection with the layout. Contractor shall furnish, at its own expense, all stakes, templates, platforms, equipment, tools, materials, and labor required to lay out any part of the Work. Contractor shall be responsible for executing the Work to the lines and grades that may be established. Contractor shall be responsible for maintaining or restoring all stakes and other marks established.

5.13 MATERIAL AND EQUIPMENT

- A. Contractor to provide new and equivalent equipment and materials: All equipment, material, and articles incorporated into the Work shall be new and of the most suitable grade for the purpose intended, unless otherwise specifically provided in the Contract Documents. References in the Specifications to equipment, material, articles, or patented processes by trade name, make, or catalog number, shall be regarded as establishing a standard quality and shall not be construed as limiting competition. Contractor may, at its option, use any equipment, material, article, or process that, in the judgment of A/E, is equal to that named in the specifications, unless otherwise specifically provided in the Contract Documents.
- B. Use of asbestos-containing building materials: The use of asbestos-containing building materials in new construction or renovation work is strictly prohibited. For the determination of asbestos-containing building materials, the following shall apply:
 - 1. Until January 1, 2025, asbestos deliberately added in any concentration that contains more than one percent asbestos by weight or area as determined using the United States environmental protection agency method for the determination of asbestos in bulk building materials, EPA/600/R-93/116, July 1993.
 - 2. Following January 1, 2025, asbestos building material deliberately added in any concentration that contains more than 1/10th of one percent asbestos by weight or area for the determination of asbestos in bulk building materials, EPA/600/R-93/116, July 1993.
- C. Contractor responsible for fitting parts together: Contractor shall do all cutting, fitting, or patching that may be required to make its several parts fit together properly, or receive or be received by work of others set forth in, or reasonably implied by, the Contract Documents. Contractor shall

not endanger any work by cutting, excavating, or otherwise altering the Work and shall not cut or alter the work of any other contractor unless approved in advance by Owner.

- D. Owner may reject defective Work: Should any of the Work be found defective, or in any way not in accordance with the Contract Documents, this work, in whatever stage of completion, may be rejected by Owner.

5.14 AVAILABILITY AND USE OF UTILITY SERVICES

- A. Owner to provide and charge for utilities: Owner shall make all reasonable utilities available to Contractor from existing outlets and supplies, as specified in the Contract Documents. Unless otherwise provided in the Contract Documents, the utility service consumed shall be charged to or paid for by Contractor at prevailing rates charged to Owner or, where the utility is produced by Owner, at reasonable rates determined by Owner. Contractor will carefully conserve any utilities furnished.
- B. Contractor to install temporary connections and meters: Contractor shall, at its expense and in a skillful manner satisfactory to Owner, install and maintain all necessary temporary connections and distribution lines, together with appropriate protective devices, and all meters required to measure the amount of each utility used for the purpose of determining charges. Prior to the date of Final Acceptance, Contractor shall remove all temporary connections, distribution lines, meters, and associated equipment and materials.

5.15 TESTS AND INSPECTION

- A. Contractor to provide for all testing and inspection of Work: Contractor shall maintain an adequate testing and inspection program and perform such tests and inspections as are necessary or required to ensure that the Work conforms to the requirements of the Contract Documents. Contractor shall be responsible for inspection and quality surveillance of all its Work and all Work performed by any Subcontractor. Unless otherwise provided, Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. Contractor shall give Owner timely notice of when and where tests and inspections are to be made. Contractor shall maintain complete inspection records and make them available to Owner.
- B. Owner may conduct tests and inspections: Owner may, at any reasonable time, conduct such inspections and tests as it deems necessary to ensure that the Work is in accordance with the Contract Documents. Owner shall promptly notify Contractor if an inspection or test reveals that the Work is not in accordance with the Contract Documents. Unless the subject items are expressly accepted by Owner, such Owner inspection and tests are for the sole benefit of Owner and do not:
1. Constitute or imply acceptance;
 2. Relieve Contractor of responsibility for providing adequate quality control measures;
 3. Relieve Contractor of responsibility for risk of loss or damage to the Work, materials, or equipment;
 4. Relieve Contractor of its responsibility to comply with the requirements of the Contract Documents; or
 5. Impair Owner's right to reject defective or nonconforming items, or to avail itself of any other remedy to which it may be entitled.

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- C. Inspections or inspectors do not modify Contract Documents: Neither observations by an inspector retained by Owner, the presence or absence of such inspector on the site, nor inspections, tests, or approvals by others, shall relieve Contractor from any requirement of the Contract Documents, nor is any such inspector authorized to change any term or condition of the Contract Documents.
- D. Contractor responsibilities on inspections: Contractor shall promptly furnish, without additional charge, all facilities, labor, material and equipment reasonably needed for performing such safe and convenient inspections and tests as may be required by Owner. Owner may charge Contractor any additional cost of inspection or testing when Work is not ready at the time specified by Contractor for inspection or testing, or when prior rejection makes reinspection or retest necessary. Owner shall perform its inspections and tests in a manner that will cause no undue delay in the Work.

5.16 CORRECTION OF NONCONFORMING WORK

- A. Work covered by Contractor without inspection: If a portion of the Work is covered contrary to the requirements in the Contract Documents, it must, if required in writing by Owner, be uncovered for Owner's observation and be replaced at the Contractor's expense and without change in the Contract Time.
- B. Payment provisions for uncovering covered Work: If, at any time prior to Final Completion, Owner desires to examine the Work, or any portion of it, which has been covered, Owner may request to see such Work and it shall be uncovered by Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an adjustment in the Contract Sum for the costs of uncovering and replacement, and, if completion of the Work is thereby delayed, an adjustment in the Contract Time, provided it makes such a request as provided in Part 7. If such Work is not in accordance with the Contract Documents, the Contractor shall pay the costs of examination and reconstruction.
- C. Contractor to correct and pay for non-conforming Work: Contractor shall promptly correct Work found by Owner not to conform to the requirements of the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed, or completed. Contractor shall bear all costs of correcting such nonconforming Work, including additional testing and inspections.
- D. Contractor's compliance with warranty provisions: If, within one year after the date of Substantial Completion of the Work or designated portion thereof, or within one year after the date for commencement of any system warranties established under Section 6.08, or within the terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, Contractor shall correct it promptly after receipt of written notice from Owner to do so. Owner shall give such notice promptly after discovery of the condition. This period of one year shall be extended, with respect to portions of Work first performed after Substantial Completion, by the period of time between Substantial Completion and the actual performance of the Work. Contractor's duty to correct with respect to Work repaired or replaced shall run for one year from the date of repair or replacement. Obligations under this paragraph shall survive Final Acceptance.
- E. Contractor to remove non-conforming Work: Contractor shall remove from the Project site portions of the Work which are not in accordance with the requirements of the Contract Documents and are neither corrected by Contractor nor accepted by Owner.
- F. Owner may charge Contractor for non-conforming Work: If Contractor fails to correct nonconforming Work within a reasonable time after written notice to do so, Owner may replace, correct, or remove the nonconforming Work and charge the cost thereof to the Contractor.

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- G. Contractor to pay for damaged Work during correction: Contractor shall bear the cost of correcting destroyed or damaged Work, whether completed or partially completed, caused by Contractor's correction or removal of Work which is not in accordance with the requirements of the Contract Documents.
- H. No Period of limitation on other requirements: Nothing contained in this section shall be construed to establish a period of limitation with respect to other obligations which Contractor might have according to the Contract Documents. Establishment of the time period of one year as described in Section 5.16D relates only to the specific obligation of Contractor to correct the Work, and has no relationship to the time within which the Contractor's obligation to comply with the Contract Documents may be sought to be enforced, including the time within which such proceedings may be commenced.
- I. Owner may accept non-conforming Work and charge Contractor: If Owner prefers to accept Work which is not in accordance with the requirements of the Contract Documents, Owner may do so instead of requiring its removal and correction, in which case the Contract Sum may be reduced as appropriate and equitable.

5.17 CLEAN UP

Contractor to keep site clean and leave it clean: Contractor shall at all times keep the Project site, including hauling routes, infrastructures, utilities, and storage areas, free from accumulations of waste materials. Before completing the Work, Contractor shall remove from the premises its rubbish, tools, scaffolding, equipment, and materials. Upon completing the Work, Contractor shall leave the Project site in a clean, neat, and orderly condition satisfactory to Owner. If Contractor fails to clean up as provided herein, and after reasonable notice from Owner, Owner may do so and the cost thereof shall be charged to Contractor.

5.18 ACCESS TO WORK

Owner and A/E access to Work site: Contractor shall provide Owner and A/E access to the Work in progress wherever located.

5.19 OTHER CONTRACTS

Owner may award other contracts; Contractor to cooperate: Owner may undertake or award other contracts for additional work at or near the Project site. Contractor shall reasonably cooperate with the other contractors and with Owner's employees and shall carefully adapt scheduling and perform the Work in accordance with these Contract Documents to reasonably accommodate the other work.

5.20 SUBCONTRACTORS AND SUPPLIERS

- A. Subcontractor Responsibility: The Contractor shall include the language of this paragraph in each of its first tier subcontracts, and shall require each of its subcontractors to include the same language of this section in each of their subcontracts, adjusting only as necessary the terms used for the contracting parties. Upon request of the Owner, the Contractor shall promptly provide documentation to the Owner demonstrating that the subcontractor meets the subcontractor responsibility criteria below. The requirements of this paragraph apply to all subcontractors regardless of tier. At the time of subcontract execution, the Contractor shall verify that each of its first tier subcontractors meets the following bidder responsibility criteria:
1. Have a current certificate of registration as a contractor in compliance with chapter 18.27 RCW, which must have been in effect at the time of subcontract bid submittal;
 2. Have a current Washington Unified Business Identifier (UBI) number;

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3. If applicable, have:
 - a. Industrial Insurance (workers' compensation) coverage for the subcontractor's employees working in Washington, as required in Title 51 RCW;
 - b. A Washington Employment Security Department number, as required in Title 50 RCW;
 - c. A Washington Department of Revenue state excise tax registration number, as required in Title 82 RCW;
 - d. An electrical contractor license, if required by Chapter 19.28 RCW;
 - e. An elevator contractor license, if required by Chapter 70.87 RCW.
 4. Not be disqualified from bidding on any public works contract under RCW 39.06.010 or 39.12.065 (3).
 5. On a project subject to the apprenticeship utilization requirements in RCW 39.04.320, not have been found out of compliance by the Washington state apprenticeship and training council for working apprentices out of ratio, without appropriate supervision, or outside their approved work processes as outlined in their standards of apprenticeship under chapter 49.04 RCW for the one-year period immediately preceding the date of the Owner's first advertisement of the project.
 6. Within the three-year period immediately preceding the date of the bid solicitation, not have been determined by a final and binding citation and notice of assessment issued by the L&I or through a civil judgment entered by a court of limited or general jurisdiction to have willfully violated, as defined in RCW 49.48.082, any provision of chapter 49.46, 49.48, or 49.52 RCW.
- B. Provide names of Subcontractors and use qualified firms: Contractor shall utilize Subcontractors and suppliers which are experienced and qualified, and meet the requirements of the Contract Documents, if any. Contractor shall not utilize any Subcontractor or supplier to whom the Owner has a reasonable objection, and shall obtain Owner's written consent before making any substitutions or additions. Substitutions of subcontractors listed on Forms A and B are only allowable according to RCW 39.30.060.
- C. Subcontracts in writing and pass through provision: All Subcontracts must be in writing. By appropriate written agreement, Contractor shall require each Subcontractor, so far as applicable to the Work to be performed by the Subcontractor, to be bound to Contractor by terms of the Contract Documents, and to assume toward Contractor all the obligations and responsibilities which Contractor assumes toward Owner in accordance with the Contract Documents. Each Subcontract shall preserve and protect the rights of Owner in accordance with the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights. Where appropriate, Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. However, nothing in this paragraph shall be construed to alter the contractual relations between Contractor and its Subcontractors with respect to insurance or bonds.
- D. Coordination of Subcontractors; Contractor responsible for Work: Contractor shall schedule, supervise, and coordinate the operations of all Subcontractors. No Subcontracting of any of the Work shall relieve Contractor from its responsibility for the performance of the Work in accordance with the Contract Documents or any other obligations of the Contract Documents.
- E. Automatic assignment of subcontracts: Each subcontract agreement for a portion of the Work is hereby assigned by Contractor to Owner provided that:

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1. Effective only after termination and Owner approval: The assignment is effective only after termination by Owner for cause pursuant to Section 9.01 and only for those Subcontracts which Owner accepts by notifying the Subcontractor in writing; and
2. Owner assumes Contractor's responsibilities: After the assignment is effective, Owner will assume all future duties and obligations toward the Subcontractor which Contractor assumed in the Subcontract.
3. Impact of bond: The assignment is subject to the prior rights of the surety, if any, obligated under any bond provided in accordance with the Contract Documents.

5.21 WARRANTY OF CONSTRUCTION

- A. Contractor warranty of Work: In addition to any special warranties provided elsewhere in the Contract Documents, Contractor warrants that all Work conforms to the requirements of the Contract Documents and is free of any defect in equipment, material, or design furnished, or workmanship performed by Contractor.
- B. Contractor responsibilities: With respect to all warranties, express or implied, for Work performed or materials furnished according to the Contract Documents, Contractor shall:
1. Obtain warranties: Obtain all warranties that would be given in normal commercial practice;
 2. Warranties for benefit of Owner: Require all warranties to be executed, in writing, for the benefit of Owner;
 3. Enforcement of warranties: Enforce all warranties for the benefit of Owner, if directed by Owner; and
 4. Contractor responsibility for subcontractor warranties: Be responsible to enforce any subcontractor's, manufacturer's, or supplier's warranties should they extend beyond the period specified in the Contract Documents.
- C. Warranties beyond Final Acceptance: The obligations under this section shall survive Final Acceptance.

5.22 INDEMNIFICATION

- A. Contractor to indemnify Owner: Contractor shall defend, indemnify, and hold Owner and A/E harmless from and against all claims, demands, losses, damages, or costs, including but not limited to damages arising out of bodily injury or death to persons and damage to property, caused by or resulting from:
1. Sole negligence of Contractor: The sole negligence of Contractor or any of its Subcontractors;
 2. Concurrent negligence: The concurrent negligence of Contractor, or any Subcontractor, but only to the extent of the negligence of Contractor or such Subcontractor; and
 3. Patent infringement: The use of any design, process, or equipment which constitutes an infringement of any United States patent presently issued, or violates any other proprietary interest, including copyright, trademark, and trade secret.
- B. Employee action and RCW Title 51: In any action against Owner and any other entity indemnified in accordance with this section, by any employee of Contractor, its Subcontractors, Sub-subcontractors, agents, or anyone directly or indirectly employed by any of them, the indemnification obligation of this section shall not be limited by a limit on the amount or type of damages, compensation, or benefits payable by or for Contractor or any Subcontractor under RCW Title 51, the Industrial Insurance Act, or any other employee benefit acts. In addition, Contractor waives immunity as to Owner and A/E only, in accordance with RCW Title 51.

PART 6 – PAYMENTS AND COMPLETION

6.01 CONTRACT SUM

Owner shall pay Contract Sum: Owner shall pay Contractor the Contract Sum plus state sales tax for performance of the Work, in accordance with the Contract Documents.

6.02 SCHEDULE OF VALUES

Contractor to submit Schedule of Values: Before submitting its first Application for Payment, Contractor shall submit to Owner for approval a breakdown allocating the total Contract Sum to each principal category of work, in such detail as requested by Owner ("Schedule of Values"). The approved Schedule of Values shall include appropriate amounts for demobilization, record drawings, O&M manuals, and any other requirements for Project closeout, and shall be used by Owner as the basis for progress payments. Payment for Work shall be made only for and in accordance with those items included in the Schedule of Values.

6.03 APPLICATION FOR PAYMENT

- A. Monthly Application for Payment with substantiation: At monthly intervals, unless determined otherwise by Owner, Contractor shall submit to Owner an itemized Application for Payment for Work completed in accordance with the Contract Documents and the approved Schedule of Values. Each application shall be supported by such substantiating data as Owner may require.
- B. Contractor certifies Subcontractors paid: By submitting an Application for Payment, Contractor is certifying that all Subcontractors have been paid, less earned retainage in accordance with RCW 60.28.011, as their interests appeared in the last preceding certificate of payment. By submitting an Application for Payment, Contractor is recertifying that the representations set forth in Section 1.03, are true and correct, to the best of Contractor's knowledge, as of the date of the Application for Payment.
- C. Reconciliation of Work with Progress Schedule: At the time it submits an Application for Payment, Contractor shall analyze and reconcile, to the satisfaction of Owner, the actual progress of the Work with the Progress Schedule.
- D. Payment for material delivered to site or stored off-site: If authorized by Owner, the Application for Payment may include request for payment for material delivered to the Project site and suitably stored, or for completed preparatory work. Payment may similarly be requested for material stored off the Project site, provided Contractor complies with or furnishes satisfactory evidence of the following:
 - 1. Suitable facility or location: The material will be placed in a facility or location that is structurally sound, dry, lighted and suitable for the materials to be stored;
 - 2. Facility or location within 10 miles of Project: The facility or location is located within a 10-mile radius of the Project. Other locations may be utilized, if approved in writing, by Owner;
 - 3. Facility or location exclusive to Project's materials: Only materials for the Project are stored within the facility or location (or a secure portion of a facility or location set aside for the Project);
 - 4. Insurance provided on materials in facility or location: Contractor furnishes Owner a certificate of insurance extending Contractor's insurance coverage for damage, fire, and theft to cover the full value of all materials stored, or in transit;

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5. Facility or location locked and secure: The facility or location (or secure portion thereof) is continuously under lock and key, and only Contractor's authorized personnel shall have access;
6. Owner right of access to facility or location: Owner shall at all times have the right of access in company of Contractor;
7. Contractor assumes total responsibility for stored materials: Contractor and its surety assume total responsibility for the stored materials; and
8. Contractor provides documentation and Notice when materials moved to site: Contractor furnishes to Owner certified lists of materials stored, bills of lading, invoices, and other information as may be required, and shall also furnish Notice to Owner when materials are moved from storage to the Project site.

6.04 PROGRESS PAYMENTS

- A. Owner to pay within 30 Days: Owner shall make progress payments, in such amounts as Owner determines are properly due, within 30 Days after receipt of a properly executed Application for Payment. Owner shall notify Contractor in accordance with chapter 39.76 RCW if the Application for Payment does not comply with the requirements of the Contract Documents.
- B. Withholding retainage; Options for retainage: Owner shall retain 5% of the amount of each progress payment until 45 Days after Final Acceptance and receipt of all documents required by law or the Contract Documents, including, at Owner's request, consent of surety to release of the retainage. In accordance with chapter 60.28 RCW, Contractor may request that monies reserved be retained in a fund by Owner, deposited by Owner in a bank or savings and loan, or placed in escrow with a bank or trust company to be converted into bonds and securities to be held in escrow with interest to be paid to Contractor. Owner may permit Contractor to provide an appropriate bond in lieu of the retained funds.
- C. Title passes to Owner upon payment: Title to all Work and materials covered by a progress payment shall pass to Owner at the time of such payment free and clear of all liens, claims, security interests, and encumbrances. Passage of title shall not, however, relieve Contractor from any of its duties and responsibilities for the Work or materials, or waive any rights of Owner to insist on full compliance by Contractor with the Contract Documents.
- D. Interest on unpaid balances: Payments due and unpaid in accordance with the Contract Documents shall bear interest as specified in chapter 39.76 RCW.

6.05 PAYMENTS WITHHELD

- A. Owner's right to withhold payment: Owner may withhold or, on account of subsequently discovered evidence, nullify the whole or part of any payment to such extent as may be necessary to protect Owner from loss or damage for reasons including but not limited to:
 1. Non-compliant Work: Work not in accordance with the Contract Documents;
 2. Remaining Work to cost more than unpaid balance: Reasonable evidence that the Work required by the Contract Documents cannot be completed for the unpaid balance of the Contract Sum;
 3. Owner correction or completion Work: Work by Owner to correct defective Work or complete the Work in accordance with Section 5.16;

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4. Contractor's failure to perform: Contractor's failure to perform in accordance with the Contract Documents; or
 5. Contractor's negligent acts or omissions: Cost or liability that may occur to Owner as the result of Contractor's fault or negligent acts or omissions.
- B. Owner to notify Contractor of withholding for unsatisfactory performance: In any case where part or all of a payment is going to be withheld for unsatisfactory performance, Owner shall notify Contractor in accordance with chapter 39.76 RCW.

6.06 RETAINAGE AND BOND CLAIM RIGHTS

Chapters 39.08 RCW and 60.28 RCW incorporated by reference: Chapters 39.08 RCW and 60.28 RCW, concerning the rights and responsibilities of Contractor and Owner with regard to the performance and payment bonds and retainage, are made a part of the Contract Documents by reference as though fully set forth herein.

6.07 SUBSTANTIAL COMPLETION

Substantial Completion defined: Substantial Completion is the stage in the progress of the Work (or portion thereof designated and approved by Owner) when the construction is sufficiently complete, in accordance with the Contract Documents, so Owner has full and unrestricted use and benefit of the facilities (or portion thereof designated and approved by Owner) for the use for which it is intended. All Work other than incidental corrective or punch list work shall be completed. Substantial Completion shall not have been achieved if all systems and parts are not functional, if utilities are not connected and operating normally, if all required occupancy permits have not been issued, or if the Work is not accessible by normal vehicular and pedestrian traffic routes. The date Substantial Completion is achieved shall be established in writing by Owner. Contractor may request an early date of Substantial Completion which must be approved by Change Order. Owner's occupancy of the Work or designated portion thereof does not necessarily indicate that Substantial Completion has been achieved.

6.08 PRIOR OCCUPANCY

- A. Prior Occupancy defined; Restrictions: Owner may, upon written notice thereof to Contractor, take possession of or use any completed or partially completed portion of the Work ("Prior Occupancy") at any time prior to Substantial Completion. Unless otherwise agreed in writing, Prior Occupancy shall not: be deemed an acceptance of any portion of the Work; accelerate the time for any payment to Contractor; prejudice any rights of Owner provided by any insurance, bond, guaranty, or the Contract Documents; relieve Contractor of the risk of loss or any of the obligations established by the Contract Documents; establish a date for termination or partial termination of the assessment of liquidated damages; or constitute a waiver of claims.
- B. Damage; Duty to repair and warranties: Notwithstanding anything in the preceding paragraph, Owner shall be responsible for loss of or damage to the Work resulting from Prior Occupancy. Contractor's one year duty to repair any system warranties shall begin on building systems activated and used by Owner as agreed in writing by Owner and Contractor.

6.09 FINAL COMPLETION, ACCEPTANCE, AND PAYMENT

- A. Final Completion defined: Final Completion shall be achieved when the Work is fully and finally complete in accordance with the Contract Documents. The date Final Completion is achieved shall be established by Owner in writing, but in no case shall constitute Final Acceptance which is a subsequent, separate, and distinct action.

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- B. Final Acceptance defined: Final Acceptance shall be achieved when the Contractor has completed the requirements of the Contract Documents. The date Final Acceptance is achieved shall be established by Owner in writing. Prior to Final Acceptance, Contractor shall, in addition to all other requirements in the Contract Documents, submit to Owner a written notice of any outstanding disputes or claims between Contractor and any of its Subcontractors, including the amounts and other details thereof. Neither Final Acceptance, nor final payment, shall release Contractor or its sureties from any obligations of these Contract Documents or the payment and performance bonds, or constitute a waiver of any claims by Owner arising from Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Final payment waives Claim rights: Acceptance of final payment by Contractor, or any Subcontractor, shall constitute a waiver and release to Owner of all claims by Contractor, or any such Subcontractor, for an increase in the Contract Sum or the Contract Time, and for every act or omission of Owner relating to or arising out of the Work, except for those Claims made in accordance with the procedures, including the time limits, set forth in Part 8.

PART 7 – CHANGES

7.01 CHANGE IN THE WORK

- A. Changes in Work, Contract Sum, and Contract Time by Change Order: Owner may, at any time and without notice to Contractor's surety, order additions, deletions, revisions, or other changes in the Work. These changes in the Work shall be incorporated into the Contract Documents through the execution of Change Orders. If any change in the Work ordered by Owner causes an increase or decrease in the Contract Sum or the Contract Time, an equitable adjustment shall be made as provided in Section 7.02 or 7.03, respectively, and such adjustment(s) shall be incorporated into a Change Order.
- B. Owner may request COP from Contractor: If Owner desires to order a change in the Work, it may request a written Change Order Proposal (COP) from Contractor. Contractor shall submit a Change Order Proposal within 14 Days of the request from Owner, or within such other period as mutually agreed. Contractor's Change Order Proposal shall be full compensation for implementing the proposed change in the Work, including any adjustment in the Contract Sum or Contract Time, and including compensation for all delays in connection with such change in the Work and for any expense or inconvenience, disruption of schedule, or loss of efficiency or productivity occasioned by the change in the Work.
- C. COP negotiations: Upon receipt of the Change Order Proposal, or a request for equitable adjustment in the Contract Sum or Contract Time, or both, as provided in Sections 7.02 and 7.03, Owner may accept or reject the proposal, request further documentation, or negotiate acceptable terms with Contractor. Pending agreement on the terms of the Change Order, Owner may direct Contractor to proceed immediately with the Change Order Work. Contractor shall not proceed with any change in the Work until it has obtained Owner's approval. All Work done pursuant to any Owner-directed change in the Work shall be executed in accordance with the Contract Documents.
- D. Change Order as full payment and final settlement: If Owner and Contractor reach agreement on the terms of any change in the Work, including any adjustment in the Contract Sum or Contract Time, such agreement shall be incorporated in a Change Order. The Change Order shall constitute full payment and final settlement of all claims for time and for direct, indirect, and consequential costs, including costs of delays, inconvenience, disruption of schedule, or loss of efficiency or productivity, related to any Work either covered or affected by the Change Order, or related to the events giving rise to the request for equitable adjustment.
- E. Failure to agree upon terms of Change Order; Final offer and Claims: If Owner and Contractor are unable to reach agreement on the terms of any change in the Work, including any adjustment in the Contract Sum or Contract Time, Contractor may at any time in writing, request a final offer from

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Owner. Owner shall provide Contractor with its written response within 30 Days of Contractor's request. Owner may also provide Contractor with a final offer at any time. If Contractor rejects Owner's final offer, or the parties are otherwise unable to reach agreement, Contractor's only remedy shall be to file a Claim as provided in Part 8.

- F. Field Authorizations: The Owner may direct the Contractor to proceed with a change in the work through a written Field Authorization (also referred to as a Field Order) when the time required to price and execute a Change Order would impact the Project.

The Field Authorization shall describe and include the following:

1. The scope of work
2. An agreed upon maximum not-to-exceed amount
3. Any estimated change to the Contract Time
4. The method of final cost determination in accordance with the requirements of Part 7 of the General Conditions
5. The supporting cost data to be submitted in accordance with the requirements of Part 7 of the General Conditions

Upon satisfactory submittal by the Contractor and approval by the Owner of supporting cost data, a Change Order will be executed. The Owner will not make payment to the Contractor for Field Authorization work until that work has been incorporated into an executed Change Order.

7.02 CHANGE IN THE CONTRACT SUM

A. General Application

1. Contract Sum changes only by Change Order: The Contract Sum shall only be changed by a Change Order. Contractor shall include any request for a change in the Contract Sum in its Change Order Proposal.
2. Owner fault or negligence as basis for change in Contract Sum: If the cost of Contractor's performance is changed due to the fault or negligence of Owner, or anyone for whose acts Owner is responsible, Contractor shall be entitled to make a request for an equitable adjustment in the Contract Sum in accordance with the following procedure. No change in the Contract Sum shall be allowed to the extent: Contractor's changed cost of performance is due to the fault or negligence of Contractor, or anyone for whose acts Contractor is responsible; the change is concurrently caused by Contractor and Owner; or the change is caused by an act of Force Majeure as defined in Section 3.05.
 - (a) Notice and record keeping for equitable adjustment: A request for an equitable adjustment in the Contract Sum shall be based on written notice delivered to Owner within 7 Days of the occurrence of the event giving rise to the request. For purposes of this part, "occurrence" means when Contractor knew, or in its diligent prosecution of the Work should have known, of the event giving rise to the request. If Contractor believes it is entitled to an adjustment in the Contract Sum, Contractor shall immediately notify Owner and begin to keep and maintain complete, accurate, and specific daily records. Contractor shall give Owner access to any such records and, if requested shall promptly furnish copies of such records to Owner.
 - (b) Content of notice for equitable adjustment; Failure to comply: Contractor shall not be entitled to any adjustment in the Contract Sum for any occurrence of events or costs that

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occurred more than 7 Days before Contractor's written notice to Owner. The written notice shall set forth, at a minimum, a description of: the event giving rise to the request for an equitable adjustment in the Contract Sum; the nature of the impacts to Contractor and its Subcontractors of any tier, if any; and to the extent possible the amount of the adjustment in Contract Sum requested. Failure to properly give such written notice shall, to the extent Owner's interests are prejudiced, constitute a waiver of Contractor's right to an equitable adjustment.

- (c) Contractor to provide supplemental information: Within 30 Days of the occurrence of the event giving rise to the request, unless Owner agrees in writing to allow an additional period of time to ascertain more accurate data, Contractor shall supplement the written notice provided in accordance with subparagraph a. above with additional supporting data. Such additional data shall include, at a minimum: the amount of compensation requested, itemized in accordance with the procedure set forth herein; specific facts, circumstances, and analysis that confirms not only that Contractor suffered the damages claimed, but that the damages claimed were actually a result of the act, event, or condition complained of and that the Contract Documents provide entitlement to an equitable adjustment to Contractor for such act, event, or condition; and documentation sufficiently detailed to permit an informed analysis of the request by Owner. When the request for compensation relates to a delay, or other change in Contract Time, Contractor shall demonstrate the impact on the critical path, in accordance with Section 7.03C. Failure to provide such additional information and documentation within the time allowed or within the format required shall, to the extent Owner's interests are prejudiced, constitute a waiver of Contractor's right to an equitable adjustment.
 - (d) Contractor to proceed with Work as directed: Pending final resolution of any request made in accordance with this paragraph, unless otherwise agreed in writing, Contractor shall proceed diligently with performance of the Work.
 - (e) Contractor to combine requests for same event together: Any requests by Contractor for an equitable adjustment in the Contract Sum and in the Contract Time that arise out of the same event(s) shall be submitted together.
3. Methods for calculating Change Order amount: The value of any Work covered by a Change Order, or of any request for an equitable adjustment in the Contract Sum, shall be determined by one of the following methods:
- (a) Fixed Price: On the basis of a fixed price as determined in paragraph 7.02B.
 - (b) Unit Prices: By application of unit prices to the quantities of the items involved as determined in paragraph 7.02C.
 - (c) Time and Materials: On the basis of time and material as determined in paragraph 7.02D.
4. Fixed price method is default; Owner may direct otherwise: When Owner has requested Contractor to submit a Change Order Proposal, Owner may direct Contractor as to which method in subparagraph 3 above to use when submitting its proposal. Otherwise, Contractor shall determine the value of the Work, or of a request for an equitable adjustment, on the basis of the fixed price method.

B. Change Order Pricing – Fixed Price

Procedures: When the fixed price method is used to determine the value of any Work covered by a Change Order, or of a request for an equitable adjustment in the Contract Sum, the following procedures shall apply:

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1. Breakdown and itemization of details on COP: Contractor's Change Order Proposal, or request for adjustment in the Contract Sum, shall be accompanied by a complete itemization of the costs, including labor, material, subcontractor costs, and overhead and profit. The costs shall be itemized in the manner set forth below, and shall be submitted on breakdown sheets in a form approved by Owner.
2. Use of industry standards in calculating costs: All costs shall be calculated based upon appropriate industry standard methods of calculating labor, material quantities, and equipment costs.
3. Costs contingent on Owner's actions: If any of Contractor's pricing assumptions are contingent upon anticipated actions of Owner, Contractor shall clearly state them in the proposal or request for an equitable adjustment.
4. Markups on additive and deductive Work: The cost of any additive or deductive changes in the Work shall be calculated as set forth below, except that overhead and profit shall not be included on deductive changes in the Work. Where a change in the Work involves additive and deductive work by the same Contractor or Subcontractor, small tools, overhead, profit, bond and insurance markups will apply to the net difference.
5. Breakdown not required if change less than \$1,000: If the total cost of the change in the Work or request for equitable adjustment does not exceed \$1,000, Contractor shall not be required to submit a breakdown if the description of the change in the Work or request for equitable adjustment is sufficiently definitive for Owner to determine fair value.
6. Breakdown required if change between \$1,000 and \$2,500: If the total cost of the change in the Work or request for equitable adjustment is between \$1,000 and \$2,500, Contractor may submit a breakdown in the following level of detail if the description of the change in the Work or if the request for equitable adjustment is sufficiently definitive to permit the Owner to determine fair value:
 - a. lump sum labor;
 - b. lump sum material;
 - c. lump sum equipment usage;
 - d. overhead and profit as set forth below; and
 - e. insurance and bond costs as set forth below.
7. Components of increased cost: Any request for adjustment of Contract Sum based upon the fixed price method shall include only the following items:
 - a. Craft labor costs: These are the labor costs determined by multiplying the estimated or actual additional number of craft hours needed to perform the change in the Work by the hourly labor costs. Craft hours should cover direct labor, as well as indirect labor due to trade inefficiencies. The hourly costs shall be based on the following:
 - (1) Basic wages and benefits: Hourly rates and benefits as stated on the L&I approved "statement of intent to pay prevailing wages" or a higher amount if approved by the Owner. Direct supervision shall be a reasonable percentage not to exceed 15% of the cost of direct labor. No supervision markup shall be allowed for a working supervisor's hours.
 - (2) Worker's insurance: Direct contributions to the state of Washington for industrial insurance; medical aid; and supplemental pension, by the class and rates established by the L&I.

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- (3) Federal insurance: Direct contributions required by the Federal Insurance Compensation Act; Federal Unemployment Tax Act; and the State Unemployment Compensation Act.
 - (4) Travel allowance: Travel allowance and/or subsistence, if applicable, not exceeding those allowances established by regional labor union agreements, which are itemized and identified separately.
 - (5) Safety: Cost incurred due to the Washington Industrial Safety and Health Act, which shall be a reasonable percentage not to exceed 2% of the sum of the amounts calculated in (1), (2), and (3) above.
- b. Material costs: This is an itemization of the quantity and cost of materials needed to perform the change in the Work. Material costs shall be developed first from actual known costs, second from supplier quotations or if these are not available, from standard industry pricing guides. Material costs shall consider all available discounts. Freight costs, express charges, or special delivery charges, shall be itemized.
- c. Equipment costs: This is an itemization of the type of equipment and the estimated or actual length of time the construction equipment appropriate for the Work is or will be used on the change in the Work. Costs will be allowed for construction equipment only if used solely for the changed Work, or for additional rental costs actually incurred by the Contractor. Equipment charges shall be computed on the basis of actual invoice costs or if owned, from the current edition of one of the following sources:
- (1) The National Electrical Contractors Association for equipment used on electrical work.
 - (2) The Mechanical Contractors Association of America for equipment used on mechanical work.
 - (3) The EquipmentWatch Fleet Manager Estimator Package (digital). The maximum rate for standby equipment shall not exceed that shown in the Associated General Contractors Washington State Department of Transportation (AGC WSDOT) Equipment Rental Agreement, current edition on the Contract execution date.
- The EquipmentWatch Rental Rate Blue Book shall be used as a basis for establishing rental rates of equipment not listed in the above sources. The maximum rate for standby equipment shall not exceed that shown in the AGC WSDOT Equipment Rental Agreement, current edition on the Contract execution date.
- d. Allowance for small tools, expendables & consumable supplies: Small tools consist of tools which cost \$250 or less and are normally furnished by the performing contractor. The maximum rate for small tools shall not exceed the following:
- (1) 3% for Contractor: For Contractor, 3% of direct labor costs.
 - (2) 5% for Subcontractors: For Subcontractors, 5% of direct labor costs.
- Expendables and consumables supplies directly associated with the change in Work must be itemized.
- e. Subcontractor costs: This is defined as payments Contractor makes to Subcontractors for changed Work performed by Subcontractors of any tier. The Subcontractors' cost of Work shall be calculated and itemized in the same manner as prescribed herein for Contractor.

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- f. Allowance for overhead: This is defined as costs of any kind attributable to direct and indirect delay, acceleration, or impact, added to the total cost to Owner of any change in the Contract Sum. If the Contractor is compensated under Section 7.03D, the amount of such compensation shall be reduced by the amount Contractor is otherwise entitled to under this subsection (f). This allowance shall compensate Contractor for all noncraft labor, temporary construction facilities, field engineering, schedule updating, as-built drawings, home office cost, B&O taxes, office engineering, estimating costs, additional overhead because of extended time, and any other cost incidental to the change in the Work. It shall be strictly limited in all cases to a reasonable amount, mutually acceptable, or if none can be agreed upon to an amount not to exceed the rates below:
- (1). Projects less than \$3 million: For projects where the Contract Award Amount is under \$3 million, the following shall apply:
- (a) Contractor markup on Contractor Work: For Contractor, for any Work actually performed by Contractor's own forces, 16% of the first \$50,000 of the cost, and 4% of the remaining cost, if any.
 - (b) Subcontractor markup for Subcontractor Work: For each Subcontractor (including lower tier subcontractors), for any Work actually performed by its own forces, 16% of the first \$50,000 of the cost, and 4% of the remaining cost, if any.
 - (c) Contractor markup for Subcontractor Work: For Contractor, for any work performed by its Subcontractor(s) 6% of the first \$50,000 of the amount due each Subcontractor, and 4% of the remaining amount if any.
 - (d) Subcontractor markup for lower tier Subcontractor Work: For each Subcontractor, for any Work performed by its Subcontractor(s) of any lower tier, 4% of the first \$50,000 of the amount due the sub-Subcontractor, and 2% of the remaining amount if any.
 - (e) Basis of cost applicable for markup: The cost to which overhead is to be applied shall be developed in accordance with Section 7.02B 7a. – e.
- (2). Projects more than \$3 million: For projects where the Contract Award Amount is equal to or exceeds \$3 million, the following shall apply:
- (a) Contractor markup on Contractor Work: For Contractor, for any Work actually performed by Contractor's own forces, 12% of the first \$50,000 of the cost, and 4% of the remaining cost, if any.
 - (b) Subcontractor markup for Subcontractor Work: For each Subcontractor (including lower tier subcontractors), for any Work actually performed by its own forces, 12% of the first \$50,000 of the cost, and 4% of the remaining cost, if any.
 - (c) Contractor markup for Subcontractor Work: For Contractor, for any Work performed by its Subcontractor(s), 4% of the first \$50,000 of the amount due each Subcontractor, and 2% of the remaining amount if any.
 - (d) Subcontractor markup for lower tier Subcontractor Work: For each Subcontractor, for any Work performed by its Subcontractor(s) of any lower tier, 4% of the first \$50,000 of the amount due the sub-Subcontractor, and 2% of the remaining amount if any.

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- (e) Basis of cost applicable for markup: The cost to which overhead is to be applied shall be developed in accordance with Section 7.02B 7a. – e.
- g. Allowance for profit: Allowance for profit is an amount to be added to the cost of any change in contract sum, but not to the cost of change in Contract Time for which contractor has been compensated pursuant to the conditions set forth in Section 7.03. It shall be limited to a reasonable amount, mutually acceptable, or if none can be agreed upon, to an amount not to exceed the rates below:
- (1) Contractor / Subcontractor markup for self-performed Work: For Contractor or Subcontractor of any tier for work performed by their forces, 6% of the cost developed in accordance with Section 7.02B 7a. – e.
 - (2) Contractor / Subcontractor markup for Work performed at lower tier: For Contractor or Subcontractor of any tier for work performed by a subcontractor of a lower tier, 4% of the subcontract cost developed in accordance with Section 7.02B 7a. – h.
- h. Insurance and bond premiums: Cost of change in insurance or bond premium: This is defined as:
- (1) Contractor's liability insurance: The cost of any changes in Contractor's liability insurance arising directly from execution of the Change Order; and
 - (2) Payment and Performance Bond: The cost of the additional premium for Contractor's bond arising directly from the changed Work.

The cost of any change in insurance or bond premium shall be added after overhead and allowance for profit are calculated in accordance with subparagraph f. and g above.

C. Change Order Pricing – Unit Prices

1. Content of Owner authorization: Whenever Owner authorizes Contractor to perform Work on a unit-price basis, Owner's authorization shall clearly state:
 - a. Scope: Scope of work to be performed;
 - b. Reimbursement basis: Type of reimbursement including pre-agreed rates for material quantities; and
 - c. Reimbursement limit: Cost limit of reimbursement.
2. Contractor responsibilities: Contractor shall:
 - a. Cooperate with Owner and assist in monitoring the Work being performed. As requested by Owner, Contractor shall identify workers assigned to the Change Order Work and areas in which they are working;
 - b. Leave access as appropriate for quantity measurement; and
 - c. Not exceed any cost limit(s) without Owner's prior written approval.
3. Cost breakdown consistent with Fixed Price requirements: Contractor shall submit costs in accordance with paragraph 7.02B and satisfy the following requirements:

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- a. Unit prices must include overhead, profit, bond and insurance premiums: Unit prices shall include reimbursement for all direct and indirect costs of the Work, including overhead, profit, bond, and insurance costs; and
- b. Owner verification of quantities: Quantities must be supported by field measurement statements signed by Owner.

D. Change Order Pricing – Time-and-Material Prices

- 1. Content of Owner authorization: Whenever Owner authorizes Contractor to perform Work on a time-and-material basis, Owner's authorization shall clearly state:
 - a. Scope: Scope of Work to be performed;
 - b. Reimbursement basis: Type of reimbursement including pre-agreed rates, if any, for material quantities or labor; and
 - c. Reimbursement limit: Cost limit of reimbursement.
- 2. Contractor responsibilities: Contractor shall:
 - a. Identify workers assigned: Cooperate with Owner and assist in monitoring the Work being performed. As requested by Owner, identify workers assigned to the Change Order Work and areas in which they are working;
 - b. Provide daily timesheets: Identify on daily time sheets all labor performed in accordance with this authorization. Submit copies of daily time sheets within 2 working days for Owner's review.
 - c. Allow Owner to measure quantities: Leave access as appropriate for quantity measurement;
 - d. Perform Work efficiently: Perform all Work in accordance with this section as efficiently as possible; and
 - e. Not exceed Owner's cost limit: Not exceed any cost limit(s) without Owner's prior written approval.
- 3. Cost breakdown consistent with Fixed Price requirements: Contractor shall submit costs in accordance with paragraph 7.02B and additional verification supported by:
 - a. Timesheets: Labor detailed on daily time sheets; and
 - b. Invoices: Invoices for material.

7.03 CHANGE IN THE CONTRACT TIME

- A. COP requests for Contract Time: The Contract Time shall only be changed by a Change Order. Contractor shall include any request for a change in the Contract Time in its Change Order Proposal.
- B. Time extension permitted if not Contractor's fault: If the time of Contractor's performance is changed due to an act of Force Majeure, or due to the fault or negligence of Owner or anyone for whose acts Owner is responsible, Contractor shall be entitled to make a request for an equitable adjustment in the Contract Time in accordance with the following procedure. No adjustment in the Contract Time shall be allowed to the extent Contractor's changed time of

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performance is due to the fault or negligence of Contractor, or anyone for whose acts Contractor is responsible.

1. Notice and record keeping for Contract Time request: A request for an equitable adjustment in the Contract Time shall be based on written notice delivered within 7 Days of the occurrence of the event giving rise to the request. If Contractor believes it is entitled to adjustment of Contract Time, Contractor shall immediately notify Owner and begin to keep and maintain complete, accurate, and specific daily records. Contractor shall give Owner access to any such record and if requested, shall promptly furnish copies of such record to Owner.
 2. Timing and content of Contractor's Notice: Contractor shall not be entitled to an adjustment in the Contract Time for any events that occurred more than 7 Days before Contractor's written notice to Owner. The written notice shall set forth, at a minimum, a description of: the event giving rise to the request for an equitable adjustment in the Contract Time; the nature of the impacts to Contractor and its Subcontractors of any tier, if any; and to the extent possible the amount of the adjustment in Contract Time requested. Failure to properly give such written notice shall, to the extent Owner's interests are prejudiced, constitute a waiver of Contractor's right to an equitable adjustment.
 3. Contractor to provide supplemental information: Within 30 Days of the occurrence of the event giving rise to the request, unless Owner agrees in writing to allow an additional period of time to ascertain more accurate data, Contractor shall supplement the written notice provided in accordance with subparagraph 7.03B.2 with additional supporting data. Such additional data shall include, at a minimum: the amount of delay claimed, itemized in accordance with the procedure set forth herein; specific facts, circumstances, and analysis that confirms not only that Contractor suffered the delay claimed, but that the delay claimed was actually a result of the act, event, or condition complained of, and that the Contract Documents provide entitlement to an equitable adjustment in Contract Time for such act, event, or condition; and supporting documentation sufficiently detailed to permit an informed analysis of the request by Owner. Failure to provide such additional information and documentation within the time allowed or within the format required shall, to the extent Owner's interests are prejudiced, constitute a waiver of Contractor's right to an equitable adjustment.
 4. Contractor to proceed with Work as directed: Pending final resolution of any request in accordance with this paragraph, unless otherwise agreed in writing, Contractor shall proceed diligently with performance of the Work.
- C. Contractor to demonstrate impact on critical path of schedule: Any change in the Contract Time covered by a Change Order, or based on a request for an equitable adjustment in the Contract Time, shall be limited to the change in the critical path of Contractor's schedule attributable to the change of Work or event(s) giving rise to the request for equitable adjustment. Any Change Order Proposal or request for an adjustment in the Contract Time shall demonstrate the impact on the critical path of the schedule. Contractor shall be responsible for showing clearly on the Progress Schedule that the change or event: had a specific impact on the critical path, and except in case of concurrent delay, was the sole cause of such impact; and could not have been avoided by resequencing of the Work or other reasonable alternatives.
- D. Cost of change in Contract Time: Contractor may request compensation for the cost of a change in Contract Time in accordance with this paragraph, 7.03D, subject to the following conditions:
1. Must be solely fault of Owner or A/E: The change in Contract Time shall solely be caused by the fault or negligence of Owner or A/E;
 2. Procedures: Contractor shall follow the procedure set forth in paragraph 7.03B;

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3. Demonstrate impact on critical path: Contractor shall establish the extent of the change in Contract Time in accordance with paragraph 7.03C; and
4. Limitations on daily costs: The daily cost of any change in Contract Time shall be limited to the items below, less the amount of any change in the Contract Sum the Contractor may otherwise be entitled to pursuant to Section 7.02B 7f for any change in the Work that contributed to this change in Contract Time:
 - a. Non-productive supervision or labor: cost of nonproductive field supervision or labor extended because of delay;
 - b. Weekly meetings and indirect activities: cost of weekly meetings or similar indirect activities extended because of the delay;
 - c. Temporary facilities or equipment rental: cost of temporary facilities or equipment rental extended because of the delay;
 - d. Insurance premiums: cost of insurance extended because of the delay;
 - e. Overhead: general and administrative overhead in an amount to be agreed upon, but not to exceed 3% of the Contract Award Amount divided by the originally specified Contract Time for each Day of the delay.

PART 8 – CLAIMS AND DISPUTE RESOLUTION

8.01 CLAIMS PROCEDURE

- A. Claim is Contractor's remedy: If the parties fail to reach agreement on the terms of any Change Order for Owner-directed Work as provided in Section 7.01, or on the resolution of any request for an equitable adjustment in the Contract Sum as provided in Section 7.02 or the Contract Time as provided in Section 7.03, Contractor's only remedy shall be to file a Claim with Owner as provided in this section.
- B. Claim filing deadline for Contractor: Contractor shall file its Claim within 120 Days from Owner's final offer made in accordance with paragraph 7.01E, or by the date of Final Acceptance, whichever occurs first.
- C. Claim must cover all costs and be documented: The Claim shall be deemed to cover all changes in cost and time (including direct, indirect, impact, and consequential) to which Contractor may be entitled. It shall be fully substantiated and documented. At a minimum, the Claim shall contain the following information:
 1. Factual statement of Claim: A detailed factual statement of the Claim for additional compensation and time, if any, providing all necessary dates, locations, and items of Work affected by the Claim;
 2. Dates: The date on which facts arose which gave rise to the Claim;
 3. Owner and A/E employee's knowledgeable about Claim: The name of each employee of Owner or A/E knowledgeable about the Claim;
 4. Support from Contract Documents: The specific provisions of the Contract Documents which support the Claim;

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5. Identification of other supporting information: The identification of any documents and the substance of any oral communications that support the Claim;
 6. Copies of supporting documentation: Copies of any identified documents, other than the Contract Documents, that support the Claim;
 7. Details on Claim for Contract Time: If an adjustment in the Contract Time is sought: the specific days and dates for which it is sought; the specific reasons Contractor believes an extension in the Contract Time should be granted; and Contractor's analysis of its Progress Schedule to demonstrate the reason for the extension in Contract Time;
 8. Details on Claim for adjustment of Contract Sum: If an adjustment in the Contract Sum is sought, the exact amount sought and a breakdown of that amount into the categories set forth in, and in the detail as required by Section 7.02; and
 9. Statement certifying Claim: A statement certifying, under penalty of perjury, that the Claim is made in good faith, that the supporting cost and pricing data are true and accurate to the best of Contractor's knowledge and belief, that the Claim is fully supported by the accompanying data, and that the amount requested accurately reflects the adjustment in the Contract Sum or Contract Time for which Contractor believes Owner is liable.
- D. Owner's response to Claim filed: After Contractor has submitted a fully documented Claim that complies with all applicable provisions of Parts 7 and 8, Owner shall respond, in writing, to Contractor as follows:
1. Response time for Claim less than \$50,000: If the Claim amount is less than \$50,000, with a decision within 60 Days from the date the Claim is received; or
 2. Response time for Claim of \$50,000 or more: If the Claim amount is \$50,000 or more, with a decision within 60 Days from the date the Claim is received, or with notice to Contractor of the date by which it will render its decision. Owner will then respond with a written decision in such additional time.
- E. Owner's review of Claim and finality of decision: To assist in the review of Contractor's Claim, Owner may visit the Project site, or request additional information, in order to fully evaluate the issues raised by the Claim. Contractor shall proceed with performance of the Work pending final resolution of any Claim. Owner's written decision as set forth above shall be final and conclusive as to all matters set forth in the Claim, unless Contractor follows the procedure set forth in Section 8.02.
- F. Waiver of Contractor rights for failure to comply with this Section: Any Claim of the Contractor against the Owner for damages, additional compensation, or additional time, shall be conclusively deemed to have been waived by the Contractor unless made in accordance with the requirements of this Section.

8.02 ARBITRATION

- A. Timing of Contractor's demand for arbitration: If Contractor disagrees with Owner's decision rendered in accordance with paragraph 8.01D, Contractor shall provide Owner with a written demand for arbitration. No demand for arbitration of any such Claim shall be made later than 30 Days after the date of Owner's decision on such Claim; failure to demand arbitration within said 30 Day period shall result in Owner's decision being final and binding upon Contractor and its Subcontractors.
- B. Filing of Notice for arbitration: Notice of the demand for arbitration shall be filed with the American Arbitration Association (AAA), with a copy provided to Owner. The parties shall negotiate or

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mediate under the Voluntary Construction Mediation Rules of the AAA, or mutually acceptable service, before seeking arbitration in accordance with the Construction Industry Arbitration Rules of AAA as follows:

1. Claims less than \$30,000: Disputes involving \$30,000 or less shall be conducted in accordance with the Northwest Region Expedited Commercial Arbitration Rules; or
 2. Claims greater than \$30,000: Disputes over \$30,000 shall be conducted in accordance with the Construction Industry Arbitration Rules of the AAA, unless the parties agree to use the expedited rules.
- C. Arbitration is forum for resolving Claims: All Claims arising out of the Work shall be resolved by arbitration. The judgment upon the arbitration award may be entered, or review of the award may occur, in the superior court having jurisdiction thereof. No independent legal action relating to or arising from the Work shall be maintained.
- D. Owner may combine Claims into same arbitration: Claims between Owner and Contractor, Contractor and its Subcontractors, Contractor and A/E, and Owner and A/E shall, upon demand by Owner, be submitted in the same arbitration or mediation.
- E. Settlement outside of arbitration to be documented in Change Order: If the parties resolve the Claim prior to arbitration judgment, the terms of the resolution shall be incorporated in a Change Order. The Change Order shall constitute full payment and final settlement of the Claim, including all claims for time and for direct, indirect, or consequential costs, including costs of delays, inconvenience, disruption of schedule, or loss of efficiency or productivity.

8.03 CLAIMS AUDITS

- A. Owner may audit Claims: All Claims filed against Owner shall be subject to audit at any time following the filing of the Claim. Failure of Contractor, or Subcontractors of any tier, to maintain and retain sufficient records to allow Owner to verify all or a portion of the Claim or to permit Owner access to the books and records of Contractor, or Subcontractors of any tier, shall constitute a waiver of the Claim and shall bar any recovery.
- B. Contractor to make documents available: In support of Owner audit of any Claim, Contractor shall, upon request, promptly make available to Owner the following documents:
1. Daily time sheets and supervisor's daily reports;
 2. Collective bargaining agreements;
 3. Insurance, welfare, and benefits records;
 4. Payroll registers;
 5. Earnings records;
 6. Payroll tax forms;
 7. Material invoices, requisitions, and delivery confirmations;
 8. Material cost distribution worksheet;
 9. Equipment records (list of company equipment, rates, etc.);
 10. Vendors', rental agencies', Subcontractors', and agents' invoices;

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11. Contracts between Contractor and each of its Subcontractors, and all lower-tier Subcontractor contracts and supplier contracts;
 12. Subcontractors' and agents' payment certificates;
 13. Cancelled checks (payroll and vendors);
 14. Job cost report, including monthly totals;
 15. Job payroll ledger;
 16. Planned resource loading schedules and summaries;
 17. General ledger;
 18. Cash disbursements journal;
 19. Financial statements for all years reflecting the operations on the Work. In addition, the Owner may require, if it deems it appropriate, additional financial statements for 3 years preceding execution of the Work;
 20. Depreciation records on all company equipment whether these records are maintained by the company involved, its accountant, or others;
 21. If a source other than depreciation records is used to develop costs for Contractor's internal purposes in establishing the actual cost of owning and operating equipment, all such other source documents;
 22. All nonprivileged documents which relate to each and every Claim together with all documents which support the amount of any adjustment in Contract Sum or Contract Time sought by each Claim;
 23. Work sheets or software used to prepare the Claim establishing the cost components for items of the Claim including but not limited to labor, benefits and insurance, materials, equipment, Subcontractors, all documents which establish the time periods, individuals involved, the hours for the individuals, and the rates for the individuals; and
 24. Work sheets, software, and all other documents used by Contractor to prepare its bid.
- C. Contractor to provide facilities for audit and shall cooperate: The audit may be performed by employees of Owner or a representative of Owner. Contractor, and its Subcontractors, shall provide adequate facilities acceptable to Owner, for the audit during normal business hours. Contractor, and all Subcontractors, shall make a good faith effort to cooperate with Owner's auditors.

PART 9 – TERMINATION OF THE WORK

9.01 TERMINATION BY OWNER FOR CAUSE

- A. 7 Day Notice to Terminate for Cause: Owner may, upon 7 Days written notice to Contractor and to its surety, terminate (without prejudice to any right or remedy of Owner) the Work, or any part of it, for cause upon the occurrence of any one or more of the following events:

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1. Contractor fails to prosecute Work: Contractor fails to prosecute the Work or any portion thereof with sufficient diligence to ensure Substantial Completion of the Work within the Contract Time;
 2. Contractor bankrupt: Contractor is adjudged bankrupt, makes a general assignment for the benefit of its creditors, or a receiver is appointed on account of its insolvency;
 3. Contractor fails to correct Work: Contractor fails in a material way to replace or correct Work not in conformance with the Contract Documents;
 4. Contractor fails to supply workers or materials: Contractor repeatedly fails to supply skilled workers or proper materials or equipment;
 5. Contractor failure to pay Subcontractors or labor: Contractor repeatedly fails to make prompt payment due to Subcontractors or for labor;
 6. Contractor violates laws: Contractor materially disregards or fails to comply with laws, ordinances, rules, regulations, or orders of any public authority having jurisdiction; or
 7. Contractor in material breach of Contract: Contractor is otherwise in material breach of any provision of the Contract Documents.
- B. Owner's actions upon termination: Upon termination, Owner may at its option:
1. Take possession of Project site: Take possession of the Project site and take possession of or use all materials, equipment, tools, and construction equipment and machinery thereon owned by Contractor to maintain the orderly progress of, and to finish, the Work;
 2. Accept assignment of Subcontracts: Accept assignment of subcontracts pursuant to Section 5.20; and
 3. Finish the Work: Finish the Work by whatever other reasonable method it deems expedient.
- C. Surety's role: Owner's rights and duties upon termination are subject to the prior rights and duties of the surety, if any, obligated under any bond provided in accordance with the Contract Documents.
- D. Contractor's required actions: When Owner terminates the Work in accordance with this section, Contractor shall take the actions set forth in paragraph 9.02B, and shall not be entitled to receive further payment until the Work is accepted.
- E. Contractor to pay for unfinished Work: If the unpaid balance of the Contract Sum exceeds the cost of finishing the Work, including compensation for A/E's services and expenses made necessary thereby and any other extra costs or damages incurred by Owner in completing the Work, or as a result of Contractor's actions, such excess shall be paid to Contractor. If such costs exceed the unpaid balance, Contractor shall pay the difference to Owner. These obligations for payment shall survive termination.
- F. Contractor and Surety still responsible for Work performed: Termination of the Work in accordance with this section shall not relieve Contractor or its surety of any responsibilities for Work performed.
- G. Conversion of "Termination for Cause" to "Termination for Convenience": If Owner terminates Contractor for cause and it is later determined that none of the circumstances set forth in paragraph 9.01A exist, then such termination shall be deemed a termination for convenience pursuant to Section 9.02.

9.02 TERMINATION BY OWNER FOR CONVENIENCE

- A. Owner Notice of Termination for Convenience: Owner may, upon written notice, terminate (without prejudice to any right or remedy of Owner) the Work, or any part of it, for the convenience of Owner.
- B. Contractor response to termination Notice: Unless Owner directs otherwise, after receipt of a written notice of termination for either cause or convenience, Contractor shall promptly:
1. Cease Work: Stop performing Work on the date and as specified in the notice of termination;
 2. No further orders or Subcontracts: Place no further orders or subcontracts for materials, equipment, services or facilities, except as may be necessary for completion of such portion of the Work as is not terminated;
 3. Cancel orders and Subcontracts: Cancel all orders and subcontracts, upon terms acceptable to Owner, to the extent that they relate to the performance of Work terminated;
 4. Assign orders and Subcontracts to Owner: Assign to Owner all of the right, title, and interest of Contractor in all orders and subcontracts;
 5. Take action to protect the Work: Take such action as may be necessary or as directed by Owner to preserve and protect the Work, Project site, and any other property related to this Project in the possession of Contractor in which Owner has an interest; and
 6. Continue performance not terminated: Continue performance only to the extent not terminated
- C. Terms of adjustment in Contract Sum if Contract terminated: If Owner terminates the Work or any portion thereof for convenience, Contractor shall be entitled to make a request for an equitable adjustment for its reasonable direct costs incurred prior to the effective date of the termination, plus reasonable allowance for overhead and profit on Work performed prior to termination, plus the reasonable administrative costs of the termination, but shall not be entitled to any other costs or damages, whatsoever, provided however, the total sum payable upon termination shall not exceed the Contract Sum reduced by prior payments. Contractor shall be required to make its request in accordance with the provisions of Part 7.
- D. Owner to determine whether to adjust Contract Time: If Owner terminates the Work or any portion thereof for convenience, the Contract Time shall be adjusted as determined by Owner.

PART 10 – MISCELLANEOUS PROVISIONS

10.01 GOVERNING LAW

Applicable law and venue: The Contract Documents and the rights of the parties herein shall be governed by the laws of the state of Washington. Venue shall be in the county in which Owner's principal place of business is located, unless otherwise specified.

10.02 SUCCESSORS AND ASSIGNS

Bound to successors; Assignment of Contract: Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to the other party hereto and to partners, successors, assigns, and legal representatives of such other party in respect to covenants, agreements, and obligations contained in the Contract Documents. Neither party shall assign the Work without written consent of the other, except that Contractor may assign the Work for security

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purposes, to a bank or lending institution authorized to do business in the state of Washington. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations set forth in the Contract Documents.

10.03 MEANING OF WORDS

Meaning of words used in Specifications: Unless otherwise stated in the Contract Documents, words which have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings. Reference to standard specifications, manuals, or codes of any technical society, organization, or association, or to the code of any governmental authority, whether such reference be specific or by implication, shall be to the latest standard specification, manual, or code in effect on the date for submission of bids, except as may be otherwise specifically stated. Wherever in these Drawings and Specifications an article, device, or piece of equipment is referred to in the singular manner, such reference shall apply to as many such articles as are shown on the drawings, or required to complete the installation.

10.04 RIGHTS AND REMEDIES

No waiver of rights: No action or failure to act by Owner or A/E shall constitute a waiver of a right or duty afforded them under the Contract Documents, nor shall action or failure to act constitute approval or an acquiescence in a breach therein, except as may be specifically agreed in writing.

10.05 CONTRACTOR REGISTRATION

Contractor must be registered or licensed: Pursuant to RCW 39.06, Contractor shall be registered or licensed as required by the laws of the State of Washington, including but not limited to RCW 18.27.

10.06 TIME COMPUTATIONS

Computing time: When computing any period of time, the day of the event from which the period of time begins shall not be counted. The last day is counted unless it falls on a weekend or legal holiday, in which event the period runs until the end of the next day that is not a weekend or holiday. When the period of time allowed is less than 7 days, intermediate Saturdays, Sundays, and legal holidays are excluded from the computation.

10.07 RECORDS RETENTION

Six year records retention period: The wage, payroll, and cost records of Contractor, and its Subcontractors, and all records subject to audit in accordance with Section 8.03, shall be retained for a period of not less than 6 years after the date of Final Acceptance.

10.08 THIRD-PARTY AGREEMENTS

No third party relationships created: The Contract Documents shall not be construed to create a contractual relationship of any kind between: A/E and Contractor; Owner and any Subcontractor; or any persons other than Owner and Contractor.

10.09 ANTITRUST ASSIGNMENT

Contractor assigns overcharge amounts to Owner: Owner and Contractor recognize that in actual economic practice, overcharges resulting from antitrust violations are in fact usually borne by the purchaser. Therefore, Contractor hereby assigns to Owner any and all claims for such overcharges as to goods, materials, and equipment purchased in connection with the Work performed in accordance with the Contract Documents, except as to overcharges which result from antitrust violations commencing after the Contract Sum is established and which are not passed on to Owner

under a Change Order. Contractor shall put a similar clause in its Subcontracts, and require a similar clause in its sub-Subcontracts, such that all claims for such overcharges on the Work are passed to Owner by Contractor.

10.10 HEADINGS AND CAPTIONS

Headings for convenience only: All headings and captions used in these General Conditions are only for convenience of reference, and shall not be used in any way in connection with the meaning, effect, interpretation, construction, or enforcement of the General Conditions, and do not define the limit or describe the scope or intent of any provision of these General Conditions.

10.11 DIVERSE BUSINESS PARTICIPTION

The state of Washington encourages participation in all of its contracts by Diverse Businesses as found in RCW Chapters 39, 43, and WAC 326. The voluntary Diverse Business goal of 26%, which is an aggregate of: 10% Minority Business Enterprises (MBE), 6% Women Business Enterprises (WBE), 5% Veteran-owned Business, and 5% Washington Small Businesses self-identified in the Washington Electronic Business Solution (WEBS). Contractors are encouraged to meet or exceed the project goals in the advertisement by any level of participation, regardless of category.

DES reserves the right to adjust the voluntary participation goals.

Businesses are encouraged to register in WEBS, as well as registering as a state certified M/WBE/Veteran Business.

For reporting, Contractor is required to register and create an account in the DES Public Works Diversity Tracking & Management System powered by B2GNow.

Every month for the duration of your contract, and while your contract is active in the DES Public Works Diversity Tracking & Management System, submit and accurately maintain the following information:

1. Payments received by the prime contractor from the Agency
2. Payments paid to each first tier subcontractor
3. Payments paid to each first tier supplier

You must also ensure the following information is reported in the DES Public Works Diversity Tracking & Management System by your first tier subcontractors and suppliers for the duration of your contract:

1. Confirmation of payments from the prime contractor to the first tier subcontractor
2. Confirmation of payments from the prime contractor to first tier suppliers

10.12 MINIMUM LEVELS OF APPRENTICESHIP PARTICIPATION

In accordance with RCW 39.04.320, the State of Washington requires 15% apprenticeship participation for projects estimated to cost one million dollars or more. Contractors who meet or exceed minimum participation requirement are eligible for monetary incentive. Contractors failing to meet minimum apprenticeship participation requirement are subject to monetary penalty.

- A. Apprentice participation, under this contract, may be counted towards the required percentage (%) only if the apprentices are from an apprenticeship program registered and approved by the Washington State Apprenticeship and Training Council (RCW 49.04 and WAC 296-05).
- B. Bidders may contact the L&I to obtain more information about apprenticeship programs.

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- C. No changes to the required percentage (%) of apprentice participation shall be allowed without written approval of the Owner. In any request for the change, the Contractor shall clearly demonstrate a good faith effort to comply with the requirements for apprentice participation.
- D. Any substantive violation of the mandatory requirements of this part of the contract may be a material breach of the contract by the Contractor. The Owner may withhold payment pursuant to Part 6.05, stop the work for cause pursuant to Part 3.04, and terminate the contract for cause pursuant to Part 9.01.

10.13 SPECIAL CONDITIONS

The Owner may have Federal Funding or other special requirements for this project. If applicable, the Contractor will be required to comply with the "DIVISION 00 SPECIAL CONDITIONS" section in the specifications that will be based on the specific requirements of the funding source.

DIVISION 01
GENERAL REQUIREMENTS

SECTION 01 11 00

SUMMARY OF WORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General Conditions, Modifications to the General Conditions and Divisions 00 and 01 Specification Sections, apply to work of this section.

1.02 SECTION INCLUDES

- A. Summary of Work, including:
 - 1. Project Description
 - 2. Contract Method
 - 3. Permit Conditions
 - 4. Objection to Application of Products
 - 5. Existing Information
 - 6. Completion Time
 - 7. Contractor's Use of Building and Site
 - 8. Construction Documents

1.03 PROJECT DESCRIPTION

- A. The work of the project is defined by the Contract Documents and generally consists of the following:
 - Fire Station 11 and 13 boiler replacement and HVAC installation** – consists of the replacement of building systems within the Tacoma Fire Stations 11 and 13 in accordance with the permitted drawings completed by KMB architects and associated consultant team, located in Tacoma, Washington.
 - i. Demo of existing boiler, fuel oil tank, fuel oil lines, and associated piping per plans - *a licensed plumber will be needed for portions of this work.*
 - ii. Installation of new heat pumps, air handlers, and duct work per enclosed plans
 - iii. Modifications to existing windows at locations shown in plans to accommodate HVAC air supplies and exhaust.

- iv. The installation of new 3-phase electrical supplies by Tacoma Power including a new power pole and transformer and running electrical supplies to the contractor provided new weather head and meter base and additional electrical components as specified in attached plans at both Fire Station 11 and 13.
 - v. Installation of new electric meters, panels and wiring to support mechanical system as shown in plans.
 - vi. New panels to feed existing on-site panels.
 - vii. Installation of all associated conduits per plans.
 - viii. Hazardous material abatement – Provide hazardous material abatement in the area of work. Refer to Reports included in the Project Manual.
- B. Provide materials, labor, equipment, temporary facilities and construction expertise as required to complete the Project as shown in the Contract Documents.
 - C. Contractor represents that he has carefully examined prior to bidding, Contract Documents and site conditions, and understands the character, quality and quantity of work called for and conditions affecting the Contract Work.

1.04 CONTRACT METHOD

- A. Construct the Work under a guaranteed single fixed-price Contract.
- B. The General Contractor is responsible for coordinating, understanding and directing the work of trades involved in the project.
- C. General Contractor is responsible for coordinating and scheduling work of each subcontractor to expedite progress of the Project. Cooperate and coordinate with any other separate Contractors under Contract with the Owner. The Contractor shall involve the City's assigned Project Manager in all communication with the tenant department where work is occurring, and shall to the extent possible conduct all such communication through the City's Project Manager throughout the project.
- D. The General Contractor shall not make changes, or modifications to the scope of work, or any alteration to the scope set forth in the attached plans and remaining specifications without the consent of the City's assigned Project Manager. Such consent shall be communicated by the City's assigned Project Manager in writing. The Contractor shall not accept on-site direction from tenant department staff as approval, acceptance, or agreement to any modification or scope of work changes to any portion of the work herein described, as authorization for any such modification or alteration. Upon such requests the General Contractor shall direct tenant department staff to contact the City's assigned Project Manager directly, and that no changes can be made without the Project Manager's approval per the specifications stated herein.

1.05 PERMIT CONDITIONS

- A. Conform to permit conditions and requirements imposed by authority(s) having jurisdiction.

- B. The Owner has submitted and obtained the Commercial Mechanical permits for Fire Stations 11 and 13. The General Contractor is responsible for obtaining all other permits, including but not limited to plumbing, electrical, roadway or sidewalk closure, and barricade permits for site dumpsters.
- C. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction. Contractor is responsible for coordinating and paying for the cost of any special permit requirements for staging and delivery of materials within the right-of-way.

1.06 OBJECTIONS TO APPLICATION OF PRODUCTS

- A. Subcontractors and suppliers submitting a bid for this Project shall thoroughly familiarize themselves with specified products and installation procedures and submit any questions or substitutions (in writing). Submittal of Bid constitutes acceptance of products and procedures specified.

1.07 EXISTING INFORMATION

- A. Subcontractors and suppliers are encouraged to familiarize themselves with existing site conditions prior to bidding. Submit any questions or substitutions (in writing). Submittal of Bid constitutes acceptance of products and procedures specified.

1.08 COMPLETION TIME

- A. Time is of the essence, the Owner needs this project completed within the times listed. Provide the necessary management, equipment and manpower, including any overtime, double-shifting or special work schedules, required to achieve completion of the Project within the times listed in the following Completion Schedule.
- B. Substantial Completion for this project will be considered to have been achieved when all of the Work shown on the drawings has been satisfactorily completed in accordance the Contract Documents and an Occupancy Permit (or Temporary Occupancy Permit or final permit sign off) has been issued by the City. Minor punch list items may be completed after Substantial Completion date within the time frame listed in the Completion Schedule. The Contractor shall provide written notice, three (3) days prior to anticipated substantial completion date.
- C. **Anticipated Construction Completion Schedule:**
 - 1. Substantially complete all the work within 104 Calendar Days (estimated 3.5 months) after the Notice to Proceed.
 - 2. Anticipated Notice to Proceed: mid-July 2023
 - 3. Anticipated Substantial Completion Date: late October 2023

- D. Early completion of the Work is allowed provided that the Owner shall not be obligated for any costs associated with delays to the Contractor's accelerated schedule which are within the stipulated contract completion schedule above.

1.09 CONTRACTOR'S USE OF BUILDING AND SITE

- A. The Contractor has direct responsibility for and control of the Contractor occupied construction areas for the duration of the Project, subject to this Section.
- B. Contractor's Use of Site: Limit use of the site for work, storage and access only as required to achieve work of this contract. Contractor shall maintain a clean and secure site.
 - 1. Owner will not reserve parking stalls for the Contractor's use to park equipment and store materials.
 - 2. Owner will not reserve parking stalls for the Contractor's or subcontractor's vehicles.
- C. Contractor's Materials / Equipment: Limit storage of materials and equipment to within Contractor occupied construction areas.
- D. Construction Facilities and Temporary Controls: Refer to Section 01 50 00.
- E. Emergency Vehicle Access: Maintain access roadway and fire lanes on site for use by emergency vehicles. Coordinate requirements with local authority having jurisdiction.
- F. Access Routes to Construction Areas: Contractor shall maintain site access routes in a clean and safe manner free of construction materials, debris and dirt. Maintain access to existing walkways, sidewalks, parking spots, entrances, and other adjacent occupied or used facilities. Do not close or obstruct walkways, sidewalks, parking spots, entrances, or other occupied or used facilities without written approval of authorities having jurisdiction.
- G. Public Safety: Contractor is responsible for performing a safety analysis for the construction work on the project site and shall:
 - 1. Implement and enforce conclusions from safety analysis for duration of project.
 - 2. Maintain site and building in a manner that prevents any unsafe or potentially unsafe condition.
- H. Construction Areas: Monitor to prevent unauthorized persons from entering during construction work. After work hours remove ladders and tools.

1. Contractor shall assume full responsibility for the protection and safekeeping of products under this Contract, stored on the site.
- I. Owner Occupancy During Construction: Owner will occupy site and existing building during entire construction period, EXCEPT the Owner will provide access to areas of the building as needed for Contractor to complete work to the extent possible for continued operation of the building. Contractor shall coordinate in advance with owner for access to areas of work to be performed. It is understood that some level of Fire Department operations will continue throughout the construction process.
 1. Contractor to provide temporary barriers to separate areas of work for security and safety.
 2. Coordinate with City's assigned Project Manager during construction operations to minimize conflicts and facilitate Owner usage.
 3. Perform the Work so as not to interfere with Owner's day-to-day operations.
 4. Maintain existing exits at all times.
- J. Noise: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruptions with the Owner. Contractor work hours and noise levels shall comply with Tacoma Municipal Code, Chapter 8.122 – Noise Enforcement.
 1. Construction and demolition activity which exceeds the noise limits of Tacoma Municipal Code Section 8.122.060(a) is not allowed between 9pm and 7am on weekdays.
 2. Construction and demolition activity which exceeds the noise limits of Tacoma Municipal Code Section 8.122.060(a) is not allowed between 9pm and 9am on weekends and federal holidays.
- K. Contractor shall provide a site-specific safety plan.

1.10 CONSTRUCTION DOCUMENTS

- A. Contractor is responsible for posting any addendums in the Contract Drawings and Project Manual.
- B. The General Contractor is responsible for costs to reproduce the Construction Documents.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

SECTION 01 12 00

PERMITS AND FEES

PART 1 - GENERAL

1.01 PERMITS PAID FOR BY OWNER

- A. The Owner has paid for the primary Commercial Mechanical Permit (and its related plan check fee) as issued by the City of Tacoma and is outside of the contract. Do not include the cost of this permit in the bid. The Owner has previously submitted the construction documents to the City of Tacoma and has received Commercial Mechanical permit approval.

1.02 PERMITS PAID FOR BY CONTRACTOR

- A. Contractor is responsible to acquire and pay for all other permits and fees required by all other agencies having jurisdiction. These may include: electrical, plumbing permits and dumpster or right of way permits.

1.03 PERMIT RECORDS

- A. Maintain notebook on site with copies of all permits and inspection reports. Include same in Maintenance and Operation Manuals furnished at conclusion of project.

1.04 UTILITY SERVICE CONNECTION FEES PAID FOR BY OWNER (Permanent)

- A. The Owner will pay directly for fees required for all permanent service connections to utilities (natural gas, electricity, water, sewer, telecommunications). Make all final connection application(s) required, advise Owner when connection fee is ready for payment, and notify Owner of all pertinent permit payment details so that payment can be made.

1.05 UTILITY SERVICE CONNECTION FEES PAID FOR BY CONTRACTOR (Temporary)

- A. Pay for all utility service connection fees required by utility vendors that are required for temporary use during the course of construction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 22 00

UNIT PRICES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Administrative and procedural requirements for unit prices and allowances.

1.02 UNIT PRICING

- A. A unit price is stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.
 - 1. There are no unit prices requirements specified for this project.

1.03 PROCEDURES

- A. Unit prices include all necessary equipment, labor, materials including cost for delivery, installation or removal, disposal, insurance, applicable taxes, overhead, and profit.
- B. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

END OF SECTION

SECTION 01 25 00

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Division 00 - Bid Period Forms – Substitution Request Form
- B. Section 01 30 00 - Administrative Requirements: Submittal procedures, coordination.

1.2 SECTION INCLUDES

- A. Procedural requirements for proposed substitutions.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Furnish and install products in accordance with options and conditions for substitutions stated in this Section.
 - 1. Where specified only by performance or reference standards, select a product meeting standards by any Manufacturer.
 - 2. Where specified by naming several products or Manufacturers, select any product and Manufacturer named.
 - 3. Where specified by naming one or more products, but indicating "or approved" or similar wording after specified listing, select specified product or submit Request for Product Substitution on attached form.
 - 4. Where specified by naming only one product and Manufacturer, there is no option, and no substitution will be allowed.

B. SUBSTITUTIONS (PRIOR TO BID DATE)

- 1. Prior to Bid Date, substitution requests shall be submitted utilizing the form provided under "Bid Period Forms" to the Senior Buyer. Substitution requests must be received no later than the date specified on the "Substitution Request Form" to be included in an addendum:
 - a. Submit electronic copy of request for substitution for consideration. Limit each request to one proposed substitution.
 - b. Requests received after the due date will not be reviewed or considered regardless of cause. No request for approval will be considered unless submitted in accordance with this Section.
 - c. Bidders will be notified by written Addendum of materials and products approved for use in addition to those specified. No other form of approval,

including verbal or implied, is acceptable as indicator of accepted Substitution Requests.

C. SUBSTITUTIONS (AFTER AWARD OF CONTRACT)

1. After award of the Contract, the Owner may, at their option, consider certain other substitutions submitted in accordance with requirements of this Section. Indicate one or more of the following reasons for request:
 - a. Substitution is required for compliance with final code interpretation requirements, or insurance regulation.
 - b. Specified product is unavailable through no fault of Contractor.
 - c. Subsequent information discloses specified product unable to perform properly or fit designated space.
 - d. Manufacturer or fabricator refuses to certify or guarantee performance of specified product, as required.
 - e. Substitution saves substantial cost, time. (Submit accurate cost and/or time data for proposed substitution in lieu of product specified.)

D. In making request for Substitution, Manufacturer/Contractor represents:

1. It has personally investigated proposed product and, in his opinion, it is equal or superior in all respects to that specified.
 - a. Substantiate whenever requested by Architect.
2. It will coordinate installation of accepted substitution into the Work and guarantees to complete it in all respects.
3. It has identified any and all changes, if any, required to other portions of the Work as a result of the proposed product.
4. It will provide the same or an improved guarantee for the proposed substitution as for the specified product.
5. It waives all claims for additional costs related to the proposed substitution that consequently become apparent.
6. It agrees to pay all of the Owner's additional costs related to the proposed substitution that consequently become apparent, such as redesign expenses, utility and service relocations, etc.
7. Cost data is complete and includes all related costs under its Contract, but excludes:
 - a. Cost under separate Contractors.
 - b. Design Consultants' redesign, unless designated.
8. Substitutions will not be considered if:
 - a. They are indicated or implied on Shop Drawings or other submittals without proper submittal on attached Form.
 - b. Acceptance will require substantial revisions of Contract Documents.

9. Contractor shall pay Architect and his Consultants for time required to review substitutions, if requested.
10. Architect is sole judge of suitability of substitution and decision is final.

3.2 ACCEPTANCE

- A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

END OF SECTION

SECTION 01 26 00

CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 GENERAL

- A. Changes to and/or clarifications of the Work may be initiated by a Request for Information, Architect's Supplemental Instruction, Construction Change Directive, or a Change Order.
- B. A monetary change to the Contract Sum is only implemented by a Change Order.

1.2 DOCUMENTATION OF COSTS

- A. Unit prices noted on the Bid Form shall include all overhead, profit and related costs. Adjustments shall be made in accordance with General Conditions. The Contractor shall document quantities used.
- B. All actual or proposed costs, whether initiated by a Change Order Proposal or Construction Change Directive, shall be summarized on forms acceptable to the Owner, with all necessary substantiating documentation attached thereto. Contractor and Subcontractors of all tiers shall submit Change in the Work Summary Calculation Sheets, Forms A and B, respectively.
- C. Estimates of Not-to-Exceed costs may only be used for the purpose of expediting the Work.
- D. The Owner reserves the right to request notarized time sheets, invoices and other documentation as necessary to protect the public interest.
- E. The Contractor's quotations shall be valid for 60 days.

1.3 CHANGES TO CONTRACT TIME

- A. The Contractor shall make every effort to comply with the Contract Dates of Substantial and Final Completion.
- B. The Contractor may not make claim for costs or losses associated with the use of float time, if any, between anticipated completion dates and the Contract Dates of Substantial and Final Completion.
- C. Only impacts on critical path activities which can be documented as delaying the Contract Date of Substantial Completion shall be considered for changes in the Contract Time. Contractor shall be responsible for showing clearly on the Progress Schedule that the change or event: had a specific impact on the critical path, and except in case of concurrent delay, was the sole cause of such impact;

and could not have been avoided by resequencing of the Work or other reasonable alternatives.

1.4 REQUEST FOR INFORMATION (RFI)

- A. Prepared by Contractor and distributed to Owner and Architect.
- B. Form provided by Architect, or on a form approved by the Owner and the Architect.
- C. Response provided by Architect.
- D. Distributed by the Owner following acceptance of Architect response.
- E. Contractor must either:
 - 1. Proceed upon receipt of response if no cost impact, or,
 - 2. Submit a statement of cost impact within 7 days of receipt of response.
 - a. If cost impact is justified, Owner shall issue a CCD and/or COP.
 - b. If cost impact is not justified, Owner will issue a Notice to Proceed, directing the Contractor to proceed with the Work in question, with no change to the Contract Sum.
- F. RFIs and responses to RFIs shall be numbered consecutively. RFIs reissued for additional clarification or information shall be given decimal extensions (e.g. 12.1).
- G. Responses shall be recorded weekly on record drawings and specifications.

1.5 ARCHITECT'S SUPPLEMENTAL INSTRUCTION (ASI)

- A. Prepared by Architect.
- B. Form provided by Architect.
- C. No change in time or cost as determined by Architect.
- D. Acceptance by Owner required prior to issuance to Contractor.
- E. Transmitted to Contractor for signature.
- F. Contractor must either:
 - 1. Proceed upon receipt.
 - 2. Submit a statement of cost impact within 7 days of receipt.
 - a. If cost impact is justified, Owner shall issue a CCD and/or COP.
 - b. If cost impact is not justified, Owner will issue a Notice to Proceed, directing the Contractor to proceed with the work in question, with no change to the Contract sum.

- G. Architect's Supplemental Instructions shall be numbered consecutively. Reissued ASIs shall be given decimal extensions (e.g. 17.1).
- H. Changes shall be recorded weekly on record drawings and specifications.

1.6 CONSTRUCTION CHANGE DIRECTIVE (CCD)

- A. Issued by Owner in response to:
 - 1. An unresolved Architect's Supplemental Instruction.
 - 2. The absence of agreement on Change Order Proposal costs submitted by Contractor.
 - 3. The need to expedite the work and avoid delays.
- B. Form provided by Architect.
- C. Signed by Owner.
- D. Contractor must proceed immediately with the work identified in the CCD.
- E. Method of adjustment of the Contract Sum shall be determined per General Conditions.

1.7 CHANGE ORDER PROPOSAL (COP)

- A. Issued by Owner and distributed to Contractor and Architect.
- B. May be initiated by Contractor by submitting a written notice to Owner indicating justification and proposed cost impact.
- C. Contractor must provide cost data and substantiating documentation within 14 days of receipt of COP.
- D. All costs must be summarized on the forms provided by the Owner, utilizing the fees indicated.
- E. Direct costs of labor and fringe benefits shall be limited to the amounts shown in Statements of Intent to pay Prevailing Wages. Additional labor burden costs shall be limited to actual costs substantiated in writing by the Contractor and approved by the Owner and Architect.
 - 1. All indirect costs, including but not limited to such items as insurance, taxes, (except Sales Tax), general conditions, small tool allowance, plant and equipment costs, and the like, shall be included in the fees as provided for on the forms, which shall not exceed the percentages specified in the General Conditions.
- F. Prime Contractor Change Order Proposal provided to the Owner, must be submitted together with all necessary substantiating documentation.

- G. Each subcontractor or sub-subcontractor of any tier must prepare and submit, through the Contractor, all of its costs together with all necessary substantiating documentation.
- H. Architect makes recommendation.
- I. Owner accepts or rejects:
 - 1. Owner prepares Change Order, or,
 - 2. Owner requests additional cost data, and/or issues CCD.
 - 3. Owner may issue Notice to Proceed to expedite Work.
- J. Accepted and signed COP is binding on both Owner and Contractor. It is the Notice to Proceed and authorization to do the work as soon as practical.
- K. COPs shall be numbered consecutively. Reissued COPs shall be given decimal extensions.
- L. Changes shall be recorded on record drawings and specifications.

1.8 CHANGE ORDER (CO)

- A. Prepared by Owner.
- B. May include several COPs or CCDs.
- C. Shall be signed by Contractor as soon as practicable.
- D. Change Orders shall be numbered consecutively.
- E. Changes shall be marked on record drawings and specifications.
- F. Costs May be included in Applications for Payment only following approval of the Change Order by the Board of Directors.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 29 00

APPLICATION FOR PAYMENT

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Division 0 (Bidding & Contract Requirements) – Section E. City Programs: LEAP Requirements
- B. Section 01 26 00 – Contract Modification Procedures
- C. Section 01 78 00 - Closeout Submittals: Project record documents.

1.02 SECTION INCLUDES

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Procedures for preparation and submittal of application for final payment.

1.03 SCHEDULE OF VALUES

- A. Forms: Use AIA G703 or other form agreed to by the Architect & Owner for the Schedule of Values.
- B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Architect for approval.
- C. Forms filled out by hand will not be accepted.
- D. Submit Schedule of Values electronically within 15 days after the Notice to Proceed.
- E. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification section. Identify site mobilization, bonds and insurance, and Contractor's General Conditions.
 - 1. Provide additional breakdown of line items if requested by the Architect or the Owner's Representative.
- F. Revise schedule to list approved Change Orders, with each Application For Payment.

1.04 PRIOR TO APPLICATION FOR PROGRESS PAYMENT

- A. Submit Contractor's Construction Schedule for information and Submittal Schedule.
- B. Submit a list of all Subcontractors and Suppliers.
- C. City of Tacoma LEAP Program Documentation Forms.

1.05 APPLICATIONS FOR PROGRESS PAYMENTS

- A. Payment Period: Submit monthly.
- B. Forms: Use modified AIA G702 or other form provided by or agreed to by the Architect & Owner for Applications for Payment.
 - 1. Application for Payment must identify sales tax as a separate item.

- C. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.
- D. Forms filled out by hand will not be accepted.
- E. For each item, provide a column for listing each of the following:
 - 1. Item Number.
 - 2. Description of work.
 - 3. Scheduled Values.
 - 4. Previous Applications.
 - 5. Work in Place and Stored Materials under this Application.
 - 6. Authorized Change Orders.
 - 7. Total Completed and Stored to Date of Application.
 - 8. Percentage of Completion.
 - 9. Balance to Finish.
 - 10. Retainage.
- F. Execute certification by signature of authorized officer.
- G. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.
 - 1. Stored Materials: Requests for payment on materials stored shall be for materials properly stored on the site. Materials stored off-site may be included subject to the following conditions:
 - a. A paid invoice from Supplier is provided.
 - b. Materials are stored in a secure facility.
 - c. Contractor and its bonding company accepts total responsibility for the stored materials.
- H. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.
- I. Submit one electronic and three hard-copies of each Application for Payment.
- J. Include the following with the application:
 - 1. Transmittal letter as specified for submittals in Section 01 30 00.
 - 2. Partial release of liens from major subcontractors and vendors.
 - 3. Affidavits attesting to off-site stored products.
- K. When Architect requires substantiating information, submit data justifying dollar amounts in question.
- L. Submit City of Tacoma LEAP Program Documentation Forms.

1.06 APPLICATION FOR FINAL PAYMENT

- A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

- B. Application for Final Payment will not be considered until the following have been accomplished:
1. All closeout procedures specified in Section 01 78 00.
 2. Satisfactory completion of the following:
 - a. Ensure that unsettled claims will be settled. Receipt by the Owner of General Release of Liens.
 - b. Receipt by the Owner of proof of all project tax payments to the State of Washington Department of Revenue and Department of Labor and Industries for the entire length of the project.
 - c. Receipt by the Owner of release by the Washington State Employment Security Department.
 - d. Receipt by the Owner of all approved Affidavit of Wages Paid.
 - e. Punch list items complete and accepted.
 - f. Contract closeout document submittals received and accepted.
 - g. Original documentation of all required permits signed off by Authorities Having Jurisdiction.
 - h. Submittal of Operating and Maintenance Data.
 - i. LEAP Program Documentation Forms.
- C. Retainage payment will be made separately. Once all completion and release forms have been received, the retainage payment may be released and a Final Acceptance Letter issued by the Owner.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 31 00

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Administrative and Procedural Requirements for:
 - 1. Project Management
 - 2. Coordination
 - 3. Variations, revisions and clarifications
 - 4. Request For Information
 - 5. Preconstruction conference
 - 6. Progress meetings

1.02 PROJECT MANAGEMENT

- A. General: Provide direct, effective, experienced, cooperative, team-oriented, hands-on management of the Work including the daily construction operations on the project site and that part of the Work that the Contractor chooses to delegate to Subcontractors / Suppliers.
 - 1. Project management personnel shall be employees of the Contractor and shall not be subcontracted, or delegated to others.
 - 2. Failure to provide the specified project management personnel is a breach of Contract and subject to Owner's termination of Contract for cause.
 - 3. Site Management Personnel: This Project requires a minimum of one (1) project management personnel on the Project site as follows:
 - a. Superintendent on site full time.
 - b. The management personnel listed herein are minimums and shall not be construed as limiting the Contractor from employing additional or other types of management personnel.
- B. SUPERINTENDENT: Employ a Project Superintendent to oversee, direct, and manage the construction of the Work and including, but not limited to, the following minimum characteristics and responsibilities:

1. A good communicator, organized, effective and capable of managing multiple tasks, difficult personalities and tight deadlines without losing self-control or management effectiveness.
2. Trained, knowledgeable and experienced in jobsite safety and shall be responsible for managing safety issues on site in conformance with Federal, State and Local regulations.
3. Superintendent shall become thoroughly familiar with the requirements of the Contract Documents before work is started.
4. Responsible for executing the Work in conformance with the Construction Schedule specified in Section 01 3215 so that Project is completed on time.
5. Oversee and direct the work of Subcontractors and suppliers and confirm they are conforming to the requirements of the Contract Documents.
6. Jointly with the Project Engineer, coordinate the Work of this project as specified under "Coordination" in this section.
7. Responsible for determining the means and methods used to execute the Work.
8. Responsible for managing and controlling the quality of the Work (including work by Subcontractors) in conformance with the Contract Documents and good construction practice.
9. Responsible for coordinating with the local Building Department and Building Inspector(s) inspections and requirements.
10. Responsible for coordinating the final inspections required by Authorities having jurisdiction required for issuance of the Certificate of Occupancy.
11. Responsible for inspecting the work and preparing the Contractor's Punch List as specified in Section 01 7800.

1.04 COORDINATION

- A. General: Coordinate the Work and construction operations required in different sections of the Specifications:
 1. Ensure efficient and orderly installation of each part of the Work.
 2. Coordinate different work and trades that depends on each other for proper installation, connection, and operation.
 3. No additional compensation will be approved for extra work incurred through the lack of cooperation and coordination.

- B. Coordination Planning and Administration: Plan out the Work in advance and anticipate the interrelationships between each subcontractor and their relationship to the overall Project.
1. Provide the leadership, direction and decisions necessary to prevent subcontractor and supplier problems and disputes from affecting the project schedule or the quality of the work.
 2. Coordinate scheduling, submittals, and Work of the various sections of Specifications to assure proper, efficient and orderly sequence of preparation and installation of interdependent construction elements, with provisions for accommodating items installed later.
 3. Hold coordination meetings with each trade to determine Work requiring coordination with other trades / sections.
 4. Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- C. Coordination Drawings: Before materials are fabricated or Work begun, prepare coordination drawings including plans, elevations, sections and other details as required to clearly define relationships between Work sharing the same space / area, or installed within or passing through Work by other trades so as to avoid any conflicts.
1. Calculate, backcheck and lay out the horizontal dimensions in conformance with the design concept indicated on the Drawings.
 2. Consult with Owner whenever available space or conditions do not permit any element of the Work to be accomplished in conformance with the design concept indicated on the Drawing.
 3. When requested by Owner, provide copy of coordination drawings; submit with any Request for Information involving coordination issues.
 4. Distribute coordination drawings to affected Subcontractors / suppliers.
- D. Subcontractor Coordination: Provide direct supervision and coordination of each Subcontractor and each part of the Work; require each Subcontractor to coordinate their portion of the Work and provide their requirements for coordination of their Work with other related Work.
1. Schedule such work so as to prevent delays in dependent work and so that related work will progress together.
 2. Fully inform each trade or Subcontractor of the relation of its work to other work, and require each to make necessary provisions for the requirements of such other work.

3. Do not delegate Subcontractor coordination responsibility to any subcontractor.
- E. Sequence of Work Coordination: Coordinate the Work of trades and other sections to ensure that elements of the work are installed in their proper sequence, without the need for unplanned modifications to work already installed.
- F. Completion and Closeout Coordination: Coordinate the efficient completion and closeout of the Work by each Subcontractor.
1. Coordinate completion and cleanup of Work of separate trades in preparation for Completion.
 2. After substantial completion, coordinate access to site for correction punch list items; minimize disruption to the building occupants if applicable.
- G. Existing Conditions Coordination:
1. Lay out and mark existing utilities requiring protection or which remain operational or active during construction, to prevent any accidental damage or disruption of building services during this Project.
- H. Coordination With Owner:
1. Cooperate with the Owner to resolve any scheduling or construction coordination concerns or problems that arise during the course of this Project and coordinate the work accordingly to minimize the disruption to the Owner and to the construction schedule.
 2. Schedule shutdowns of existing equipment, utilities and building systems with the Owner, refer to Section 01 5000 for requirements.
 3. Coordinate with the Owner for the scheduling of any construction activities that could potentially disturb or threaten the life safety of any building occupants involving the building structure, chemical fumes and smells, noise, change of exiting or access, blocking of any site path or road, or that could potentially result in disruption or damage to any existing utility or building system. Work that involves any of these potential disturbances, poses a threat to life safety, or involves any element of risk to building occupants shall be subject to the Owner's direction to accomplish this work at a time when the building is not occupied.
 4. Coordinate with and follow Owner's security procedures and requirements to maintain building and area / room security throughout the Project.
 5. Coordinate deliveries in advance with the Owner. Schedule delivery times so that Owner's use of the site is not hindered.

1.05 VARIATIONS, REVISIONS AND CLARIFICATIONS

- A. Variations, revisions and clarifications to the work not involving an adjustment to the Contract Sum or Contract Time will be confirmed in writing. These written confirmations may be included in the project minutes, memos to the Contractor and Owner, e-mail correspondence, or in answers to written Requests for Information (RFI).

1.06 PRECONSTRUCTION CONFERENCE

- A. Owner will schedule a preconstruction conference at start of construction.
- B. Attendance Required: Contractor, Owner and Architect / Engineer.
- C. Agenda:
 - 1. Designation of personnel representing the parties in Contract and the Architect.
 - 2. Discussion of list of Subcontractors, list of Products, schedule of values, and progress schedule.
 - 3. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders and Contract closeout procedures.
 - 4. Scheduling.
 - 5. Coordination with Owner.
 - 6. Procedures for maintaining record documents.
 - 7. Requirements for start-up of equipment.
 - 8. Inspection and acceptance of equipment put into service during construction period.
 - 9. Contractor Safety.

1.07 PROGRESS MEETINGS

- A. Progress meetings will be held on a regularly scheduled basis not exceeding once per week.
 - 1. Owner will administer the meeting, record decisions and actions from the meeting and send copies of meeting notes to Owner and Contractor.
 - 2. The Contractor will be responsible to distribute copies to his field representative and to Subcontractors.

- B. Location of Meeting: Progress meetings will be held at the job site. The contractor shall make physical arrangements for the meeting space.
- C. Attendance: Contractor's management team, Owner, Architect and professional Consultants; subcontractors; suppliers and others as appropriate to agenda may attend.
- D. Agenda:
 - 1. Approval of minutes of previous meetings.
 - 2. Review of Work progress since previous meeting and work planned.
 - 3. Review project schedule (4-week and Master Project Schedule).
 - 4. Review submittal schedules; expedite as required.
 - 5. Review of Request for Information (RFI).
 - 6. Review deliveries.
 - 7. Review proposed changes.
 - 8. Review technical and administrative questions / concerns from Contractor, Owner, Architect, Consultants.
 - 9. Review As-Built Drawings.
 - 10. Field Observations.
- E. Four-Week Schedule:
 - 1. Prior to each meeting, prepare a four (4) week schedule showing work completed during the previous week, work that is in progress for the current week and work planned for the following two weeks. This four week schedule, which is revised weekly by the Contractor, will be presented by the Contractor at the progress meeting and a copy will be given to the Owner at that time.
 - 2. In the event that a progress meeting is not scheduled for the current week, prepare the 4 week schedule and forward it to the Owner in the same week.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

SECTION 01 32 15

CONSTRUCTION SCHEDULE

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Administrative and procedural requirements for the contractor's construction schedule.

1.02 GENERAL

- A. The intent of the construction schedule is to assist the Contractor in planning and execution of the Work in a timely manner and assist the Contractor, Architect and Owner in monitoring the construction progress for the purpose of coordination, communication, evaluation of Applications and Certificates for Payment, and evaluation of time extension requests.
- B. The Owner's review of the schedule will be to ensure that it conforms to the requirements of the specifications. The sequence and scheduling of the work is the Contractor's responsibility. Contract completion date(s) is as specified in the Contract Documents. The Owner's review of the schedule does not change, revise, or amend that date(s).
- C. This section supplements the General Conditions and the Modifications to the General Conditions with additional schedule requirements, where conflicts exist, the most restrictive requirement shall govern.
- D. Any plan by the Contractor to complete the Work or any part of the Work earlier than any contract required milestone or specific completion date shall not be construed as creating any responsibility or liability for the Owner or Architect should their actions, or lack thereof, prevent the Contractor from achieving the planned early completion. The Owner and Architect shall not be liable to the Contractor for any costs or other damages if the Contractor is unable to achieve early completion of the Work before a milestone or completion date.
- E. Float Time: Float time is the amount of time between the earliest start date and the latest start date, or between the earliest finish date and the latest finish date of a chain of activities on the CPM Schedule. Float time belongs to the project and is not for the exclusive use or benefit of either the Contractor or the Owner; float time may be used by either the Contractor or Owner for offsetting delays. Use of float suppression techniques such as preferential sequencing, special lead / lag logic restraints, zero total or free float constraints, extended activity times or imposed dates shall be cause for rejection of the Construction Schedule or any revisions or updates.

- F. Schedule shall anticipate and include sufficient float time for weather dependent work tasks to allow for any delays due to normal inclement weather (defined as any inclement weather within the ten year average of accumulated record mean values from climatological data compiled by the National Oceanic and Atmospheric Administration (NOAA), for the locale of the project, over the full duration of the Contract Time).

1.03 FORMAT

- A. Listings: Reading from left to right, in ascending order for each activity. Identify each activity with the applicable specification section number.
- B. Diagram Sheet Size: 11 x 17 inches.
- C. Scale and Spacing: Weekly increments to be a minimum of 5/8-inch long. Lettering to be a minimum of 1/16-inch high. Schedule to be legible and allow for notations and revisions.

1.04 SCHEDULES

- A. Provide a time scaled diagram with a separate activity bar for each work activity. Diagram to illustrate order and interdependence of activities and sequence of work, how start of a given activity depends on completion of preceding activities and how completion of the activity may restrain start of subsequent activities. Indicate early and late start, early and late finish, manpower loading and description of each activity. Indicate critical path.
- B. Provide as many activities as necessary to clearly show how the project will be constructed within the time allowed. As a minimum, every item on the schedule of values must be shown on the progress schedule. Provide sub-net schedules where necessary to enhance clarity.
- C. Show complete sequence of construction by activity, identifying work of separate stages and other logically grouped activities.
- D. Show accumulated percentage of completion of each item of work at time of each Application for Progress Payment.
- E. As a sub-net show submittal dates including specified Architects' review time for shop drawings, product data and samples. Indicate decision date for selection of finishes.
- F. Show product delivery dates, including those furnished and / or installed by Owner.
- G. Show dates when application for separate permits (i.e., fire alarm, fire sprinkler, etc.) will be made and when permit will be received.
- H. Show dates when application for warranties / guarantees will be made and when warranties will be delivered. Final payment will not be made until all warranties / guarantees have been received and found to be acceptable.

1.05 UPDATING SCHEDULES

- A. Update the construction schedules monthly to reflect actual work activity dates accomplished and any revised work activity dates.
- B. Maintain Construction Schedules to record actual start and finish dates of activities as they are completed.
- C. Indicate progress of each activity at the time of the revision date. Update diagrams to graphically depict current status of Work.
- D. Indicate revision date on revised schedule.
- E. Show changes occurring since previous Schedule submission such as:
 - 1. Any major changes in scope;
 - 2. Activities modified since previous submission;
 - 3. Revised projections for progress and completion, as applicable;
 - 4. Any other identifiable changes.
- F. Provide narrative report as needed to define:
 - 1. Problem areas; anticipated delays; and impact on schedule.
 - 2. Corrective action to be taken by the Contractor to get the project back on schedule. This report will define how and when the Contractor will accomplish this.

1.06 SUBMITTALS

- A. Prepare and submit proposed construction schedule to Owner and Architect as soon as possible after Notice to Proceed and prior to first Application for Payment.
 - 1. Submit schedule in both paper and digital computer formats acceptable to the Owner.
- B. Submit updated schedule with each Application for Payment or more frequent if required.
- C. Applications for Payment will not be processed until schedule is in conformance with requirements of the specifications.

1.07 DISTRIBUTION

- A. Distribute copies of construction schedule to project site file, subcontractors, suppliers, Owner, Architect, and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedules.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 33 00

SUBMITTALS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Administrative and Procedural Requirements for Project Submittals

1.02 SUBMITTAL PROCEDURES

- A. Schedule submittals to expedite the Project. Transmit submittals in accordance with Construction Schedule and in such sequence to avoid delay in the Work. Coordinate submission of related items with schedule.
- B. Electronic Submittals – Format: Shop Drawings, Product Data, Certificates, Warranties and any similar submittals, other than physical samples, shall be provided as digital submittals in PDF format suitable for sending via electronic mail or downloaded from internet file transfer website.
 - 1. PDF security permissions shall be formatted to allow printing, reviewing and editing functions by Architect and Owner using any PDF compatible computer program.
 - 2. When electronic submittals are required to be accompanied by a physical sample, the submittal will not be returned until both the electronic submittal and physical sample are reviewed.
- C. Contractor Shall:
 - 1. Prepare / obtain submittals for each item required in the specifications in accordance with the Contractor's submission schedule and as required to prevent delays in the ordering, fabrication, delivery and installation of the Work.
 - a. Sequence the frequency rate of submittals sent to the Architect to avoid submitting more submittals within the same week than can receive a thorough, timely review, generally 4 to 5 submittals per week. Include a review priority for Architect if multiple and / or large submittals are transmitted to Architect in the same week and plan for longer review times by Architect.
 - 2. Review each submittal for compliance to the Contract Documents, note any deviations and approve in writing prior to submission to Architect; each submittal shall bear the Contractor's review and approval stamp, with the review date and name of reviewer.
 - 3. Reproduce and distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with

provisions. Pay costs for reproduction, distribution and materials.

4. Coordinate submittals into logical groupings to facilitate inter-relation of the several items:
 - a. Finishes which involve Architect selection of colors, textures, or patterns.
 - b. Associated items which require correlation for efficient function or for installation.
5. Identify, in writing, variations from Contract Documents and product or system limitations which may be detrimental to successful performance of the completed Work.
6. Accompany submittals with transmittal letter containing:
 - a. Date.
 - b. Project title and number.
 - c. Contractor's name and address.
 - d. Number of copies of Shop Drawings, Product Data and Samples submitted.
 - e. Identification of submittal as it relates to:
 - 1) Subcontractor / Supplier / Manufacturer:
Name.
Address.
Telephone number.
Representative's name.
 - 2) Detail number and location in Construction Documents.
 - 3) Specification reference number and paragraph.
 - 4) Applicable Standards.
 - 5) Finishes.
 - 6) Identification of deviations from Contract Documents.

D. Additional Information Required:

1. Relation to adjacent structure or materials.
 2. Fabrication methods, assembly, special installation requirements, accessories, fasteners, and other pertinent information.
 3. Field dimensions, clearly identified.
 4. Coordination with other trades. Stamped and signed by affected trades.
- E. Distribution:
1. Send submittals to Owner and Architect via electronic mail or from internet file transfer website.
 2. Architect will return reviewed submittals to Contractor and Owner via electronic mail or Architect's internet file transfer system.
 3. Send copy of Architect reviewed submittal to Subcontractors / Suppliers.

1.03 SUBCONTRACTOR AND SUPPLIER LIST

- A. Prior to submission of First Application for Payment, submit complete list of subcontractors and suppliers to be used for the Work. Provide specification section identification number, addresses and telephone numbers for each listed subcontractor and supplier providing materials.

1.04 SHOP DRAWINGS

- A. Present in clear and thorough manner. Title each drawing with Project name and number; identify each element of drawings by reference to sheet number and detail, schedule, or room number of Contract Documents.
- B. Identify field dimensions; show relation to adjacent or critical features or Work or products.
- C. Do not submit freehand drawings.
- D. Shop Drawings Requiring Code Agency Approval: Submit on format and media required by Approval Agency. Include information required by Project Documents and Approval Agency.

1.05 PRODUCT DATA

- A. Submit only pages which are pertinent; mark each copy of standard printed data to identify pertinent products, referenced to Specification Section and Article number. Show reference standards, performance characteristics, and capacities; wiring and piping diagrams and controls; component parts; finishes; dimensions; and required clearances.
- B. Modify manufacturer's standard schematic drawings and diagrams to supplement

standard information and to provide information specifically applicable to the Work. Delete information not applicable.

1.06 SAMPLES

- A. Submit two samples of the specified color and texture for each product unless specified otherwise in individual specification sections; samples will be retained by Architect.
- B. Where a specific color has not been specified, submit full range of manufacturer's standard and special finishes except when more restrictive requirements are specified, indicating colors, textures, and patterns, for Architect selection.
- C. Label each sample with identification required for transmittal letter.
- D. Field samples are to be maintained at the site of the Work and are to be removed after substantial completion unless directed otherwise.

1.07 CONTRACTOR REVIEW

- A. Coordinate submittals with requirements of the Work and Contract Documents.
- B. Apply Contractor's approval stamp with signature. The submittal signed by the Contractor certifies that the Contractor has reviewed the submittal for accuracy, completeness and compliance with the Contract Documents. It also certifies that the Contractor has verified products required, field dimensions, adjacent construction work, and coordination of information, in accordance with the requirements of the Work and Contract Documents. Submittals without Contractor's stamp and signature are rejected. Notify Architect in writing at time of submittal, of any deviations from requirements of Contract Documents.

1.08 RESUBMITTALS

- A. Revise and resubmit submittals as required, identify changes made since previous submittal.
- B. Shop Drawings, Product Data and Calculations:
 - 1. Revise initial drawings, data or calculations and resubmit as specified for the initial submittal.
 - 2. Indicate any changes which have been made including those requested by the Architect.
- C. Samples: Submit new samples as required.
- D. Architect reserves the right to charge the Contractor for reviewing non-responsive resubmittals.

1.09 ARCHITECT REVIEW

- A. Architect or their consultant(s) will review shop drawings, product data, calculations and samples and return submittals to Contractor as soon as possible, generally within 10 working days, except Contractor shall plan for large submittals such as mechanical and electrical product binders or numerous submittals sent to Architect at the same timing taking a longer period of time.
- B. Architect's review is qualified by the following language included on the review stamp: "This review is only for general conformance with design concept of the Project and general compliance with the information given in the Contract Documents. Corrections or comments made on the shop drawings during this review do not relieve the Contractor from compliance with the requirements of the plans and specifications. Approval of a specific item shall not include approval of an assembly of which the item is a component. Contractor is responsible for: dimensions to be confirmed and correlated at the jobsite; information that pertains solely to the fabrication processes or to the means, methods, techniques, sequences and procedures of construction; coordination of his or her Work with that of all other trades; and for performing all work in a safe and satisfactory manner".
1. Any action shown is subject to Contract Document's requirements. Architect will mark the review submittal in one of the following boxes on review stamp:
- ☐ Reviewed
 - ☐ Reviewed with Comments / Corrections
 - ☐ Rejected
 - ☐ Revise and Resubmit
 - ☐ Submit Specified Item
 - ☐ Informational Submittal – Not Reviewed
- C. Architect / Engineer review of individual or separate items does not constitute review of assembly in which it functions.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 35 16

ALTERATION PROJECT PROCEDURES, CUTTING AND PATCHING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Alteration Project Procedures.
- B. Cutting and Patching.

1.02 REGULATORY REQUIREMENTS

- A. Obtain required permits from authorities.
- B. Do not close or obstruct egress from any building exit.
- C. Do not disable or disrupt existing building utilities or fire and life safety systems without 3 days prior written notice to the Owner; proceed only after receiving the Owner's confirmation of approval.
- D. Conform to procedures and requirements of authorities having jurisdiction when hazardous or contaminated materials are discovered. Notify the Owner and Architect immediately.

1.03 QUALIFICATIONS

- A. Contractor's on-site management personnel shall be competent to survey the condition of the structures and building systems to determine both their condition and the possibility of unplanned structural collapse or failure. Management Personnel shall be capable of taking prompt corrective action when necessary to protect the safety of persons and the integrity of the building structure or systems.
- B. DEFINITIONS:
 - 1. SKILLED CRAFTSMAN is someone who has journeyman level abilities in a specific trade or craft and is currently working at that trade or craft on a regular basis, is capable of competently performing all aspects of the specific trade or craft and, if work has special warranties involved, has received special training to qualify their work for warranty.
 - 2. QUALIFIED INSTALLER is someone who has journeyman level abilities for installing a particular product or system and is currently doing this installation work on a regular basis, is capable of competently performing all aspects of the installation and, if work has special warranties involved, has received special training to qualify their work for warranty.

- C. Demolition, moving, removing, cutting and drilling is required to be performed by trades qualified to perform the work in a manner to cause the least damage and disruption to existing structure and finishes. Use skilled craftsmen or qualified installers wherever waterproof integrity, structural integrity, sight-exposed finishes or materials or systems that are under warranty are involved.
- D. Patching, repair and restoration work shall be accomplished by skilled craftsmen and qualified installers in those specific trades that normally perform the type of work required (e.g. finish carpentry work by a finish carpenter, plaster work by a plasterer, etc.).

1.04 QUALITY ASSURANCE

- A. Assign the specific demolition, cutting and patching work required for the work of this contract to the appropriate skilled craftsman or qualified installer.
- B. Lay out, coordinate, and direct the demolition and cutting accomplished by the various trades to:
 - 1. Minimize patching work required for restoration.
 - 2. Accommodate the existing conditions.
 - 3. Prevent damage to existing building structure, finishes or equipment / systems.
 - 4. Prevent removal or cutting of existing elements intended to remain.

1.05 PROTECTION

- A. Protect and prevent damage to existing finishes, equipment / systems and adjacent work scheduled to remain.
- B. Protection shall include, but not be limited to, wood timbers or framing, plywood panels, plastic sheeting, canvas drop cloths, carpet scraps etc. or anything required to protect item(s) or areas from damage.
- C. Protection shall be in place prior to specific demolition, cutting or patching work is started.

1.06 EXISTING CONDITIONS

- A. UNFORESEEN CONDITIONS: Should unforeseen conditions be encountered that affect the design or function of the project or the structural or functional integrity of the structure or any building system, notify the Architect and Owner immediately in writing.

PART 2 - PRODUCTS

2.01 PRODUCTS / MATERIALS FOR PATCHING AND EXTENDING WORK

- A. New Products / Materials: As specified in Product sections; match existing products / materials and work for patching and extending work.
- B. Type and Quality of Existing Products / Materials: Determine by inspecting and testing Products where necessary, referring to existing Work as a standard.
- C. As applicable, salvage sufficient quantities of cut or removed material to replace damaged work of existing construction, when materials are not obtainable on the current market. Do not incorporate salvaged or used materials in new construction except with permission of Architect and Owner. Protect stored salvage items in dry, secure place.

PART 3 - EXECUTION

3.01 COORDINATION

- A. Review, coordinate and accommodate work of other trades that interface with, affect or are affected by the work of this section so as to facilitate the execution of the overall Work of this project in a coordinated and efficient manner.

3.02 ALTERATION PROJECT PROCEDURES

A. PREPARATION

- 1. Replace and restore at completion.
- 2. Remove unsuitable material not marked for salvage, such as rotted wood, corroded metals and deteriorated masonry and concrete. Replace materials as specified for finished Work.
- 3. Remove debris and abandoned items from area and from concealed spaces.
- 4. Prepare surface and remove surface finishes to provide for proper installation of new work and finishes.
- 5. Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity. Insulate duct work and piping to prevent condensation in exposed areas.

B. INSTALLATION

- 1. Coordinate and direct the work of alterations and renovations to expedite completion sequentially.

2. Remove, cut and patch Work in a manner to minimize damage and to provide a means of restoring Products and finishes to original condition. If original condition is substandard or damaged, restore to level of quality required for new work.
3. Refinish visible existing surfaces to remain in renovated rooms and spaces, to specified condition for each material, with a neat transition to adjacent finishes
4. Install Products as specified in individual sections.

C. TRANSITIONS

1. Where new Work abuts or aligns with existing, perform a smooth and even transition. Patched Work to match existing adjacent Work in texture and appearance.
2. When finished surfaces are cut so that a smooth transition with new Work is not possible, terminate existing surface along a straight line at a natural line of division and provide trim appropriate to new surface or as determined by Architect.

D. ADJUSTMENTS

1. Where a change of plane occurs, provide a smooth transition
2. Trim existing doors as necessary to clear new floor finish. Refinish trim as required.
3. Fit work at penetrations of surfaces as described in Cutting and Patching.

E. REPAIR OF DAMAGED SURFACES

1. Patch or replace portions of existing surfaces which are damaged, lifted, discolored or showing other imperfections.
2. Repair substrate prior to patching finish.

F. FINISHES

1. Finish surfaces as specified in individual Product sections.
2. Finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, refinish entire surface to nearest intersections.

3.03 CUTTING AND PATCHING

A. EXAMINATION:

1. Inspect existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.
2. After uncovering existing work, inspect conditions affecting performance of work.
3. Beginning of cutting or patching means acceptance of existing conditions.

B. PREPARATION

1. Layout and coordinate the cutting work so that new work can be completed free from conflicts with work of other trades and existing conditions / systems not scheduled for removal. Do not proceed with cutting work until conflicts are resolved.
2. Provide, erect and maintain temporary barriers and exterior enclosures and protect existing and installed work.
3. Provide temporary supports, braces or shoring to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage.
4. Provide protection from elements for areas which may be exposed by uncovering work.
5. Maintain excavations free of water.

C. CUTTING AND PATCHING

1. Provide the tools and equipment best suited for the specific type of cutting and patching required.
2. Plan and execute cutting work in a manner that results in the least negative impact to the surrounding work.
3. Execute cutting, fitting and patching including excavation and fill, wherever necessary to construct the work.
4. Fit products together, to integrate with other work.
5. Uncover work to install ill-timed work.
6. Remove and replace defective or non-conforming work.
7. Remove samples of installed work for testing, when requested.
8. Provide openings in the work for penetration of mechanical and electrical work.

9. Provide access for installation of items too large to fit through permanent openings.

D. PERFORMANCE

1. Execute work using methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.
2. Employ skilled craftsmen and / or qualified installer to perform cutting and patching for weather exposed and moisture resistant elements, sight-exposed surfaces and warranted work.
3. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval. Do not overcut corners of materials exposed to view or where overcutting would weaken its structural integrity.
4. Restore work with new products in accordance with requirements of Contract Documents.
5. Fit work tight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.
6. At penetrations of fire rated walls, partitions, ceiling or floor construction, completely seal voids with fire rated material of equal fire rating.
7. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

3.04 EXISTING ITEMS FOR REUSE

- A. Remove the existing item carefully so as not to damage the item.
- B. Carefully clean item and store item in a protected location.
- C. If the item is damaged during the removal process, replace with new that matches the existing at the Contractor's expense.
- D. Reinstall item using procedures for installing new work.

END OF SECTION

SECTION 01 45 00

QUALITY CONTROL

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Administrative and procedural requirements for project quality control.

1.02 REFERENCES

- A. References shall be the edition current as of the date of the Contract Documents.
- B. Obtain current copies of referenced standards.
- C. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.
- D. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.
- E. International Code Council (ICC):
 - 1. ICC / ANSI A117 - Accessible and Usable Buildings and Facilities

1.03 CONTRACTOR'S QUALITY ASSURANCE / CONTROL OF CONSTRUCTION

- A. Employ / assign quality control personnel to monitor the work of this project for conformance to the requirements of the Contract Documents and to good construction practices.
 - 1. Prior to starting their work, review the scope of work, performance requirements, materials and workmanship requirements with each trade and subcontractor.
 - 2. Review materials when delivered to the site for conformance to the Contract Documents and submittals.
 - 3. Monitor work in progress for conformance to the Contract Documents and submittals.
- B. Contractor is solely responsible for managing and controlling the quality of the work and conformance with the requirements of the Contract Documents.
- C. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

- D. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Work shall be performed by trained and experienced workers qualified to produce workmanship of specified quality.
- F. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion and disfigurement.

1.04 ADA TOLERANCES

- A. ADA Tolerances: The ADA tolerances shown on the Drawings represent the allowable tolerances required for conformance with the ADA and ICC / ANSI A117. Strict conformance with the ADA tolerances shown on the Drawings is required for this project; non-conforming work will require correction at Contractor's expense.
 - 1. ADA tolerances shown on the Drawings supersede industry standard tolerances and any other tolerances included in any specification section.
- B. Submittal Review: Review submittals for conformance with the accessibility requirements of ICC / ANSI A117 and the ADA tolerances shown on the Drawings; mark up submittals that have incorrect or missing ADA tolerance information.
- C. Review with Workers: Review the accessibility requirements of ICC / ANSI A117 and the ADA tolerances shown on the Drawings with workers performing work that is required to conform to the accessibility requirements of ICC / ANSI A117.
- D. Monitoring: Monitor the work of this project for compliance with the accessibility requirements of ICC / ANSI A117 and the ADA tolerances shown on the Drawings on work that is required to conform to ICC / ANSI A117.
- E. Inspection: Inspect the completed work that is required to conform to ICC / ANSI A117 for conformance with the ADA tolerances shown on the Drawings. Inspection shall require accurate measurements to confirm that dimensions, slopes and relationships shown on the Drawings have been constructed within the ADA tolerances shown on the Drawings.

1.05 MANUFACTURER'S INSTRUCTIONS

- A. Comply with manufacturer's installation / assembly instructions in full detail, including each step in sequence.
- B. Substrates, Site Conditions And Work By Others shall conform to manufacturer's requirements:
 - 1. Inspect substrate, site conditions and work by others for conformance to manufacturer's requirements for material and condition prior to starting any work.

2. Do not start work if substrate construction, site conditions or work by others does not comply with manufacturer's recommendations; report any problems to Contractor and Architect.
 3. Start of work / installation indicates installer's acceptance of substrate, site conditions and work by others as meeting manufacturer's requirements.
- C. Should manufacturer's instructions conflict with Contract Documents, request clarification from Architect before proceeding.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

SECTION 01 50 00

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Requirements for the contractor's construction facilities and temporary controls.

1.02 DESCRIPTION

- A. This section specifies minimum actions required. Other actions may be specified elsewhere in the Contract Documents, manufacturer's literature, and governing regulations.
- B. Nothing in this section is intended to limit types or amounts of construction facilities and temporary controls.
- C. No omission from this section will be recognized as a temporary activity that is not required to complete the Work.

1.03 PROTECTION OF EXISTING UTILITIES

- A. If unknown utilities are encountered in the course of construction, protect them from damage and notify the utility Owner immediately. Do not remove or disable any unknown existing utility without the approval of the Owner.
- B. In the event utilities are damaged during construction, temporary services and / or repairs must be made immediately to maintain continuity of services at Contractor's expense.

1.04 DISPOSAL OF WASTE MATERIALS

- A. Transportation and disposal of solid waste shall meet the requirements of Tacoma Municipal Code 12.09.50. Coordinate with the City of Tacoma Solid Waste Division for the collection and disposal of solid wastes.
- B. Dispose of refuse and waste material off Owner's property. Do not stockpile waste material on Owner's property. Immediately clean up any spilled material.
- C. Clean trash and debris from work area daily. Keep work area, site, and adjacent properties free from accumulations of waste materials, rubbish and windblown debris resulting from construction operations.
- D. Provide on-site containers for collection of waste materials, debris and rubbish. Periodically remove waste from the site.

- E. Waste Construction Liquid Disposal: Provide portable containers for disposal of any waste construction liquids or fluids that are generated by or needed for the construction work. Do not dump any waste construction liquid or fluid (including oil, solvent, cleaning compound, paint, plaster mud, brush and tool cleanup water, etc.) onto the ground or down the building sanitary or storm drain systems or anywhere on the site. Dispose of contents of all portable containers off site daily.
- F. Dispose of flammable, hazardous, and toxic waste materials daily.
- G. Conform to work place safety regulations for storage, mixing, application and disposal of all cleaning, sealing and repair related materials to requirements of those authorities having jurisdiction, including Federal, State and Local.
- H. Conform to safety precautions in accordance with the latest requirements to Health and Safety regulations, latest edition, of authorities having jurisdiction.

1.05 TEMPORARY ELECTRICITY

- A. The Owner will allow the Contractor to use the existing building's electricity for the duration of the construction without charge.
- B. Provide power outlets for construction operations, with branch wiring and distribution boxes. Provide OSHA / WISHA approved flexible power cords as needed.
- C. Provide over current protection at convenient locations for large loads on the existing electrical panels.
- D. Permanent convenience receptacles may be utilized during construction, provided they are replaced if damaged or defaced in any way.

1.06 TEMPORARY LIGHTING

- A. Provide and maintain temporary lighting for construction operations. Provide sufficient lighting to ensure proper workmanship everywhere.
 - 1. The Owner will allow the Contractor to use the existing building's lighting for the duration of the construction without charge. If the lighting levels are too low, temporary lighting may be required.
- B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required to do the Work safely and at the light levels required by each trade to produce work conforming to the quality specified.
- C. Maintain lighting and provide routine repairs.

1.07 TEMPORARY TELEPHONE SERVICE

- A. Superintendent shall carry a cellular phone to allow voice communication at all times.

1.08 TEMPORARY WATER SERVICE

- A. The Owner will allow the Contractor to use the existing building's water service for the duration of the construction without charge.
- B. Provide backflow prevention device approved by State of Washington Department of Health for any water connection to domestic water main or system serving the public.

1.09 TEMPORARY SANITARY FACILITIES

- A. Contractor shall provide and maintain required facilities and enclosures. Provide at time of project mobilization. Maintain daily in clean and sanitary condition.

1.10 TEMPORARY HEAT

- A. The Owner will allow the Contractor to use the existing building's heating system for the duration of the construction without charge. Direct fired gas / oil heaters are not allowed for supplemental heat, all combustion / exhaust gases shall be vented to building exterior.
- B. Install MERV 8 HEPA filters at return air intakes where construction activities are occurring.
- C. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless required otherwise by manufacturers, trade associations, and / or the specification sections.
- D. Maintain current temperature settings in the existing building. Coordinate with the Owner to determine the correct temperature setting.

1.11 TEMPORARY VENTILATION

- A. Provide temporary ventilation equipment to assist curing and drying out of materials, to dissipate humidity, to maintain consistent temperature in areas and to prevent accumulation of dust, fumes, vapors, or gases.

1.12 TEMPORARY DEHUMIDIFICATION

- A. Provide temporary dehumidification equipment as required to lower the moisture content of the building interior and allow materials to dry out to required levels.

1.13 BUILDING MATERIALS ACCLIMATIZATION AND DRY OUT

- A. Prior to installation of any wall surfaces or finishes, the Contractor shall provide the equipment and expertise required to dry out the building structure and materials, including concrete slabs, to conform with the following minimum criteria:

1. Contractor is responsible for selecting the means and methods utilized to dry out, ventilate and acclimate the building materials, including deciding the proper sequence of construction and other determinates affecting the dry out process; and shall hire an expert consultant to advise in this process if problems or questions are encountered.
2. Acclimate, ventilate and dry out structure and materials as required by manufacturers of finishes or coverings applied over, onto or within the structure or material.
3. Acclimate, ventilate and dry out structure and materials as required to allow installed materials to dry evenly and rapidly as recommended by manufacturer or reference standard.
4. Acclimate, ventilate and dry out structure and materials as required to prevent the formation of water condensation on any material.
5. Test and record moisture content of each different material on a daily basis during and after acclimatization and dry out process.

1.14 TEMPORARY BARRIERS AND TRAFFIC CONTROL

- A. Provide temporary barriers within the building as required.
- B. Provide barriers to protect the public from any potentially unsafe conditions, and from damage from construction operations.
- C. Provide protection for existing plant life designated to remain. Replace damaged plant life.
- C. Protect non-owned vehicular traffic, stored materials, site and structures from damage.
- D. Provide vehicular and pedestrian traffic control as appropriate for the work.

1.15 TEMPORARY STORAGE

- A. Make whatever provisions are necessary to ensure the safe and weathertight protection of materials and equipment temporarily stored.

1.16 PROTECTION OF EXISTING AND INSTALLED WORK

- A. Protect installed work. Provide special protection where specified in individual specification sections or as required to prevent any type of damage or defacement.
- B. Provide temporary and removable protection for existing and installed products. Control activity in immediate work area to minimize damage.
- C. Prohibit traffic in landscaped areas.

- D. Prohibit construction worker access to rooms and areas which do not have construction work. After work in any area or room is complete, prohibit further worker access.
- E. Prevent any construction dust and dirt from entering the HVAC equipment and ductwork, computer equipment, electrical switchgear, building systems / equipment, smoke detectors or anything that will be adversely affected.

1.17 SECURITY

- A. Provide site and building security as required to protect work in progress, stored materials, tools and equipment from vandalism and theft.
- B. Maintain security until Substantial Completion when Owner takes responsibility for security.

1.18 ACCESS ROADS

- A. Provide and maintain access to fire hydrants, free of obstructions. Do not block access roads or prevent emergency vehicles access to site.
- B. Maintain the emergency vehicle access road on the site in good, drivable condition for any type of emergency vehicle as required by the City of Tacoma code and permit conditions.

1.19 PROGRESS CLEANING

- A. Provide periodic cleaning to prevent any buildup or accumulation of construction debris in the building or on the site.
- B. Pre-Cover Cleaning: Remove construction debris and vacuum clean dirt and dust from concealed spaces that will be enclosed or inaccessible after completion of the work, including concealed spaces within walls, shafts, attics, and void spaces.
- C. Maintain building and site in a clean and orderly condition.
- D. Remove waste materials, debris, and rubbish from building and site weekly and dispose off-site.
- E. Provide final cleaning at substantial completion

1.20 ENVIRONMENTAL PROCEDURES

- A. Comply with environmental and health safety regulations. Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result.
- B. Burning on site is not permitted.

1.21 MACHINERY AND EQUIPMENT RESTRICTIONS

- A. Equipment and Internal Combustion Engine Noise: The noise level of each vehicle or piece of equipment shall not be greater than 90 DB(A) at a distance of 50 feet as measured under noisiest operating conditions. Mufflers for stationary engines shall be hospital-area quality of silencing.

1.22 REMOVAL OF UTILITIES, FACILITIES AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, etc.
- B. Clean and repair damage caused by installation or use of temporary work.

1.23 EMERGENCY CONTACTS

- A. Provide Owner with two emergency contact names (Superintendent and Project Manager), with cell phone numbers.

1.24 CONSTRUCTION PARKING

- A. Contractor is responsible to provide temporary parking areas for construction personnel.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Section 01 25 00 – Substitution Procedures

1.02 SECTION INCLUDES

- A. Requirements for Materials and Equipment related to:
 - 1. Transportation and handling
 - 2. Storage and protection
 - 3. Product options

1.03 PRODUCTS

- A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the work. Products may also include existing materials or components required for reuse.
- B. Provide interchangeable components of the same manufacturer, for similar components.
- C. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.

1.04 TRANSPORTATION AND HANDLING

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement or damage.

1.05 STORAGE AND PROTECTION

- A. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight, climate controlled enclosures.
- B. For exterior storage of fabricated products, place on sloped supports, above

ground.

- C. Provide and pay for off-site storage and protection when site does not permit on-site storage or protection.
- D. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.
- E. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- F. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- G. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.

1.06 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Products of manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by naming a Manufacturer "or approved equal", or with a provision for Substitution Request: Submit a request for substitution for any manufacturer not named.
- D. Products Specified by "or approved equal" to a Listed Manufacturer: Products with same function and similar quality and features to listed manufacturer.
- E. Products Specified by "Similar To" a Listed Manufacturer: Products with same function and similar quality and features to listed manufacturer.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 70 00

EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. This section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. General Installation of Products
 - 2. Progress Cleaning
 - 3. Starting and Adjusting
 - 4. Protection of Installed Construction
 - 5. Correction of the Work

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Acceptance of Conditions: Start of work / installation indicates acceptance of existing conditions as not conflicting with the requirements of the Contract Documents or the design intent and being acceptable without any modification.

3.02 PREPARATION

- A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a Request for Information (RFI) to Owner and Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.03 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
- G. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.04 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Pre-Cover Cleaning: Remove construction debris and vacuum clean dirt and dust from concealed spaces that will be enclosed or inaccessible after completion of the work, including concealed spaces within walls, shafts, attics, and void spaces.
- C. Site: Maintain Project site free of waste materials and debris.
- D. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

- E. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- F. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- G. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.05 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each installed utility and piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: Arrange for a factory-authorized service representative to inspect and repair any piece of equipment that does not function properly or cannot be made to operate as specified.

3.06 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

3.07 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction.
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- C. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

END OF SECTION

SECTION 01 78 00

CLOSEOUT

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Administrative and Procedural Requirements for the Contract Closeout.
 - 1. Final Cleaning
 - 2. Adjusting
 - 3. Extra Stock
 - 4. Project Record Documents
 - 5. AHJ Approved Permit Drawing Set
 - 6. Operation And Maintenance Data
 - 7. Warranties
 - 8. Spare Parts And Maintenance Materials
 - 9. Punch List
 - 10. Final Adjustment of Accounts

1.02 CLOSEOUT PROCEDURES

- A. Comply with the General Conditions of the Contract.

1.03 FINAL CLEANING

- A. Execute final cleaning prior to Substantial Completion review and during the period between Substantial and Final Completion where punch list work causes waste, rubbish or debris.
- B. Clean surfaces exposed to view, remove temporary labels, stains and foreign substances. Follow manufacturer's recommendations for cleaning installed products.
- C. Clean equipment and fixtures to sanitary condition.
- D. Clean site; sweep paved areas, rake clean landscaped surfaces if they were impacted by the work of this Project.

- E. Remove waste and surplus materials, rubbish, and construction facilities from the site.

1.04 ADJUSTING

- A. Adjust operating products and equipment in accordance with manufacturer's recommendations and specification section to ensure smooth and unhindered operation.

1.05 EXTRA STOCK

- A. Make arrangements with the Owner to deliver extra stock items.
- B. Document receipt of extra stock by Owner's representative by listing each extra stock item and obtaining the signature of the Owner's representative for it. Include this document in Part 1 of the O and M Manual.

1.06 PROJECT RECORD DOCUMENTS

- A. The Project Record Documents shall consist of the following:
 - 1. Contract Documents (Drawings, Project Manual, Addendums and Change Orders).
- B. Maintain on-site throughout the construction period, one set of the project record documents and record actual revisions to the work on these documents. Project record documents and recordings specified below may be kept in electronic format with on-site access and with off-site weekly backup.
 - 1. Store Record Documents separate from documents used for construction.
 - 2. Record information concurrent with construction progress.
 - 3. Project Manual: Legibly mark, cloud and flag Project Manual changes and include a description of actual Products installed, including the following:
 - a. Manufacturer's name and product model and number.
 - b. Product substitutions or alternates utilized.
 - c. Changes made by Addenda and Change Order.
 - 4. Contract Drawings: Legibly mark, cloud and flag each item to record actual construction including:
 - a. Measured location of internal utilities concealed in construction, referenced to visible and accessible features of the work.
 - b. Field changes of dimensions and detail.

- c. Details not on original Contract Drawings.
 - d. Transcribe Addenda to Project Record Documents.
 - e. Transcribe Change Orders to Project Record Documents.
- C. Prior to contract closeout, prepare and deliver record documents to Owner as follows:
 - 1. Project Record Drawings: One photocopy set of Drawings legibly marked in red ink to show revisions and changes made during construction and as-built conditions. Mark or stamp bottom of each sheet "As-Built Drawings, Name of Construction Company, Date"
 - a. Digital Copy: Provide a digital copy of each sheet of the Project Record Drawings on a 4-1/2 inch compact disc or USB compatible flash/thumb drive in PDF format.
 - 2. Project Record Manual: One copy of Project Manual (in good, clean condition) legibly marked with red ink to record construction changes and as-built conditions.
 - a. Digital Copy: Provide a digital copy of each sheet of the Project Record Manual on a 4-1/2 inch compact disc or USB compatible flash drive in PDF format.
 - 3. A copy of each addendum and each change order in three-ring binder(s) (match binders specified for Operations and Maintenance Data), 4-1/2 inch compact disc, or USB compatible flash drive in PDF format. Include the Field Authorizations and / or Change Order Proposals directly behind each Change Order. Insert a labeled, tabbed divider for each Addendum and Change Order. Label front cover and spine of binder as follows:

Record Addendums and Change Orders

Project Name – City of Tacoma

Prepared by (Name of Contractor and Date)

1.07 AHJ APPROVED PERMIT DRAWING SET

- A. Transmit the AHJ approved Permit Set of drawings to the Owner for their permanent record.
- B. Maintain Permit Set of drawings in good, clean condition, protect from damage or marks.

1.08 OPERATION AND MAINTENANCE DATA

- A. Submit three (3) sets, on 8-1/2 x 11 inch text pages, bound in black three ring binders and in also in PDF electronic format. Binders shall have heavy-duty durable vinyl covers, heavy duty metal D-rings with cover label on front and on spine. All binders shall be same manufacturer, size and color where more than one binder is required.
- B. Prepare binder cover labels with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, year project completed, and volume number and subject matter of binder when multiple binders are required.
- C. Internally subdivide the binder contents with permanent page dividers similar to Avery PI Series dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- D. Contents: Prepare a Table of Contents for each volume, with each Product or system description identified. Type on 30 lb. white paper.
- E. Part 1: Directory, listing names, addresses, and telephone numbers of Architect / Engineer, Contractor, Subcontractors, and major equipment suppliers. Name and signature of Owner's representatives instructed in operation of equipment. Extra parts listing with signature of Owner's representative acknowledging receipt.
- F. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category identify names, addresses and telephone numbers of Subcontractors and suppliers. Identify the following:
 - 1. Significant design criteria.
 - 2. List of equipment.
 - 3. Parts list for each component.
 - 4. Operating instructions.
 - 5. Maintenance instructions for equipment and systems.
 - 6. Maintenance instructions for special finishes, including recommended cleaning methods and materials and any special precautions.
- G. Part 3: Project documents and certificates, including the following:
 - 1. Shop drawings and product data.
 - 2. Certificates required by specification sections.

- H. Submit one (1) draft copy of completed volumes in final form prior to Substantial Completion for review by Owner. These copies will be returned to Contractor with Owner comments. Revise content of documents as required by Owner comments.
- I. Submit three (3) sets of the final revised volumes no later than the Substantial Completion date.

1.09 WARRANTIES

- A. Execute and assemble warranty documents from Subcontractors, suppliers, and manufacturers.
- B. Provide Table of Contents and assemble in one, three ring binder with durable plastic cover matching the binders provided for operation and maintenance data.
- C. Submit at same time as operation and maintenance manuals.
- D. For items of Work delayed beyond date of Project Completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period for those items.

1.10 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification sections.
- B. Deliver to project site and place in location as directed. Obtain receipt signed by Owner's representative prior to final payment and include receipts in Part 1 of Operation and Maintenance binders.

1.11 PUNCH LIST

- A. Upon completion of the Work, the Contractor shall walk-through each room / area of the Project and prepare a punch list of each item of work that is not completed or does not conform to the requirements of the Contract Documents.
- B. After completion of the punch list by the Contractor, provide written notice that the Work has been substantially completed and schedule a room by room punch list walk-through with the Architect and Owner to review the finished work and Contractor's punch list items.
 - 1. Any additional items of uncompleted or unacceptable work that are found during this walk-through shall be added onto the Punch List for completion / correction.

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

TECHNICAL SPECIFICATIONS

- DIVISION 01 – CUTTING AND PATCHING
- DIVISION 02 – SELECTIVE DEMOLITION
- DIVISION 03 - MISC. CAST-IN-PLACE CONCRETE
- DIVISION 07 – JOINT SEALANTS KMB BASE
- DIVISION 08 – ACCESS DOORS AND FRAMES
- DIVISION 20 – MECHANICAL SUPPORT
- DIVISION 21 – FIRE SUPPRESSION
- DIVISION 23 – HVAC
- DIVISION 25 – INTEGRATED AUTOMATION FACILITY CONTROLS
- DIVISION 26 – ELECTRICAL

SECTION 017329
CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Procedural requirements for cutting and patching of existing construction.

1.2 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent Work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent Work.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Where cutting and patching operations may interfere with activities of adjacent occupied areas, coordinate with occupants of adjacent areas to minimize interference with use of and interruption of free passage to adjoining areas.
- B. Cutting and Patching Meeting: Conduct meeting at Project site.
 - 1. Prior to commencing Work requiring cutting and patching, review extent of cutting and patching anticipated and examine procedures for ensuring satisfactory result from cutting and patching Work. Require representatives of each entity directly concerned with cutting and patching to attend, including the following:
 - a. Contractor's Superintendent.
 - b. Trade supervisor responsible for cutting operations.
 - c. Trade supervisor(s) responsible for patching of each type of substrate.
 - d. Mechanical, electrical, and utilities Subcontractors' supervisors, to extent each trade is affected by cutting and patching operations.
 - 2. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.4 INFORMATIONAL SUBMITTALS

- A. Cutting and Patching: Comply with requirements for, and limitations on, cutting and patching of construction elements.
- B. Cutting and Patching Plan: Submit plan describing cutting and patching procedures. Include the following information:
 - 1. Timing: Submit plan a minimum of 2 weeks prior to starting cutting and patching operations.
 - 2. Extent: Describe reason for and extent of each occurrence of cutting and patching.
 - 3. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
 - 4. Products: List products to be used for patching and firms or entities that will perform patching Work.
 - 5. Dates: Indicate when cutting and patching will be performed.
 - 6. Utilities and Mechanical and Electrical Systems:
 - a. List services and systems that cutting and patching procedures will disturb or affect.

- b. List services and systems that will be relocated and those that will be temporarily out of service.
 - c. Indicate length of time permanent services and systems will be disrupted.
 - d. Include description of provisions for temporary services and systems during interruption of permanent services and systems.
- C. Noise and Vibration Control Plan: Comply with requirements in Section 015000 – Temporary Facilities and Controls.

1.5 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for, and limitations on, cutting and patching of construction elements.
 - 1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding.
 - a. Shore, brace, and support structural elements during cutting and patching operations.
 - b. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
 - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
 - 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
 - 4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce building's aesthetic qualities.
 - a. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching identical to in-place materials.
 - 1. For exposed surfaces, use materials that visually match in-place adjacent surfaces to fullest extent possible.
 - 2. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for visual and functional performance of in-place materials.
- C. Cleaning Agents: Comply with requirements in Section 017300 – Execution.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Before proceeding with cutting and patching:
 - 1. Examine surfaces to be cut and patched, and conditions under which cutting and patching are to be performed.
 - 2. Inspect existing conditions to ascertain elements subject to damage or movement and determine need for temporary bracing during cutting and patching operations.

3. Verify compatibility with, and suitability of, substrates, including compatibility with existing finishes or primers.
- B. Completion of Cutting Operations:
 1. Once cutting Work is complete, and removed materials have been disposed of, inspect conditions and notify Owner and Architect of possibly unforeseen physical conditions that may affect performance of Work of Project.
 2. Verify that demolition is complete and areas are ready for installation of new work
- C. Proceeding with cutting and patching operations indicates acceptance of existing conditions.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Temporary Partitions: Provide temporary partitions, in compliance with Section 015000 – Temporary Facilities and Controls, for the following conditions:
 1. To separate areas occupied by Owner from dust and dirt migration.
 2. To separate areas occupied by Owner from fumes and noise.
 3. For safe passage of individuals through or adjacent to cutting and patching operations.
- C. Protection: Protect in-place construction during cutting and patching to prevent damage.
 1. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- D. Move or remove items as necessary for access to cutting and patching operations.

3.3 CUTTING AND PATCHING, GENERAL

- A. Cutting and Patching: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at earliest feasible time, and complete without delay.
 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Repair or remove and replace unsuitable substrate materials, such as rotted wood, water damaged materials, corroded metals, and deteriorated concrete, for new Work.
- C. Completely seal penetrations cut in existing fire-rated partitions with firestopping materials.
 1. Replace existing firestopping materials damaged by cutting and patching operations.
- D. Perform cutting and patching operations in a manner that:
 1. Avoids damaging existing construction indicated to remain.
 2. Provides surfaces properly prepared to receive new Work.
 3. Provides neat and clean transitions between existing and new finishes.
- E. Cleaning:
 1. Clean areas and spaces during cutting and patching operations.
 2. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.
 3. Properly dispose of demolition materials.
 4. Leave surfaces ready to receive Work indicated in Contract Documents.

3.4 CUTTING

- A. Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations using methods least likely to damage elements retained or adjoining construction.
 1. If possible, review proposed procedures with original Installer and comply with original Installer's written recommendations.

- B. Use hand or small power tools designed for sawing and grinding, not hammering and chopping.
- C. Cut holes and slots neatly to minimum size required, with minimum disturbance of adjacent surfaces.
 - 1. Temporarily cover openings when not in use.
- D. Finished Surfaces:
 - 1. Cut or drill from exposed or finished side into concealed surfaces.
- E. Concrete and Masonry:
 - 1. Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - a. Use of pneumatic tools is not allowed without Owner's prior written approval.
 - 2. Make cuts in accurately-located straight lines.
 - 3. Core-drill pipe penetrations. Saw both sides of wall and break out remainder.
 - 4. Concrete Floors: Provide temporary support of elevated floor areas requiring removal and saw-cut.
 - 5. Masonry Walls: Saw-cut along mortar joints. Remove mortar adhering to edges. Overcuts are not acceptable.
 - 6. Wood and Metal Framed Walls: Cut wall finish materials in straight, uniform lines and remove wall framing as indicated on Drawings.
- F. Mechanical and Electrical Services:
 - 1. Cut off pipe or conduit in walls or partitions to be removed.
 - 2. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
- G. Proceed with patching after cutting operations are complete.

3.5 PATCHING

- A. Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work.
 - 1. Patch with durable seams that are as invisible as practicable.
 - 2. Provide materials and comply with installation requirements specified in other Sections, where applicable.
- B. Inspection:
 - 1. Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
- C. Exposed Finishes:
 - 1. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - 2. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - 3. Restore damaged pipe covering to its original condition.
- D. Floors and Walls:
 - 1. Where walls or partitions are removed, extend finishes from one area into another.
 - a. Patch and repair floor and wall surfaces in new space.
 - b. Provide an even surface of uniform finish, color, texture, and appearance.
 - 2. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - 3. Where painted surfaces are patched, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over patch, and apply final paint coat over entire unbroken surface containing patch.
 - a. Provide additional coats until patch blends with adjacent surfaces.
- E. Ceilings:

1. Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
- F. Exterior Building Enclosure:
1. Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- 3.6 RESTORATION
- A. If existing work indicated to remain becomes damaged or destroyed due to cutting and patching operations caused from failure to exercise reasonable care, restore surfaces and materials to condition acceptable to Architect.
1. Pay costs for restoration of damaged or destroyed surfaces and materials.

END OF SECTION 017329

SECTION 024119
SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Demolition and removal of selected portions of building or structure.

1.2 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Arrange selective demolition schedule so as not to interfere with Owner's operations.
- B. Predemolition Meeting: Conduct meeting at Project site.
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review requirements of Work performed by other trades that rely on substrates exposed by selective demolition operations.
 - 5. Review areas where existing construction is to remain and requires protection.

1.4 INFORMATIONAL SUBMITTALS

- A. Proposed Protection Measures: Submit report, including Drawings, that indicates measures proposed for protecting individuals and property, environmental protection, dust control, and noise control. Indicate proposed locations and construction of barriers.
- B. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal Work, with starting and ending dates for each activity. Ensure Owner's -site operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Use of elevator and stairs.
 - 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- C. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations.
 - 1. Submit before Work begins.
- D. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.5 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Existing Conditions:
 - 1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
 - 2. Before selective demolition, confirm with Owner which, if any, items will be removed
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in Work.
 - 1. Hazardous materials will be removed by Owner before start of Work.
 - 2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE CRITERIA

- A. Regulatory Requirements:
 - 1. Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of AHJ.
- B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner.
 - 1. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Verify that hazardous materials have been remediated before proceeding with building demolition operations.
- D. Survey of Existing Conditions: Record existing conditions by use of measured drawings or preconstruction photographs or video.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
3. Disconnect, demolish, and remove plumbing systems, equipment, and components indicated on Drawings to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.

3.3 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 – Temporary Facilities and Controls.
- B. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. Demolish and remove existing construction only to extent required by new construction and as indicated. Use methods required to complete Work within limitations of governing regulations and as follows:
 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on next lower level.
 2. Neatly cut openings and holes plumb, square, and true to dimensions required.
 - a. Use cutting methods least likely to damage construction to remain or adjoining construction.
 - b. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping.
 - c. Temporarily cover openings to remain.
 3. Cut or drill from exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 4. Do not use cutting torches until Work area is cleared of flammable materials.
 - a. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations.
 - b. Maintain portable fire-suppression devices during flame-cutting operations.
 5. Maintain fire watch during and for at least 4 hours after flame-cutting operations.
 6. Maintain adequate ventilation when using cutting torches.
 7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.

9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 10. Dispose of demolished items and materials promptly. Comply with requirements in Section 017419 – Construction Waste Management and Disposal.
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with walkways and other adjacent occupied and used facilities.
- C. Existing Items to Remain:
1. Protect construction indicated to remain against damage and soiling during selective demolition.
 2. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition, cleaned, and reinstalled in their original locations after selective demolition operations are complete.
- 3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS
- A. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings."
1. Do not use methods requiring solvent-based adhesive strippers.
- 3.6 DISPOSAL OF DEMOLISHED MATERIALS
- A. Remove demolition waste materials from Project site and recycle or dispose of them according to Section 017419 – Construction Waste Management and Disposal or dispose of them in an EPA-approved construction and demolition waste landfill acceptable to AHJ.
1. Do not allow demolished materials to accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn demolished materials.
- 3.7 CLEANING
- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 033053

MISCELLANEOUS CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Steel reinforcement bars.
 - 2. Cast-in-place concrete.
 - 3. Concrete materials.
 - 4. Mixture design.
 - 5. Placement procedures.
 - 6. Finishes.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Conduct meeting at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture.

1.4 QUALITY ASSURANCE

- A. Ready-Mixed Concrete Manufacturer Qualifications: A firm with a minimum 10 years of experience in manufacturing ready-mixed concrete products and that complies with ASTM C94 requirements for production facilities and equipment.
 - 1. Manufacturer member of NRMCA and certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ASTM C94 and ACI 301.
- B. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage, and to avoid damaging coatings on steel reinforcement.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in Contract Documents:
 - 1. ACI 301, Specification for Structural Concrete, Sections 1 through 5.
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A615, Grade 60, deformed.
- B. Steel Bar Mats: ASTM A184, fabricated from ASTM A615, Grade 60, deformed bars, assembled with clips.

2.3 CONCRETE MATERIALS

- A. Source Limitations:
 - 1. Obtain concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
 - 2. Obtain each type or class of cementitious material of same brand from same manufacturer's plant.
 - 3. Obtain aggregate from single source.
 - 4. Obtain each type of admixture from single source from single manufacturer.
- B. Cementitious Materials:
 - 1. Portland Cement; ASTM C150; as follows:
 - a. Interior Locations: Type I and Type II. Do not use air entrained concrete at interior slabs.
 - 2. Fly Ash: ASTM C618, Class F pozzolan, loss on ignition not exceeding 1 percent. Account for lower calcium content of Class F where used.
 - 3. Slag Cement: ASTM C989, Grade 120, ground, granulated blast-furnace slag.
 - 4. Blended Hydraulic Cement: ASTM C595, Type IL, portland-limestone cement.
- C. Normal-Weight Aggregates: ASTM C33, Class 3S coarse aggregate or better. Provide aggregates from a single source.
 - 1. Maximum Coarse-Aggregate Size: As follows:
 - a. Slabs and Structural Concrete: Maximum 3/4 inch nominal.
 - b. Footings: Maximum 1 inch nominal.
 - 2. Gradation: Uniformly graded.
- D. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C494, Applications as follows:
 - a. Type A: Low range.
 - b. Type F: Mid-range.
 - c. Type A or Type F: High-range.
- E. Water: ASTM C94; potable.

2.4 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- B. Moisture-Retaining Cover: Provide one of the following that complies with ASTM C171:
 - 1. Impervious paper consisting of 2 sheets of kraft paper cemented together by a bituminous adhesive with fiber reinforcement.
 - 2. Polyethylene film, clear or white, minimum nominal thickness of 0.0040 inch.
 - 3. White-burlap-polyethylene sheet, 40 inches wide, weighing not less than 10 oz./lin. yd.
 - 4. Color: Comply with man's color restrictions for ambient temperatures.
- C. Curing Compound: ASTM C309, clear, waterborne, membrane-forming, dissipating, Type 1, Class A and B, certified by curing compound manufacturer to not interfere with bonding of floor covering. .

2.5 CONCRETE MIXTURES

- A. Prepare design mixtures for each type and strength of concrete, proportioned on basis of laboratory trial mixture or field test data, or both, according to ACI 301.
- B. Proportion concrete mixes in accordance with requirements indicated in structural Drawing. The following requirements are a minimum standard.

- C. Exterior Concrete: Normal-weight concrete.
 - 1. Minimum Compressive Strength: 4,000 psi at 28 days.
 - 2. Maximum w/c Ratio: 0.42 to 0.5 unless indicated otherwise in civil Construction Documents.
 - 3. Minimum Cementitious Materials Content: 520 lb/cu. yd.
 - 4. Slump Limit: 3 inches, plus or minus 1 inch.
 - 5. Air Content: 4-1/2 to 7-1/2 percent, according to ASTM C231.
 - 6. Applications: Exterior mechanical equipment pads.

2.6 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C94 and ASTM C1116. Furnish batch certificates for each batch discharged and used in Work.
 - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes.
 - 2. When air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
 - 3. Monitor concrete in truck and reject if temperature rises to 89 deg F or 5 deg F in 10 minutes, indicating that concrete is setting up prior to discharge.
- B. Project-Site Mixing: Not permitted without Architect's written approval. If approved by Architect, measure, batch, and mix concrete materials and concrete according to ASTM C94. Mix concrete materials in appropriate drum-type batch machine mixer.
 - 1. For concrete batches of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes, after ingredients are in mixer, before any part of batch is released.
 - 2. For concrete batches larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
 - 3. Provide batch ticket for each batch discharged and used in Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added.
 - 4. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 INSTALLATION OF STEEL REINFORCEMENT

- A. Comply with CRSI (DA4) for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Accurately position, support, and secure reinforcement against displacement.
 - 1. Maintain minimum concrete cover.
 - 2. Do not tack weld crossing reinforcing bars.
- D. Provide concrete coverage in accordance with ACI 318.
- E. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete, prior to placing concrete.

3.2 CONCRETE PLACEMENT

- A. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.
- B. Before placing concrete, verify that installation reinforcement and embedded items is complete and that required inspections are completed.

- C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect in writing, but not to exceed the amount indicated on the concrete delivery ticket.
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301, but not to exceed the amount indicated on concrete delivery ticket.
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - 1. Use mechanical vibrating equipment in accordance with ACI 301.

3.3 FINISHING FLOORS AND SLABS

- A. Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Float Finish:
 - 1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
 - 2. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 tolerances for conventional concrete.
 - 3. Locations: Surfaces to receive trowel finish.
- C. Trowel Finish:
 - 1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
 - 2. Continue troweling passes and restraighen until surface is free of trowel marks and uniform in texture and appearance.
 - 3. Grind smooth surface defects that would telegraph through applied coatings or floor coverings.
 - 4. Do not add water to concrete surface.
 - 5. Do not apply hard-troweled finish to concrete that has a total air content greater than 3 percent.
 - 6. Locations: Surfaces exposed to view.

3.4 CONCRETE CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
 - 1. Maintain moisture loss no more than 0.2 lb/sq. ft. x h before and during finishing operations.
 - 2. Apply evaporation retarder immediately after placing concrete if necessary to maintain maximum moisture loss.
- B. Curing Unformed Surfaces: Comply with ACI 308.1:
 - 1. Floors to Receive Curing Compound:
 - a. Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions.
 - b. Recoat areas subjected to heavy rainfall within 3 hours after initial application.
 - c. Maintain continuity of coating and repair damage during curing period.
 - d. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.
 - e. Applications: Interior surfaces schedule to receive floor covering adhesives.

3.5 CONCRETE SURFACE REPAIRS

- A. Defective Concrete:
 - 1. Repair and patch defective areas when approved by Architect.
 - 2. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar:
 - 1. Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
 - 1. Testing agency shall be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31.
 - 2. Testing agency shall immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
 - 3. Testing agency shall report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.
- B. Concrete Testing: Perform testing of composite samples of fresh concrete obtained in accordance with ASTM C172 according to the following requirements:
 - 1. Testing Frequency: Obtain at least 1 composite sample for each 150 cu. yd. or fraction thereof of each concrete mixture placed each day.

3.7 PROTECTION

- A. Protect concrete surfaces scheduled to remain exposed until Substantial Completion.
- B. Protect concrete surfaces scheduled to receive finished flooring until installation of floor coverings.
- C. Prohibit the following:
 - 1. Placement of steel items on concrete surfaces.
 - 2. Use of acids or acidic detergents over concrete surfaces.

END OF SECTION 033053

SECTION 079200

JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Urethane joint sealants.
 - 2. Joint sealant backing.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meetings: Conduct meeting at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2 inch wide joints formed between two 6 inch long strips of material matching appearance of exposed surfaces adjacent to joint sealants.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Product Test Reports: For each kind of joint sealant, for tests performed by manufacturer and witnessed by qualified testing agency. Include the following information for each joint sealant and substrate material to be tested:
 - 1. Joint-sealant location and designation.
 - 2. Manufacturer and product name.
 - 3. Type of substrate material.
 - 4. Proposed test.
 - 5. Number of samples required.
- C. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers who are trained and approved by sealant manufacturer with a minimum 5 years of documented experience performing work similar in scale and scope to this Project.
 - 1. Single Source Responsibility: Provide field-installation of exterior joint sealers specified in this Section under responsibility of a single installer.

1.6 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.

4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: 5 years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: 5 years from date of Substantial Completion.
- C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
 1. Movement of structure caused by stresses on sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 3. Mechanical damage caused by individuals, tools, or other outside agents.
 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A. Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 URETHANE JOINT SEALANTS

- A. Urethane: Single-component, nonsag, nontraffic-use, urethane joint sealant.
 - a. ITW Polymers Sealants North America: Permthane SM7108.
 - b. Master Builders Solutions: MasterSeal CR 195.
 - c. Polymeric Systems, Inc.: Flexiprene 1000.
 - d. Sherwin-Williams Company (The): Loxon S1.
 - e. Sika Corporation: Sikaflex 1a.
 - f. Tremco Incorporated: Dynatrol I-XL.
2. Compliance: ASTM C920, Type S, Grade NS, Class 25/Class 35, Use NT, G, M, A, and O.

2.3 JOINT-SEALANT BACKING

- A. Joint Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; as approved in writing by joint-sealant manufacturer, for joint applications indicated based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C1330; any of the following types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
 1. Type B (Bicellular Material with Surface Skin):
 - a. Applications: Interior and exterior perimeter of window and door frames.

- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.4 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), existing joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond: do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.2 INSTALLATION OF JOINT SEALANTS

- A. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Install sealant backings at joint widths of 1/2 inch or more, and joint depths of 3/4 inch or more.

2. Install sealant backings so that joint depth does not exceed 50 percent of joint width, unless otherwise recommended by sealant manufacturer.
 3. Do not leave gaps between ends of sealant backings.
 4. Do not stretch, twist, puncture, or tear sealant backings.
 5. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at same time backings are installed:
1. Place sealants so they directly contact and fully wet joint substrates.
 2. Completely fill recesses in each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants per requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealant from surfaces adjacent to joints.
 2. Provide concave joint profile per Figure 8A in ASTM C1193, unless otherwise indicated.
- 3.3 CLEANING
- A. Clean off excess sealant or sealant smears adjacent to joints as Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.
- 3.4 PROTECTION
- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion.
- 3.5 JOINT-SEALANT SCHEDULE
- A. Exterior joints in vertical surfaces and horizontal, nontraffic surfaces:
1. Joint-Sealant SLNT-U3.
 - a. Perimeter joints between louver frames and adjacent surfaces.

END OF SECTION 079200

SECTION 083113

ACCESS DOORS AND FRAMES

THIS SECTION PERTAINS ONLY TO FIRE STATION 13

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Access doors and frames.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed plumbing, mechanical, or other concealed Work, and indicate in schedule specified in "Submittals" Article.
- B. Ceiling Coordination Drawings:
 - 1. Reflected ceiling plans, drawn to scale, on which ceiling-mounted items including access doors and frames, lighting fixtures, diffusers, grilles, speakers, sprinklers, and special trim are shown and coordinated with each other.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material, individual components and profiles, and finishes.
- B. Samples: For each type of access door and frame and for each finish specified, complete assembly minimum 6 by 6 inches in size.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.

2.2 PERFORMANCE CRITERIA

- A. Design Requirements:
 - 1. Door Sizes, General: Provide access doors and frames in the following sizes, unless indicated otherwise:
 - a. Ceilings: As indicated on Drawings.
 - 2. Smoke Gaskets: Face of door flush with frame, gasketed, with concealed flange for gypsum board installation. Provide gaskets for access door and frame assemblies.

2.3 NON-RATED ACCESS DOORS AND FRAMES

- A. Aluminum Removable Access Doors:
 - 1. Products: Subject to compliance with requirements, provide products by one of the following:
 - a. Acudor Products, Inc.: DW-5058-1.
 - b. Babcock-Davis: BRGBR.
 - c. Bauco Access Panel Solutions, Inc.: BP11 58.

- d. Williams Brothers Corporation of America: WB DWAL 412.
- 2. Description: Removable, recessed door with preinstalled 5/8 inch for gypsum board with concealed open pin hinge with 1/16 inch maximum reveal between panel and frame when finished.
- 3. Optional Features: Gasketing.
- 4. Locations: Interior gypsum board walls and ceilings.
- 5. Size: As indicated on Drawings.
- 6. Door Material: Nominal 0.045 inch thick extruded aluminum sheet, alloy 6063-T6, with manufacturer's standard clear finish.
- 7. Frame: Same material, thickness, and finish as door.
- 8. Reinforcing: Galvanized steel.
- 9. Hinge: Concealed, galvanized steel open pin type with safety cable to secure door to frame.
- 10. Latch and Lock: Access door manufacturer's standard concealed touch/push latch.
- 11. Safety Cable: Access panel manufacturer's standard nylon-coated cable, rated for 135 lbf., with crimp connections and spring snap aluminum carabineer.

2.4 MATERIALS

- A. Metallic-Coated Steel Sheet: ASTM A653, Commercial Steel (CS) Type B; with minimum G60 or A60 metallic coating.
 - 1. Provide access doors and frames with metallic-coated steel sheet at exterior soffit locations in lieu of uncoated steel sheet.
- B. Aluminum Extrusions: ASTM B221, Alloy 6063.
- C. Aluminum Sheet: ASTM B209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- D. Gaskets: Manufacturer's standard urethane, neoprene, or santoprene gasket designed to form smoke seal between door and frame.
- E. Frame Anchors: Same type as door face.
- F. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel per ASTM A153 or ASTM F2329.

2.5 FABRICATION

- A. Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.
 - 1. For concealed flanges with drywall bead, provide edge trim for gypsum board securely attached to perimeter of frames.
- D. Recessed Access Doors: Form face of door panel to provide recess for application of applied finish. Reinforce door panel as required to prevent buckling. Provide access sleeves for each latch operator and install in holes cut through finish.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Install doors flush with adjacent finish surfaces.
- C. Install doors and frames plumb, level, and square, and in proper alignment with adjacent surface.

3.2 ADJUSTING

- A. Adjust doors and hardware after installation for proper operation.

END OF SECTION 083113

SECTION 200200
OPERATION AND MAINTENANCE MANUAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

- A. Operation and Maintenance Manual.

1.3 SUBMITTALS

- A. General: Comply with Section 20 05 00 and Division 01.
- B. Preliminary O&M: Submit preliminary review O&M manual for review.
- C. Final O&M: Submit Final O&M manuals per Division 01.

PART 2 - PRODUCTS

2.1 GENERAL

- A. General Contents: A maintenance manual shall be compiled containing maintenance and operating information and maintenance schedules for all project mechanical systems. See Division 01 for quantities, organization, format, and other requirements; meet additional requirements as specified herein.

2.2 SUBMITTAL DATA AND TECHNICAL O&M DATA

- A. Submittal Data:
 - 1. General: Provide a copy the submittal data (clearly identified and marked to suit each item). Note: The submittals are not retained by the Owner and a copy is therefore required in the O&M.
 - 2. Product Data: Manufacturer's technical product data, with manufacturer's model number, description of the equipment, equipment capacities, equipment options, electrical power voltage/phase, special features, and accessories. Label data sheets with same designation as used on contract documents. Provide for all items requiring maintenance and for items that may require replacement over a 30-year period or be revised due to an Owner building improvement.
 - 3. Shop Drawings: Provide copy of final shop drawings as approved for each area where shop drawings were required to be submitted.
- B. Technical O&M Data: Provide for each equipment or item requiring maintenance. Label O&M data to clearly indicate which equipment on the project it applies to (use same designation as used in the Contract Documents). Data to include:
 - 1. Manufacturer's operating and maintenance manuals and instructions.
 - 2. Itemized list of maintenance activities and their scheduled frequency.
 - 3. Maintenance instructions for each maintenance activity.
 - 4. Manufacturer's parts list.

5. Manufacturer's recommended lubricants.
 6. Size, quantity and type of filters required (as applicable).
 7. Size, quantity and type each belts unit requires (as applicable).
 8. Size, quantity and type of fuses (as applicable).
- C. Sources: Provide names, addresses, and phone numbers for local manufacturer's representative, service companies, and parts sources for mechanical system components.
- D. Start-Up Reports: Include copies of all equipment and system start-up reports.
- E. Balancing Report: Include a full copy of the balancing report under a dividing tab for the specification section (or building system) where this work is specified. Where balancing is provided by others, obtain from the balancer a copy of the report to insert in the O&M's.
- 2.3 MAINTENANCE SCHEDULES
- A. General: Provide Maintenance schedules with an itemized list of maintenance activities and their scheduled frequency (i.e., weekly, monthly, semi-annually, etc.) for item requiring maintenance.
- B. Special Maintenance: List any critical maintenance items or areas requiring special attention.
- C. Start-Up/Shut-Down: Provide normal start-up, operating, and shut-down procedures; emergency shut-down procedures; and (where applicable) seasonal shut-down procedures.
- 2.4 REDUCED RECORD DRAWINGS
- A. Reduced As-Built Drawings: Provide reduced as-built construction drawings for fire suppression, plumbing, HVAC, Controls. Drawings' size shall be 11" x 17", except where such size precludes the reading of portions of the drawing, a larger size may be used.

PART 3 - EXECUTION

NOT USED

END OF SECTION 200200

SECTION 200500
COMMON WORK RESULTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Division 21 - Fire Suppression.
- C. Division 23 - Heating, Ventilation, and Air Conditioning (HVAC) Systems.
- D. Division 25 - Integrated Automation.

1.2 WORK INCLUDED

- A. General Mechanical System Requirements.
- B. Mechanical System Motors.
- C. Identification and Labeling.

1.3 DEFINITIONS

- A. Abbreviations and Terms: Where not defined elsewhere in the Contract Documents, shall be as defined in RS Means Illustrated Construction Dictionary, Fourth Addition and in the ASHRAE Handbook of Fundamentals, latest edition.
- B. "As required" means "as necessary to form a safe, neat, and complete working installation (or product), fulfilling all the requirements of the specifications and drawings and in compliance with all codes."
- C. "Concealed" means "hidden from view" as determined when areas are in their final finished condition, from the point of view of a person located in the finished area. Items located in areas above suspended ceilings, in plumbing chases, and in similar areas are considered "concealed." Items located in cabinet spaces (e.g. below sinks) are not considered concealed.
- D. "Coordinate" means "to accomplish the work with all others that are involved in the work by: directly discussing the work with them, arranging and participating in special meetings with them to discuss and plan the work being done by each, obtaining and completing any necessary forms and documentation required for the work to proceed, reaching agreement on how parts of the work performed by each trade will be installed relative to each other both in physical location and in time sequence, exchanging all necessary information so as to allow the work to be accomplished with a united effort in accordance with the project requirements".
- E. "Finished Areas" means "areas receiving a finish coat of paint on one or more wall surface."
- F. "Mechanical", where applied to the scope of work, includes all project fire suppression systems, HVAC systems, and controls for these systems and all work covered by specification Divisions 20, 21, 23, and 25. Such work is shown on multiple drawings and is not limited to a particular set of sheets, or sheets prefaced with a particular letter.
- G. The term "related documents" (as used at the beginning of each specification section), and the Specification Divisions and Sections listed with it, is only an indication of some of the specification sections which the work of that section may be strongly related to. Since all items of work relate to

one another and require full coordination, all specification sections, as listed in the Table of Contents, shall be considered as being "related documents", and shall be considered (by this reference) in the same manner as if they had all been listed under the term "related documents" in each specification section.

- H. "Work included" (as used at the beginning of each specification section), and the items listed with it, is only an indication of some of the items specified in that Section and is in no way limiting the work of that Section. See complete drawings and specifications for all required work.
- I. "Verify" means "Contractor shall obtain, by methods independent of the project Architect/Engineer and Owner, the information noted and the information needed to properly perform the work". Where used as "verify existing" the reference is to all existing items related to the work (i.e. piping systems, duct systems, electrical power, controls, structural conditions, space available, building construction type, etc.); the "verify" definition shall include "Confirm by means independent of any existing field labeling and independent of the Architect/ Engineer and Owner what the existing piping (or duct) system contains, sizes, what the flow direction is, what normal pressures/temperatures are, what other systems and areas the piping (or duct) is interconnected to; what the existing control voltages/signal types are by direct measurement; what the existing electrical power voltages and phases are by direct measurement; and additional field verification and coordination to ensure that compatible products are provided, correct connections made, and all work performed to allow for fully functioning systems." "Means independent of existing field labeling" shall include methods such as: the use of exterior pressurized sources to pressurize piping system lines, use of flow tests with dyes, physical tracing of piping and all connections to, electronic detection methods, electronic/electric line tracing, electrical measurements, physical disassembling of system, excavation or uncovering of concealed systems, use of insertion cameras and similar efforts.
- J. "Substitution": As applied to equipment means "equipment that is different than the 'Basis of Design' equipment scheduled on the drawings (or otherwise indicated in the contract documents)".

1.4 GENERAL REQUIREMENTS

- A. Scope: Furnish all labor, materials, tools, equipment, and services for all mechanical work. This section applies to all Division 20, 21, 23, 25 specifications and to all project mechanical work. All mechanical equipment and devices furnished or installed under other Divisions of this specification (or by the Owner) which require connection to any mechanical system shall be connected under this division of the Specifications.
- B. General: All work shall comply with Division 00, General Conditions, Supplementary Conditions, Division 01, and all other provisions of the Contract Documents.
- C. Code:
 - 1. Compliance: All work shall be done in accordance with all applicable codes and ordinances. Throughout the Project Documents, items are shown or specified in excess of code requirements; in all such cases, the work shall be done so that code requirements are exceeded as indicated. Comply with code accessibility requirements.
 - 2. Documentation: Maintain documentation of all permits and code inspections for the mechanical work; submit documentation showing systems have satisfactorily passed all AHJ inspections and requirements.
 - 3. Code Knowledge: Contractor and workers assigned to this project shall be familiar and knowledgeable of all applicable codes and ordinances. Code requirements are typically not repeated in the Contract Documents. By submitting a bid, the Contractor is acknowledging that the Contractor and workers to be utilized on this project have such knowledge.
 - 4. Proof of Code Compliance: Prior to final completion, satisfactory evidence shall be furnished to show that all work has been installed in accordance with all codes and that all inspections required have been successfully passed. Satisfactory evidence includes signed inspections

by the local code authority, test lab results, qualified and witnessed field tests, and related acceptance certificates by local code authorities, and field notes by the Contractor as to when all inspections and tests occurred.

- D. Complete Systems: Furnish and install all materials, appurtenances, devices, and miscellaneous items not specifically mentioned herein or noted on the drawings, but which are necessary to make a complete working installation of all mechanical systems. Not all accessories or devices are shown or specified that are necessary to form complete and functional systems.
- E. Review and Coordination:
 - 1. General: To eliminate all possible errors and interferences, thoroughly examine all the Drawings and Specifications before work is started, and consult and coordinate with each of the various trades regarding the work. Such coordination shall begin prior to any work starting, and continue throughout the project.
 - 2. Suppliers: Suppliers of products shall review the documents to confirm that their products are suitable for the application and that all manufacturers requirements and recommendations have been satisfactorily addressed in the Contract Documents. Where not addressed the supplier shall notify bidders and the Engineer prior to bidding to resolve any issue or include in their bid an adequate amount to resolve the issue.
- F. Conflicts and Discrepancies: Notify the Architect/Engineer of any discrepancies or conflicts before proceeding with any work or the purchasing of any materials for the area(s) of conflict until requesting and obtaining written instructions from the Architect/Engineer on how to proceed. Where conflicts occur, the most expensive and stringent requirement (as judged by the Architect/Engineer) shall prevail. Any work done after discovery of such discrepancies or conflicts and prior to obtaining the Architect/Engineer's instructions on how to proceed shall be done at the Contractor's expense.
- G. Drawings and Specifications: Drawings and specifications are complementary and what is called for in either is binding as if called for in both. The drawings are diagrammatic and show the general arrangement of the construction and therefore do not show all offsets, fittings and accessories which are required to form a complete and operating installation. Mechanical work is shown on multiple drawings and is not limited to a particular set of sheets, or sheets prefaced with a particular letter.
- H. Offsets/Fittings:
 - 1. Piping Systems: Include in bid all necessary fittings and offset to completely connect up all systems, maintain clear access paths to equipment, and comply with all project requirements. Offsets are required to route piping around building structural elements, roof slopes, mechanical systems, electrical systems, and numerous other items. Due to the schematic nature of the plans such offsets are typically not shown. Contractor is responsible to determine the quantity of offsets and fittings required, and the labor involved. No added payment or "extras" will be granted for the Contractor's failure to correctly estimate the number of offsets and fittings and labor required. Contractor is advised that equipment and fixture connections may require more than 20 elbows per plumbing fixture and coil per pipe line.
 - 2. Duct Systems: Include in bid all necessary fittings, offsets, and transitions to completely connect all systems, maintain clear access paths, and comply with all project requirements. Offsets are required to route ducts around building structural elements, roof slopes, mechanical systems, electrical systems, and numerous other items. Due to the schematic nature of the plans such offsets are typically not shown. Contractor is responsible to determine the quantity of offsets and fittings required, and the labor involved. No added payments or "extras" will be granted for the Contractor's failure to correctly estimate number of offsets, fittings, transitions and labor required. Contractor is advised that transitions are required at connections to all equipment, to all air inlets/outlets, crossing of beam lines, at crossing with piping, and similar locations.

- I. Design: The level of design presented in the documents represents the extent of the design being furnished to the Contractor; any additional design needed shall be provided by the Contractor. All design by the Contractor shall be performed by individuals skilled and experienced in such work, and where required by local code (or elsewhere in the documents) shall be performed by engineers licensed in the State where the project is located. Include in bid the costs of all such project design; including engineering, drafting, coordination, and all related activities and work. Such designs services are required for many building systems; including but not limited to ductwork at equipment, piping at fixtures and equipment, hanger/support systems, temporary duct/piping systems, mechanical offsets/adjustments to suit other system, and for methods/means of accomplishing the work.
 - J. Special Tools: Furnish to the Owner one complete set of any and all special tools such as odd size wrenches, keys, etc. (allen wrenches are considered odd), which are necessary to gain access to, service, or adjust any piece of equipment installed under this contract. Each tool shall be marked or tagged to identify its use. Submit a written record listing the special tools provided, date, and signed by the Owner's representative receiving the tools.
 - K. Standards and References: Shall be latest edition unless a specific edition, year, or version is cited, or is enforced by the AHJ.
 - L. Warranties:
 - 1. General: Products and workmanship shall be warranted to be free from all defects, capable of providing satisfactory system operation, and conforming to the requirements of the Contract Documents. Include in the project bid all costs associated with project warranties to ensure that the warranty extends for the required period; possible project delays and failure by others to complete their work may cause the start of the warranty period to be delayed. The Contractor shall be responsible for increasing the warranty dates by corresponding amounts to provide the required warranty periods.
 - 2. Basic Project Warranty: As described in the General Conditions, Supplementary Conditions, and Division 01. See individual specification sections for specific warranty requirements. Start date and duration are as indicated in General Conditions, Supplementary Conditions, and Division 01. Where not indicated otherwise, the basic project warranty shall start at project substantial completion and be for one year.
 - 3. Special Warranties: See individual specification sections for special warranty requirements and extended warranty periods beyond the basic project warranty.
 - M. Special Work Requirements: See Contract Documents regarding building occupancy type, type of construction, special work areas, or other requirements where special products, special installation methods, or special phasing may be required. Code requirements are typically not repeated in the Contract Documents and certain building types or classifications may involve special requirements; Contractor is responsible to carefully review the Contract Documents and code to identify such work.
 - N. Permits and Fees:
 - 1. Obtain and pay for all permits, licenses, fees and inspections as required by the Code and as specified herein (unless noted otherwise).
 - 2. Pay all charges made by any utility company or municipality for material, labor or services incident to the connection of service (unless noted otherwise).
 - O. Commissioning: All mechanical systems are to be commissioned per Section 20 08 00. The Contractor has specific responsibilities for scheduling, coordination, startup, test development, testing and documentation.
- 1.5 SUBSTITUTIONS
- A. General: See Division 00 and 01 for information and requirements regarding substitutions. Manufacturers not scheduled on the plans or listed as "Acceptable Manufacturers" require prior

approval and shall submit a substitution request form (see Division 01 for requirements and limitations). See Paragraph 2.01 this specification section regarding "Acceptable Manufacturers".

- B. Redesign:
 - 1. The Contract Documents show design configurations based on particular manufacturers. Use of other manufacturers' products (i.e. substitutions) from what is shown (or specified) may require redesign of mechanical, plumbing, controls, fire protection, electrical, structural, and general building construction to accommodate the substitution.
 - 2. Review the installation requirements for substitutions and provide redesign of all affected construction. The redesign shall be equal or superior in all respects to the Architect/Engineer's design (as judged by the Architect/Engineer), including such aspects as equipment access, ease of maintenance, utility connection locations, unit electrical requirements, noise considerations, unit performance, and similar concerns.
 - 3. Redesign shall be done by the Contractor and shall meet the requirements and have the approval of the Architect/Engineer prior to beginning work. Apply for and obtain all permits and regulatory approvals.
- C. Construction Modifications: Provide all required construction modifications to accommodate the substituted products; this includes all mechanical, plumbing, controls, fire protection, electrical, structural, and general building construction. Construction modification shall comply with code, specifications, and be equal to designed construction.
- D. Costs: Cost of redesign, construction costs, and all additional costs incurred to accommodate substituted equipment shall be borne by the Contractor.
- E. Submittals: In addition to other required submittals, submit shop drawings showing the redesign for substituted equipment; submittal shall include installation plans and sections, connecting services (i.e. ducts, piping, electrical) locations and routing, required service clearances, and related installation details. Submit data required by other disciplines to allow review of the impact of the substitution (i.e. weights, electrical).

1.6 QUALITY ASSURANCE

- A. Experience: All work shall be performed by individuals experienced and knowledgeable in the work they are performing, and experienced with the same type of systems and building type as this project. By virtue of submitting a bid, the Contractor is acknowledging that workers to be utilized on this project have such experience and knowledge. Upon request of the Engineer, submit resumes showing the work history, training, and types of projects worked on, for individuals assigned to this project.
- B. Code: Utilize workers experienced and knowledgeable with codes pertaining to their work; verify code compliance through-out the project.
- C. ASME: All pressure vessels, pressure vessel safety devices, and pressure vessel appurtenances shall comply with the standards of, and bear the stamp of ASME.
- D. Quality Assurance Checks: Prior to ordering products and making submittals, confirm the following for each:
 - 1. General: Product is suitable for the intended purpose and complies with the Contract Documents.
 - 2. Manufacturer: Product's manufacturer is listed as an acceptable manufacturer in the Contract Document's or a substitution request (where allowed) has been submitted and the manufacturer has been listed as acceptable.
 - 3. Electrical (for products requiring electrical power):
 - a. Product is for use with the voltage/phase as indicated on the electrical plans (or for the electrical circuit the item will be connected to).

- b. Product's ampacity requirements (MCA) do not exceed that indicated on the electrical plans (or for the electrical circuit the item will be connected to).
 4. Weight: Product's weight is no greater than that indicated.
 5. Space Verification: Product will fit in the space available, and along the path available to install the item, will have adequate service clearances, and will not impede on any clearances required for other items in the space the item will be located.
 6. Installation: A suitable method for installing the product has been selected which meets the project schedule and other requirements.
 7. Lead Time: The product's fabrication, shipping, and delivery period meets the project schedule requirements.
 8. Substituted Equipment: Where equipment is not the basis of design confirm all requirements for substituted equipment have been met and shop drawings of construction revisions have been (or are being) prepared.
 9. Controls: Item is compatible with the controls it will be connected to and has been coordinated with the firm providing the project control work.
 10. Listing: Item is Listed when required to be as such. And if the item is to be installed as part of a Listed system or assembly, it is compliant with the Listing of the overall system or assembly.
 11. Existing Buildings/Systems: Product size, weight, connecting services (i.e. electrical, controls, power, plumbing, etc.) are configured and suitable for existing items they connect to or interface with.
 - E. Check-Out: The Contractor shall be responsible to verify that proper installation and proper connections have been provided for all mechanical work. Contractor shall provide installation checkout, start-up services, and perform a thorough check of all mechanical systems to verify proper installation and operation. Contractor shall operate all items multiple times under varying conditions to confirm proper operation. Contractor shall submit a checklist listing all equipment, fixtures, and similar items furnished on this project, with a date and initials indicating when the item was checked, a list of what was checked, and by whom. Such check shall, as a minimum utilize documents provided by the equipment manufacturer. Such a check-out is in addition to any commissioning activities specified (unless noted otherwise).
- 1.7 SUBMITTALS - GENERAL
- A. Variations: Only variations that are specifically identified as described herein will be considered. Provide with the submittal (in addition to other information required): description of the proposed variation, entity who is proposing the variation, why the variation is being proposed, any cost changes associated with the variation, and any other pertinent data to allow for review. Failure to submit information on the variation as described will result in the submittal review being conducted without considering the variation.
 - B. Quality Assurance: By submitting an item for review, the Contractor is claiming that all "Quality Assurance Checks" (see paragraph 1.06 this specification Section) have been performed and satisfactorily passed and no further comment from the submittal reviewer is required for the "Quality Assurance Checks".
 - C. Product Submittals - Information Required:
 1. Manufacturer's catalog information, containing product description, model number, and illustrations. Mark clearly to identify pertinent information and exact model and configuration being submitted.
 2. List of accessories and options provided with product.
 3. Product dimensions and clearances required.
 4. Product weight.
 5. Submittal identified with product name and symbol (as shown on the drawings or written in the specifications) and specification Section and paragraph reference.
 6. Performance capacity and characteristics showing compliance with the Contract Documents.

7. Manufacturer's and local manufacturer's representative names, addresses, and phone numbers.
 8. For equipment requiring piping or duct connections:
 - a. Type of connections required.
 - b. Size and locations of connections.
 9. For electrically operated equipment:
 - a. Number and locations of electrical service connections required.
 - b. Voltage required.
 - c. Fuse or circuit breaker protection requirements.
 - d. Motor starter requirements; if motor starter is furnished with the equipment, submit product information on motor starter.
 10. For equipment requiring control connections:
 - a. Type of control signals required.
 - b. Control communication protocol.
 - c. Information on control devices furnished with equipment.
 - d. Location of control connections.
 11. Manufacturer's installation instructions.
 12. See each specification Section for additional submittal requirements.
- D. Shop Drawing Submittals: Provide for the following systems:
1. Fire Suppression Systems.
 2. HVAC control systems.
 3. For any parts of any system which are to be installed differently than as shown on the drawings.
 4. Construction revisions to accommodate Substituted Equipment.
 5. Other areas/work as noted in the Contract Documents.
 6. For those systems requiring shop drawings, reference system's specification Section for additional requirements.

1.8 SCHEDULE OF VALUES

- A. Breakdown: Provide schedule of values for the following categories (as a minimum); provide a materials and labor breakdown for each category.
1. Mobilization.
 2. General Project Management, General Design, General Coordination, Submittals.
 3. Insulation.
 4. Fire Suppression:
 - a. Engineering and shop drawings.
 - b. Rough-in.
 - c. Trim.
 5. HVAC System:
 - a. Equipment.
 - b. HVAC Ductwork and Accessories.
 - c. Piping Systems.
 6. Controls:
 - a. Engineering and shop drawings.
 - b. Rough-in.
 - c. Trim.
 - d. Programming.
 7. Balancing.
 8. Commissioning.
 9. O&M Manual, Record Data.
 10. Punchlist, Closeout, Owner Training.

- B. Closeout: The dollar value for "Punchlist, Closeout, and Owner Training" shall in no case be less than 3% of the total dollar value of the mechanical work.
- C. Proof of Operation: In addition to payments held out for retainage and project final completion as specified above and in Division 01, the Owner reserves the right to withhold a percentage of the funds for any of the above categories until the systems (of that category) have been proven to operate as specified and have been completely tested, adjusted, commissioned, and balanced.

1.9 RECORD DOCUMENTS

- A. Field Record Drawings: Maintain a set of full size contract plans at the project site upon which all changes from the as-bid plans are noted. Plans shall be maintained clean, dry and legible; with information recorded concurrent with construction progress. These plans shall also include actual locations (with dimensions) of all underground and concealed mechanical systems. Connection points to outside utilities shall be located by field measurements and so noted on these record drawings. All addenda, change order, field orders, design clarifications, request for information, and all other clarifications and revisions to the plans shall also be made a part of these record drawings. Plans shall be available for weekly review by the Architect/Engineer. Label drawing "As-Built" with date, name of Contractor, and name of individual overseeing the work.
- B. Final Field Record Drawings Submittal: Deliver to the Architect/Engineer the original Field Record drawings and one full size copy.

1.10 PRODUCT HANDLING, PROTECTION AND MAINTENANCE

- A. Protection:
 - 1. Protect all products from contamination, becoming unclean, and from damage of any kind and whatever cause; when being handled, in storage, and while installed, until final project acceptance.
 - 2. Completely cover fixtures, motors, control panels, equipment, and similar items to protect from becoming unclean and damage of any kind.
 - 3. Protect premises and work of other trades from damage due to Mechanical work.
- B. Openings: Cap all openings in pipe, ductwork and equipment to protect against entry of foreign matter until all work that could cause unclean conditions or damage is complete (including work that has dust or fumes associated with it). Caps shall be of sufficient strength and seal integrity to prevent entry of water or fumes for the most extreme conditions they may be exposed to (i.e. high velocity water spray, high winds, concrete splash, etc.)
- C. Storage: Provide properly conditioned and sheltered storage facilities for products to prevent damage of any kind and to maintain new condition. Provide adequate venting arrangements to avoid condensation damage.
- D. Operation and Maintenance:
 - 1. General: Inspect products periodically to confirm conditions and maintenance needs. Keep records of inspections and (upon request) forward to the Architect/Engineer prior to project final acceptance. Operation and Maintenance shall be in accordance with manufacturer's written procedures and recognized best maintenance practices. Keep records of maintenance and (upon request) forward to the Architect/Engineer prior to project final acceptance.
 - 2. Stored Products: Provide maintenance (i.e. equipment rotation, lubrication, flush, cleaning, etc.) and inspection on products while stored to maintain new condition.
 - 3. Installed Products: Provide maintenance and inspection of products and operate mechanical systems until substantial completion or specified Owner Instruction has been provided (whichever is later). Maintenance shall include all labor and materials and all manufacturers' recommended maintenance (i.e. strainer cleaning, filter changes, bearing lubrication, belt tensioning, etc.). In addition to scheduled maintenance, review all

equipment periodically to allow detection of improper operation or any special maintenance needs; review shall be consistent with best practices for the product but in no case less than a site visit every two weeks. Document all maintenance activities.

- E. Damaged Products: Damaged products shall be replaced with new. Where damage is limited to paint (or similar finish), the product may remain if the finish is restored to a new condition (as judged by the Architect/Engineer).

1.11 JOB CONDITIONS

- A. Special Requirements:
 - 1. Maintain emergency and service entrance usable to pedestrian and vehicle traffic at all times. Where trenches are cut, provide adequate bridging for traffic.
 - 2. Coordinate startup and shutdown of all mechanical systems and utilities with related trades and the Owner's representative.
 - 3. Coordinate all construction activities with the Owner's Representative and cooperate fully so as to minimize conflicts and to facilitate Owner usage of the premises during construction.
 - 4. Provide temporary services to occupied areas to accommodate Owner's use during construction. All temporary work shall comply with same specifications as for new work and be of same quality.
- B. Downtime Restrictions:
 - 1. Contractor shall notify the Owner at least 72 hours in advance of any intended shut-down of any building services or systems and obtain Owner approval prior to proceeding.
 - 2. Electrical power to the building shall not be interrupted at any one time for more than 15 minutes.
- C. Schedule of Work: Arrange work to comply with schedule of construction, and so as not to violate any downtime restrictions, and to accommodate the Owner's scheduled use of the premises during construction.

1.12 ENGINEER FIELD REVIEWS AND TEST WITNESSING

- A. General: Arrange construction schedule and notifications to the Engineer to accommodate Engineer's schedule and the possibility of review times occurring up to 14 days after notification, and for the possible failure to satisfactorily pass Engineer's reviews requiring revisions and re-reviews.
- B. Notification: Notify Engineer at least 7 days in advance of readiness for reviews; arrange mutually agreed upon times for the reviews to occur.
- C. Access: Provide ladders, any special tools and safety equipment to allow Engineer's access to areas and equipment. Remove and reinstall ceiling tiles, access panels, and similar items where requested to allow for reviews.
- D. Review of Systems with Equipment:
 - 1. Prior to Engineer's review, system's equipment shall have received specified start-up and be substantiated by a written report.
 - 2. Prior to Engineer's review, systems shall have been operating properly for at least five consecutive days prior to the scheduled review date.
 - 3. Personnel shall be present to operate the system's equipment and controls, and to vary system settings as directed by the Engineer to allow for a review of operation over a range of settings.
- E. Re-Review Fees: The project budget allows for one review by the Engineer for specified reviews and witnessing. The Engineer shall be compensated for additional reviews required due to failed

work or failed tests; such compensation will include travel time and mileage and be billed at the Engineer's current billing rates. See Division 00 and 01 for additional information.

1.13 REFERENCES

- A. ASME A13.1: Scheme for the Identification of Piping Systems.

PART 2 - PRODUCTS

2.1 2.01 ACCEPTABLE MANUFACTURERS

- A. General: Any reference in the Specifications or on the Drawings to any article, device, product, material, fixture, form or type of construction by manufacturer, name, make, model number, or catalog number shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. The manufacturers listed as Acceptable Manufacturers may bid the project for the items indicated without submitting a substitution request; however that does not relieve the products from having to comply with the Contract Documents.
- B. Substitutions: Products by manufacturers listed as "Acceptable Manufacturers" (other than those listed as the "Basis of Design") are considered substitutions and shall comply with the requirements for substitutions. See Paragraph titled "Substitutions" in Part 1 of this specification section.
- C. Considerations: In reviewing a manufacturer for acceptance, factors considered (as compared to the specified item) include: engineering data showing item's capacity, performance, proper local representation of manufacturer, likelihood of manufacturer's future local support of product, service availability, previous installations, previous use by Owner/Engineer/Architect, product quality, availability/quality of maintenance and operation data, electrical requirements, capacity/performance, acoustics, physical dimensions, weight, items geometry and access requirements, utility needs, and similar concerns.
- D. Limitations of the Term "Acceptable Manufacturer": The listing of a manufacturer as an Acceptable Manufacturer does not necessarily mean that the products of that manufacturer are equal to those specified. The listing is only an indication of those manufacturers which have represented themselves as being capable of manufacturing, or have in the past manufactured, items equal to those specified. The burden to review products to confirm equivalency with the specified products is on the Contractor. The Architect/Engineer shall be the final judge as to whether an item is equal to that specified.
- E. Quality: Products provided by Acceptable Manufacturers shall be equal to or superior to the specified manufacturer's item in function, appearance, and quality, and shall fulfill all requirements of the Contract Documents. The Architect/Engineer shall be the judge as to whether an item meets these requirements or not.
- F. Manufacturer: To be considered as being made by a particular manufacturer, the product must be made directly by the manufacturer and have the manufacturer's name (or nameplate with name) affixed to the product (or on the product container where direct labeling is not possible). Example: manufacture "A" is listed as an acceptable manufacture; manufacturer "B" is not listed as an acceptable manufacturer; manufacturer "A" owns "B"; products from "B" do not qualify as being made by an acceptable manufacturer by virtue of ownership.

2.2 PRODUCTS - GENERAL

- A. **Standard Products:** Products shall be standard products of a manufacturer regularly engaged in the manufacture of such products. The standard products shall have been in satisfactory commercial or industrial use for two years prior to bid opening. The two year use shall include applications of equipment and materials under similar circumstances and of similar size. The two year's experience must be satisfactorily completed by a product which has been sold or is offered for sale on the commercial market through advertisements, manufacturers' catalogs, or brochures. Except that equipment changes made solely to satisfy code requirements, to improve unit efficiency, or to comply with unique project requirements are not required to have two year prior operation.
- B. **Latest Design:** Products shall be the latest design and version available from the manufacturer, including software. Discontinued products shall not be used.
- C. **Service Support:** Qualified permanent service organizations for support of the equipment shall be located reasonably convenient to the equipment installation and able to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.
- D. **Manufacturer's Nameplate:** Equipment shall have a manufacturer's nameplate bearing the manufacturer's name, address, model number, serial number, and additional information as required by code. Nameplate shall be securely affixed in a conspicuous place. The nameplate of the distributing agent will not be acceptable. Nameplate shall be of durable construction, easily read, with lettering minimum size 12 font.
- E. **Compatibility:** All components and materials used shall be compatible to the conditions and materials the items will be exposed to. All items exposed to the weather shall be galvanized, or be of stainless steel or similar corrosion resistant material.
- F. **Sizes:** Sizes indicated for products manufactured to standardized sizes (e.g. pipe, pipe fittings, valves, material gauges, etc.) are minimums. During bidding confirm that the sizes are available and meet project requirements. Where indicated sizes are not available provide the next larger available size; confirm this larger size will suit the construction and meet Contract Document requirements prior to ordering. Such size revisions are subject to Engineer's review; indicate size revisions on the product submittal and why the size is being revised.
- G. **Non-Specified Items:** Materials shown on the drawings but not specified shall be provided as shown and as required to suit the application illustrated and intended and shall be of commercial quality, consistent with the quality of similar type items provided on the project. Not all items shown on the drawings necessarily have a corresponding specification; such items shall be provided per this paragraph and so as to provide complete, finished, fully functioning mechanical systems.
- H. **Weights:** Do not exceed the weights shown unless added structural supports are provided. Such supports shall meet the requirements of the project Structural Engineer. The Contractor shall bear all costs for all redesign and added supports to accommodate heavier equipment. The Contractor shall reimburse the Engineer for all time associated with all review and analyses regarding the use of equipment heavier than that indicated.
- I. **Temperature/Pressure Rating:** All materials and components furnished shall be suitable for the temperature and pressures they will be exposed to. Contractor shall consider possible operating modes to ensure proper material ratings.
- J. **Standardization:** All products of the same type shall be by the same manufacturer and have the same characteristics and features to allow for Owner's standardization.
- K. **Model Numbers:** Any reference to a manufacturer's "model number" is a reference to a manufacturer's series number or type of product, and is not a complete "model number" in having all the necessary numbers/letters to convey all of the features, accessories, and options that are

required. These series numbers are only meant to convey a type of product that may meet the project requirements. Where conflicts or discrepancies occur regarding a listed manufacturer's series or "model" number and specified capacities or features, the more stringent and expensive shall prevail.

- L. Application and Suitability: Products shall be designed and intended for: commercial and industrial applications, for the use indicated, and be suitable for the operating conditions they will be exposed to. Firms supplying the products shall review the documents and related site and environmental data to confirm compliance. By making product submittals and using products they are being represented as appropriate for the project and application shown.
- M. Lead Free: All solder, valve components, drinking fountain components, and other items in contact with potable water shall be lead free.

2.3 ELECTRICAL

- A. General: All electrical devices, wiring, products, and work shall comply with the Division 26 specifications and code. See drawings for building occupancy type, types of construction, and areas which may require special wiring methods or other electrical work.
- B. Equipment: All equipment requiring power shall be factory wired to an equipment mounted junction box (or an accessible compartment with power terminals or electrical device) arranged to allow for connection of electrical power.
- C. Overcurrent protection: Circuit breakers, circuit breaker disconnects, fuses, and other current limiting devices indicated to be provided, shall be rated to suit the maximum overcurrent rating of the item served, and have other ratings, as required by code. Circuit breakers for HVAC and refrigeration unit equipment shall be UL listed by HACR type.
- D. Short Circuit Current Rating (SCCR): All equipment (or components) requiring the use of electrical power shall have a SCCR value to comply with code. The minimum rating shall be 65,000 Amps RMS Symmetrical unless a lower value is indicated on the plans or allowed by code. Where the Contractor wishes to utilize equipment having a lower rating, the Contractor shall be responsible to provide calculations substantiating that a lower SCCR is acceptable (and complies with code), or make revisions to the electrical system to accommodate the proposed equipment (or components).
- E. Product Certification (Listing): Products which require connection to electrical power shall be certified (i.e. listed) by a Nationally Recognized Testing Laboratory (NRTL) and be labeled (in a conspicuous place) with such certification (or certification mark). Certification shall comply with code, OSHA Standards, and Authority Having Jurisdiction (AHJ) requirements. NRTL's shall be recognized as such by OSHA and the AHJ. Certification shall be for the complete assembly (approval of individual components is not acceptable). Field evaluations to obtain certification shall be performed by accredited product testing laboratories acceptable to the AHJ and Engineer, be performed in accordance with code, NFPA 791, recognized practices, and be labeled to identify the certification. Certification is not required where the AHJ does not require it.
- F. Designated Critical Operations Areas (DCOA): Electrical work DCOA areas shall comply with NFPA requirements for Critical Operations Power Systems (COPS). Essential facilities in their entirety shall be considered as DCOA unless noted otherwise.

2.4 MOTORS

- A. General: Where a piece of equipment specified includes an electric motor, the motor shall be factory installed and mounted. Motor starters and motor electrical disconnect switches shall be provided by the Contractor doing the work of the Section where the item was specified, unless specifically shown to be provided by Division 26 (or another Division). Wiring from the motor to

motor starters and to electrical disconnects shall be by the Contractor doing the work of the Section where the item was specified, unless specifically shown to be provided by Division 26.

- B. Acceptable Manufacturers: General Electric, TECO-Westinghouse, Reliance, Gould, Century, Baldor, U.S. Motors, Marathon, and acceptable manufacturers for the equipment (see individual specification sections).
- C. Type: Motor type shall comply with code and applicable standard requirements and be configured to suit the application. Motors located indoors shall be open frame, drip-proof type, unless indicated otherwise. Motors located outdoors exposed to weather shall have corrosion resistant finish and shall be totally enclosed fan cooled (TEFC) or totally enclosed non-ventilated (TENV) type, unless indicated otherwise.
- D. Listing: All motors shall be UL listed.
- E. Efficiency: Motor efficiencies shall comply with code. Fractional horsepower motors shall be the electronically commutated (EC) type with speed control where noted and where non-EC motors are not available which comply with code efficiency requirements. Motor power factor shall comply with code, local utility requirements, and as indicated. Provide added power factor correction devices as necessary to comply.
- F. Sizing: Motors shall not be smaller than indicated and of adequate size to start and drive the respective equipment when handling the quantities specified without exceeding the nameplate full load current at the conditions indicated and for the expected operating conditions. If it becomes evident that a motor furnished is too small to meet these requirements as a result of the Contractor using substituted equipment or having revised the system arrangement, the Contractor shall replace it with a motor of adequate size at no additional cost to the Owner. Contractor shall also arrange with the Electrical Contractor to increase the size of the wiring, motor starter and other accessories as required to serve the larger motor at no additional cost to the Owner.
- G. Service Factor: Minimum 1.15.
- H. Variable Frequency Drive (VFD) Applications: Motors used with Variable Frequency Drives (VFD's) shall be rated for such use per IEEE standards and have shaft grounding protection.
- I. EC Motors (ECM):
 - 1. General: Electronically commutated type with integral inverter to convert AC power (of voltage/phase indicated) to DC power, and solid state circuitry to vary output power and speed of motor. Motor shall have permanently lubricated bearings with an L10 life of 100,000 hours at expected operating conditions. Motor shall have rotor position and rotation detection as required for operation.
 - 2. Speed Range: Motor speed shall be controllable down to 25% of full speed.
 - 3. Manual Speed Control: Provide with manual speed adjustment dial for motor speed control. Dial shall be motor mounted unless indicated otherwise, operable by a screwdriver or by hand. Motor mounted controls shall be factory wired. Remote mount dials shall be hand operable (i.e. no tools required), shall be for mounting on a standard 2 x 4 electrical junction box, and be able to be located up to 100 feet remote from the motor. Motor control wiring for remote mount dials shall be factory wired from the motor to an equipment mounted junction box (with field supplied wiring from this J-box to the remote dial).
 - 4. EMCS Control: Motor speed shall be adjustable via a remote 0-10V input signal (unless noted otherwise) from the building EMCS. Control wiring shall be factory wired from the motor to an equipment mounted junction box. EMCS control is not required where not indicated to be provided or where not utilized as part of the control sequence.
 - 5. Control Power: Provide with integral transformer, factory wired, as needed to power motor controls. Locate transformer at motor or equipment.

2.5 IDENTIFICATION AND LABELS

- A. General: All piping, valves, and mechanical equipment shall be labeled. Labels in concealed accessible spaces shall be reviewed and verified by Architect/Engineer prior to being concealed.

B. Piping:

1. Type: Self-sticking colored identification markers, lettered to identify the pipe contents, and banded at each end with arrow tape indicating the direction of flow. Markers shall be similar and equal to Brady "System 1" and Seton "Opti-Code" markers. Spray painted stencil labeling is not acceptable. Some labels may be special order.
2. Identification Colors: Comply with ASME A13.1, and as follows:

<u>Conveyed Material/System</u>	<u>Background</u>	<u>Letters</u>
Flammable	Yellow	Black
Fire Suppression	Red	White
Refrigeration	Black	White
Waste/Vent	Gray	White

3. Lettering: Lettering shall identify the material conveyed in each pipe and shall match the designation used on the plans, but without abbreviations. Systems which have supply and return piping shall have piping labeled as such (i.e. heating water return, heating water supply, etc.). Systems that have different pressures shall be labeled to indicate such (i.e. Steam-Low Pressure, Steam- Medium Pressure, Natural Gas-Low Pressure, Natural Gas-Medium Pressure, etc.).
4. Size: Size of letters and color field shall comply with ASME A13.1, repeated here for convenience:

<u>Outside Diameter of Pipe or Covering</u>	<u>Length of Color Field</u>	<u>Size of Letters</u>
3/4 to 1-1/4 Inches	8 Inches	1/2 Inches
1-1/2 to 2 Inches	8 Inches	3/4 Inches
2-1/2 to 6 Inches	12 Inches	1-1/4 Inches
8 to 10 Inches	24 Inches	2-1/2 Inches
Over 10 Inches	32 Inches	3-1/2 Inches

5. Applications: Install on all exposed piping adjacent to each shut-off valve, at branches to indicate changes of direction, where pipes pass through walls and floors, on 20 foot centers or at least one in each room on each pipe. Markers shall be installed on all concealed accessible piping (i.e., piping above suspended ceilings, behind access doors, in accessible chases, etc.) near the point of access. For piping above suspended ceilings, markers shall be installed the same as if the piping was exposed (i.e., same as if the suspended ceiling was not in place). Markers shall be installed so as to be easily read by a person standing on the floor. Provide additional flow arrows at each pipe connection at valves having more than 2 ports (i.e. 3-way control valves).
6. Other Requirements: See other specification Sections for additional requirements.

C. Equipment:

1. Labels: Laminated plastic (or phenolic) material, 1/16-inch thick, with black surface layer and white (unless other color indicated) sub-layer, with engraving through to expose white sub-layer. Minimum 2-inch high (unless indicated otherwise or required due to equipment size) with length to contain required lettering. Label shall be pre-drilled and be mechanically fastened to the equipment. Prior to making labels, submit a list of all proposed labels.
2. Lettering: All caps, engraved on label, with equipment designation (same designation as used on Contract Drawings; e.g. HVAC-101, EF-22, CP-1A). Air handling equipment (i.e. VAV terminal units, fans, etc.) labels shall include the room names and numbers or area of building served (use final installed room designations). Where systems serve portions of the

building (i.e. wings or floors), include on label the area served. Lettering shall be in multiple rows, with equipment label on top row. Equipment lettering to be 5/8-inch high; area served lettering to be 3/8-inch high (except that smaller lettering may be used if necessary to fit label size).

3. Application: All scheduled mechanical equipment shall be labeled. The label shall be located on a side of the equipment so as to be easily read, with the marking visible to a person standing at the access level near the equipment (assuming any necessary access to a concealed unit has been made).

D. Electrical Devices:

1. Labels: Minimum 1/4-inch high (unless indicated otherwise) lettering, all caps, engraved on laminated plastic or phenolic material, at least 1/16-inch thick. Laminated plastic (or phenolic) shall have black surface layer and white (unless other color indicated) sub-layer, with engraving through to expose white sub-layer. Label shall be pre-drilled and be mechanically fastened to the item; where mechanical fastening is not possible use 3M VHB double sided specialty tape No. 4945. Prior to making labels, submit a list of all proposed labels.
2. Lettering: Label shall identify the item served (using the same designation as indicated on the Contract Drawings), the source of power (by panel and circuit breaker), and comply with code.
3. Application: Variable frequency drives, motor starters, disconnects, contactors, relays and similar items which control power to equipment and system components shall be labeled. The label shall be located so as to be easily read. See Division 25 for labeling of low voltage control components.

E. Duct Access Doors:

1. Labels: Minimum 1-inch high (unless indicated otherwise) lettering, engraved on laminated plastic or phenolic material, at least 1/16th inch thick. Laminated plastic (or phenolic) shall have red surface layer and white (unless other color indicated) sub-layer, with engraving through to expose white sub-layer. Label shall be pre-drilled and be mechanically fastened to the duct access door. In lieu of laminate type, self-adhesive vinyl signs may be used.
2. Lettering: Label shall comply with code, and indicate the item being accessed (i.e. Fire/Smoke Damper, Fire Damper, CO2 Sensor, etc.).
3. Application: All duct access doors serving control dampers, items required by code, and control devices shall be labeled. Where these items are provided under Division 26, they shall be labeled by Division 26. Access door label is not required where it is readily obvious as to what is being accessed (e.g. duct coil where coil is easily seen). The label shall be located so as to be easily read, with the marking visible to a person standing at the access level near the access door (assuming any necessary access to a concealed label has been made).

- F. Concealed Items: Equipment, valves, dampers and similar items concealed above accessible ceilings shall have the ceiling marked below the item to identify the item and its location. The marking system shall consist of printed labels made by a professional labeling machine, black lettering on clear self sticking tape, with minimum 1/2-inch high lettering using Arial font. Apply labels to ceiling grid below concealed item. Labels shall identify equipment using the same designation indicated on the plans; valves shall be identified by size and system (e.g. EF-1, VAV-101, VALVE 4" CW). Prior to making labels, submit a list of all proposed labels.

PART 3 - EXECUTION

3.1 GENERAL

- A. Workmanship: Furnish and install products to provide complete and functioning systems with a neat and finished appearance. If, in the judgment of the Architect/Engineer, any portion of the work

has not been installed in accordance with the Contract Documents and in a neat workmanlike manner, or has been left in a rough, unfinished manner, the Contractor shall be required to revise the work so that it complies with the Contract Documents, at no increase in cost to the Owner.

- B. Coordination: Coordinate the work with all trades that may be affected by the work to avoid conflicts and to allow for an organized and efficient installation of all systems.
- C. Examination and Preparation: Examine installation conditions and verify they are proper and ready for the work to proceed. Verify compatibility of materials in contact with other materials, and suitability for conditions they will be exposed to. Do not proceed with the work until unsatisfactory conditions have been corrected. Prepare area to accept the work and prepare products for the installation.
- D. Field Conditions: Check field conditions and verify all measurements and relationships indicated on the drawings before proceeding with any work. In verifying existing conditions, the Contractor shall verify by direct physical inspection, complete tracing out of systems, by applying test pressures, by excavation and inspection, use of pipeline cameras, and other suitable absolute certain methods to confirm the actual physical conditions that exist.
- E. Openings and Cutting and Patching in New Construction:
 - 1. Openings - General: The General Contractor shall provide all required spaces and provisions in structures of new construction for the installation of work of all other contractors or subcontractors.
 - 2. Coordination: The Contractors doing work subject to Division 20 shall furnish to the General Contractor (in a timely manner) all needed dimensions and locations of openings to allow for these openings to be provided as the construction adjacent to the opening is being done.
 - 3. Cutting and Patching: Cutting and patching of structures in place made necessary to admit work, repair defective work, or by neglect of contractors and subcontractors to properly anticipate their requirements, shall be done by the General Contractor at the expense of the contractors or subcontractors responsible. Work shall be done in a fashion to duplicate the results that would have been obtained had the work been properly sequenced.
 - 4. Patching Materials: Patching shall be with materials of like kind and quality of the adjoining surface by skilled labor experienced in that particular trade.
- F. Openings and Cutting and Patching in Existing Construction:
 - 1. Openings--General: Provide all openings and cutting as needed to accommodate all work. Provide patching to restore all damaged and disturbed areas to pre-construction conditions (or better). The Contractor or subcontractor requiring the opening shall be responsible for making that opening. The opening shall be made by skilled labor experienced in providing openings in the material being penetrated.
 - 2. Areas To Be Cut and Patched: Wherever floors, walls, ceilings, plates, firestops and framing members are cut, these openings shall be substantially reinforced and sealed so as to maintain the strength and sealing ability of the element equal to that as if it had not been cut. All reinforcement/sealing shall satisfy the Architect/Engineer and comply with the governing codes. Such cut areas shall be patched and restored to a finished condition, equal to adjacent final finished areas that have not been cut.
 - 3. Cutting of Structural Features: Make no cuts or alterations to any structural framing members without explicit consent of the Engineer, and then only under his direction. Locate cuttings so they will not weaken structural components. Cut carefully and only the minimum amount necessary. All required cutting to install material shall be accomplished with the use of saw cutting equipment.
 - 4. Patching Materials: Patching shall be with materials of like kind and quality of the adjoining surface by skilled labor experienced in that particular trade.
- G. Cleaning: Clean all products (whether exposed to view or not) of all construction debris, and other materials; grease and oil spots shall be removed with appropriate cleaning agents and surfaces

carefully wiped clean. Where cleaning cannot restore items to new conditions, the item shall be replaced with new.

3.2 INSTALLATION

- A. General: Work shall be in accordance with manufacturer's written installation instructions, code, applicable standards, and best construction practices.
- B. Space Verification: Prior to ordering materials verify that adequate space exists to accept the products, along the installation path, and to allow for proper maintenance access. Select products that will fit the space available; some optional materials (i.e. valve types, fitting types, substitutes manufacturer's etc.) may not be suitable. Verification shall be by direct field measurement of the actual space available and use of manufacturer's final submittal dimensions. Where the project involves new construction and long lead items and a time schedule not allowing for such direct field measurements, confirm in writing with all trades associated with building the space that adequate room is available. Review maintenance and service access space required and confirm requirements will be met. No submittals shall be made until such space verification work has been performed, and confirmed that adequate space is available. By virtue of making a submittal that Contractor affirms he has completed this verification.
- C. Installation Locations:
 - 1. General: Unless dimensioned locations for items are shown, select the precise location of the item in accordance with the Contract Documents, coordinated with other trades and item connection locations, and subject to the Architect/Engineer's review. No allowances will be granted for failure to obtain the Architect/Engineer's review, failure to coordinate the work, and failure to comply with Contract Document requirements.
 - 2. Manually Operated Components: Valves, damper operators, on/off switches, keypads, controls, and other devices which are manually adjustable or operated shall be located so as to be easily accessible by a person standing on the floor adjacent to the item. Any such items which are not in the open shall be made accessible through access doors in the building construction. See individual specification sections for additional requirements.
 - 3. Monitoring Components: Gauges, thermometers, instrumentation, and other components which display visual information (i.e. operating conditions, alarms, etc.), shall be located and oriented so as to be easily read by a person standing on the floor. Provide necessary brackets, hangers, remote read devices and accessories as needed. Equipment control panels and graphic displays furnished with equipment (or integral to equipment) shall be located to be easily accessible by a person standing on the floor adjacent to the equipment, and be located between 4-feet and 6-feet above the finished floor.
 - 4. Installation Issues: If circumstances at a particular location make the accessible installation of an item difficult or inconvenient, the situation shall be discussed with the Architect/Engineer before installing the item in a location that will result in poor access.
 - 5. ADA Accessibility: Locate items which are required to be ADA accessible in accordance with code (including but not limited to IBC, ICC A117.1 and local amendments) for accessibility; verify accessibility requirements with the AHJ.
- D. Replacement and Maintenance: Install mechanical equipment to permit easy access for normal maintenance, and so that parts requiring periodic replacement or maintenance (e.g. coils, heat exchanger bundles, sheaves, filters, bearings, etc.) can be removed. Relocate items which interfere with access or revise item installation location, orientation, or means of access.
- E. Building Access Doors: Provide access doors where indicated and where needed to provide access to valves, drains, duct access doors, and similar items requiring service or access that would otherwise be inaccessible. Consult architectural drawings and coordinate location and installation of access doors with trades which are affected by the installation. Access doors are typically not shown on the drawings. The Contractor shall review all construction details and types and locations of items requiring access to determine quantity and sizes of access doors required.

- F. Rotating Parts: Belts, pulleys, couplings, projecting setscrews, keys and other rotating parts which may pose a danger to personnel shall be fully enclosed or guarded in accordance with Code, and so as not to present a safety hazard.
- G. Equipment Pads: All ground and slab mounted mechanical equipment shall be installed on a minimum 4-inch thick concrete pad, (unless indicated otherwise). Where the largest dimension for any pad exceeds 6 feet provide a 6 x 6 - 10 gauge welded wire fabric reinforcement in the pad (unless noted otherwise). Concrete shall be same as used for building footings (unless noted otherwise).
- H. Dissimilar Metals: Provide separations between all dissimilar metals. Where not specified in another way, use 10 mil plastic tape wrapped at point of contact or plastic centering inserts.
- I. Electrical Offsets: Provide offsets around all electrical panels (and similar electrical equipment) to maintain space clear above and below electrical panels to structure, and clearance of 3.5 feet directly in front of panel, except where indicated otherwise or required by code to be more. Such required offsets are typically not shown on the plans but are to be provided per this paragraph. Include in bid offsets for all systems near electrical panels.
- J. Piping Through Framing: Piping through framing shall be installed in the approximate center of the member. Where located such that nails or screws are likely to damage the pipe, a steel plate at least 1/16-inch thick shall be installed to provide protection. At metal framing, wrap piping to prevent contact of dissimilar metals. At metal and wood framing, provide plastic pipe insulators at piping penetrations through framing nearest each equipment connection and on at least 32-inch centers.
- K. Safety Protection: All ductwork, piping and related items installed by this Contractor that present a safety hazard (i.e., items installed at/near head height, items projecting into maintenance access paths, etc.) shall be covered (at hazardous area) with 3/4" thick elastomeric insulation and reflective red/white self-sticking safety tape. All sharp corners on supports and other installed items shall be ground smooth.
- L. Equipment Access: Access to equipment is of utmost importance. Contractor shall apply extra attention to the location of pipe and duct routings and in coordinating all work so that equipment access and a clear maintenance pathway to equipment is maintained. Poor maintenance access will not be accepted. Contractor shall note that in essentially all areas piping and ducts need to run with slopes parallel to the roof (or floor above), in necessitating elbows/fittings/transitions at crosses of ducts/pipes and at all connections to mains and branches; and requiring added fittings to maintain a clear walking path over attic walkways. An approximate 3' wide x 7' high maintenance walkway path (or as close to as possible due to structure) is required to allow access through the attic areas (such paths are not shown at all locations on the drawings but are required per this paragraph).
- M. Pressure Tests: Maintain documentation of all pressure (and leakage) tests performed on systems and submit with project closeout documents. Records shall contain (as a minimum): date of test, system name, description portion of system being tested, method of test, initial and final test pressures (or of measured leakage rates, as applicable), indication of test pass or fail, name and signature of individual performing (or documenting) the test, initials of independent witness of test.

3.3 PAINTING

- A. General: Painting shall comply with Division 09 specifications regarding painting. Colors, in all cases, shall be as selected by the Architect/Engineer. Color samples shall be submitted to the Architect/Engineer for approval prior to painting.
- B. The following painting shall be provided under Division 20:

1. All exposed metallic surfaces (includes piping, ducts, hangers, conduits, etc.) provided by this Contractor (except equipment with factory finish or items specifically excluded) shall receive one coat of rust inhibiting primer and two (2) coats of selected finish paint.
2. All exposed insulated surfaces provided by this Contractor (except where specifically excluded) shall receive one coat of primer and two coats of selected finish paint.
3. The inside of all ductwork (including visible dampers, roof vents, insulation pins, and any visible metal) behind grilles, registers, diffusers, and louvers shall be painted flat black.

C. Items to be painted under Division 09:

1. Exposed duct work in finished areas.
2. Exterior mechanical equipment.
3. Exposed piping in finished areas.

3.4 PENETRATION PROTECTION

- A. Exterior and Watertight Penetrations: Where any work pierces the building exterior (or construction intended to be watertight) the penetration shall be made watertight and weatherproof. Provide all necessary products (e.g. caulking, flashing, screens, gaskets, backing materials, siding, roofing, trim, etc.). Where not detailed or indicated how to install submit shop drawings of the proposed methods. Flashing arrangements shall be per SMACNA Architectural Sheet Metal Manual unless noted otherwise. Caulking alone is not an acceptable means of sealing penetrations.
- B. Equipment: Equipment or products located outdoors shall be watertight (except for provisions designed to intentionally accept water and having drain provisions) and shall be designed and intended by the manufacturer to be used outdoors at the project location. Where any work pierces the unit casing exposed to the outdoors the penetration shall be made watertight and weatherproof; provide all necessary products (e.g. caulking, flashing, gaskets, backing materials, etc.).
- C. Animal Protection: Mechanical system openings, overhangs, shrouds, coverings, gaps below units, and other elements where animals could enter or occupy shall be protected with screens to prevent animal entry or occupation. Screening shall be installed in a neat professional manner, square to the adjacent construction, and be securely attached with removable fasteners.

3.5 START-UP

- A. General: Provide inspections, start-up and operational checks of all mechanical systems and equipment. Maintain documentation of all start-up work and submit with project closeout documents. See individual specification Sections for additional requirements.
- B. Personnel: Inspection and start-up services shall be done by individuals trained in the operation, and knowledgeable with, the systems being started-up. Equipment start-up shall be by the manufacturer's authorized service representative where indicated (see individual specification Sections).
- C. Scheduling and Agenda: Submit a proposed detailed start-up schedule with proposed dates and times at least 30 days prior to the earliest proposed system start-up. Revise dates and times as mutually agreed upon with trades involved, and witnesses, before submitting a final start-up schedule.
- D. Witnessing: Start-up may be witnessed by the Engineer and Owner's representative (at their option). Notify the Engineer and Owner 7 days prior to the proposed start-up time.

3.6 OWNER INSTRUCTION

- A. General: Provide instruction to the Owner on the operation and maintenance of all installed mechanical systems.

- B. Personnel: Instruction on the operation and maintenance of products shall be by individuals trained and experienced in the installation, operation and maintenance of these products. Instruction shall be by the product manufacturer's authorized service representative where indicated (see individual specification Sections).
- C. Scheduling and Agenda: Submit a proposed instruction schedule (with proposed dates and times) and an instruction agenda at least 30 days prior to the earliest proposed instruction period. Coordinate Owner and Architect/Engineer review and arrange mutually agreed upon instruction schedule and the instruction agenda, and submit a final instruction schedule and agenda. Organize instruction by sub-systems corresponding to the project specifications (or similar logical grouping).
- D. Instruction: Demonstrate and explain normal start-up, normal shut-down, normal operation, normal settings, adjustments, signs of abnormal operation, emergency shut-down, safety concerns, and related information. Demonstrate and explain system maintenance requirements with references to the O&M Manual. Show how maintenance is performed, including how items are accessed, maintenance procedures, tools and parts required, and related information. Review typical repairs and explain how performed.

END OF SECTION 200500

SECTION 200503
EXISTING SYSTEMS WORK FOR MECHANICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

- A. Protection of Items from Damage.
- B. Maintaining Utilities and Building Services.
- C. Cleaning.
- D. Temporary Systems.
- E. Review of Existing Conditions.
- F. Cutting and Patching.
- G. Deactivation and Cap-off of Systems.
- H. Mechanical Demolition and Disposal.
- I. Hazardous Materials Discovery.

1.3 DEFINITIONS

- A. "Remove", "demo", and "demolish" mean "Remove and legally dispose of item and item accessories; except where indicated to be reinstalled, salvaged, or some other required work is indicated."

1.4 ALLOWANCES

- A. General: In addition to quantities otherwise indicated in the Contract Documents, include in the bid added work for the items listed below. Include all aspects of all costs associated with the items; including labor, materials, field verification of the work location and conditions, field verification of sizes, field verification of existing materials, layout time for work, scheduling, shop drawings, delivery of materials, material handling, clean-up, inspection, testing, warranty, maintenance, etc.
- B. Demolition: Include demolition for 1,000 lbs of rectangular ductwork and associated supports; 250 linear feet of 3" schedule 40 steel pipe (with mechanical couplings), associated insulation fittings and hangers, and 250 linear feet of type L copper piping with insulation, fittings, and hangers.
- C. System Cap-Offs: Include the capping off of the following;
 - 1. Ducts: Two locations of 12 x 12 ducts.
 - 2. Hydronic Water Piping: Four 6" lines (steel).

PART 2 - PRODUCTS

2.1 GENERAL

- A. Materials: All materials used for capping, temporary piping, repairs, reconnecting, reinstalling, and related work shall be same as specified for new systems.

PART 3 - EXECUTION

3.1 GENERAL

- A. Protection: Existing items not being demolished shall be protected against damage. Where necessary to prevent damage or necessary to accomplish other work, items shall be disconnected and moved to a suitable protective storage location during the project and then reinstalled to their original location.
- B. Utilities and Building Systems: Maintain existing utilities and building systems in service (unless indicated otherwise) and protect from damage during project. Where utilities or building systems must be shut-off to accomplish the work, see drawing notes, Section 20 05 00, and Division 01 for downtime limitations and Owner coordination and notification requirements; coordinate interruptions with other trades.
- C. Cleaning: All existing items that remain during construction and were affected by the construction shall be cleaned to a like new condition.
- D. Equipment and System Contents: Equipment and systems contain fluids that are typical for such items (e.g. HVAC units contain refrigerant, oils; hydronic systems contain ethylene glycol, corrosion control chemicals, etc.) and require special removal methods and disposal.
- E. Existing Items:
 - 1. Information and Field Verification: Routing, locations, and identification of existing items on plans are approximate and are limited. The relative location of systems shown on plans has not been verified, and is schematic only. Field verify locations, contents, and flow direction of all piping and ducts prior to performing any work associated with such systems (see also Section 20 05 00). Do not rely on existing labeling of systems; such labeling shall be considered wrong until verified by other physical evidence.
 - 2. Work Around: Existing building cavities (ceiling spaces, walls, etc.) contain a multitude of systems (e.g. conduit, wiring, fire suppression, light fixtures, low voltage system components, piping, ducts, etc.) typical for buildings of the type of this project. Added effort is required to identify and locate these systems, to work around such systems, and to temporarily disconnect and reconnect (and possibly remove and store) various building components to accommodate the work. Existing building elements will also require the work to be installed in smaller sections (i.e. shorter pipe or duct lengths) than normally possible, and to make system connections in awkward or cramped locations.
 - 3. Revisions: Revise existing systems as needed to accommodate project work and new finishes. Work shall include adjusting locations of items to suit new ceiling heights, revisions to building element locations, revisions to finishes, and other changes.
 - 4. Electrical: Verify voltage, phase, horsepower, panel circuits, and other electrical parameters of existing items prior to beginning work and ordering replacement products. Electrical data listed on the drawings for such items has not been field verified.
 - 5. Controls: Verify existing communication protocol, existing component manufacturers, and model numbers, LAN type(s), software, location of devices, quantity of system points, methods used in terminating communication wiring, overall system performance, and sequences.

- F. Cutting: Provide all cutting and openings as necessary to accomplish the work indicated. No structural members shall be cut unless Structural Engineer's approval is obtained first. Assume all building members are "structural" unless clearly evident otherwise. See Section 20 05 00 and Division 01 for additional requirements.
- G. Patching: Patch all wall/floor/ceiling/roof openings left by removal of existing items where wall/floor/ceiling/roof is to remain. Patch with materials and workmanship so as to match finish of adjacent undisturbed area, and to provide conditions equivalent to the original new construction.
- H. Disposal: Dispose of all demolished items and all waste materials off site in accordance with code and legal requirements.
- I. Owner's Salvage: Owner has first right to all items shown to be demolished. All items not wanted by Owner, and not indicated to be salvaged for reuse, shall be removed by the Contractor.

3.2 REVIEW OF EXISTING CONDITIONS

- A. General: Provide field investigation of all systems and existing conditions to confirm extent of demolition, routing of existing systems, existing building materials of construction, mechanical system types and materials involved, areas where cutting and patching is required, site access, sizes of existing system components, and all other aspects of existing building and systems and their relationship to the Work.
- B. Review Timing: Review existing conditions prior to bidding, again prior to commencing any work or ordering materials, and continually throughout the project.
- C. Review for Space and Routing:
 - 1. Review existing conditions (including dimensions) where equipment must be moved through to confirm adequate space and path.
 - 2. Review existing conditions (including dimensions and locations of existing systems) where work will occur to determine impact on the locations and routing of new systems; include time to develop shop drawings and revisions to routing shown on the design drawings to accommodate existing conditions.
- D. Existing Record Drawings: Existing record drawings located at the Engineers office, or Architect's office are available for review.
- E. Site Utility Locate: Contact utility agencies and utility locate services to locate utilities. Where such locate services are not provided by public utility locate services retain the services of a private locate company. Such locate work shall include the use of ground penetrating radar (or equivalent technology) and pot-holing to determine the exact location of utilities where connections to these utilities occurs, and to determine the location of utilities in the vicinity of the work.
- F. Construction Thickness: Where needed to perform the work, and to prevent damage to adjacent construction, verify the thickness of existing concrete floors and other elements by selective drilling or saw cutting.
- G. Reinforcement Location: Existing concrete floors and walls being cut shall be x-rayed prior to cutting to determine existing reinforcement locations. Reinforcement shall not be cut. Cuts and core drills shall maintain at least 6-inch distance from rebar and other structural elements in concrete (unless noted otherwise).

3.3 EXISTING CONSTRUCTION

- A. Concrete Slabs: All slab on grade concrete floors shall be assumed to be 8" thick, with #4 rebar reinforcement 12" O.C. each way (unless noted otherwise). All upper floors shall be assumed to be 8" thick with #4 rebar 24" O.C. each way (except where existing drawings indicate otherwise).

- B. Ceiling Construction: All ceiling construction shall be assumed to be two layers of 5/8" type X GWB installed over 2 x 6 20 gauge steel stud framing on 16" centers (unless noted otherwise).
- C. Wall Construction: All walls shall be assumed to be constructed of 8 x 16 solid grouted CMU (unless noted otherwise).

3.4 DEMOLITION

- A. General: Review site conditions and identify all demolition work; include in bid all costs for demolition and disposal. Coordinate all demolition work with other trades. Confirm items to be salvaged or reused, and overall demolition scope.
- B. Scope: Not all items to be demolished are necessarily shown on the drawings, but are covered by notes and specifications. In addition to demolishing items indicated, demolish all associated items (unless indicated otherwise); this includes such items as supports, insulation, piping, drains, control wiring/conduit, power wiring/conduit, unions, valves, and similar accessories. Demolish all utilities serving demolished items completely or back to active mains where mains are to remain active; assume such utilities extend at least forty feet from the demolished items (unless indicated otherwise). Demolish all mechanical items located in building elements which are being demolished (i.e. located in walls, chases, roof assemblies, etc.). Demolish items as required to accomplish the work.
- C. Prevent Damage: Where existing building systems are to be reused to serve new items, carefully execute the demolition work to prevent damage to items to be reused and to prevent the demolition of items that are intended for reuse.
- D. Depth: Abandoned items, anchors, inserts, and other projections embedded in existing construction and not being concealed by new construction shall be removed to 1" below the adjacent finished surface, and the disturbed area patched.
- E. Cap-Offs and Terminations:
 - 1. Permanent: Provide cap-off of all existing utilities and systems that are cut or served demolished items. All cap-offs shall occur in concealed locations (unless indicated otherwise). Cap-off's shall be of equivalent material as the item being capped and be insulated where the connected system was insulated or where doing so will reduce energy consumption or prevent condensation.
 - 2. Temporary: Provide temporary cap-off of all existing utilities and systems to allow continued use of all systems until the final system components are installed and connected.
 - 3. Wiring Terminations: Terminate all control wiring and electrical power connections in a manner that complies with code and allows remaining items to function as intended.
- F. Reuse: For items indicated to be reused:
 - 1. Reinstall items and accessories as completion of other work allows. Provide all necessary connections and services to allow item to function properly; not all such connections are illustrated on the plans.
 - 2. Provide new fasteners, supports, anchors, gasketing, seals, pipe connectors, unions and related items to allow for complete and proper connections and operation of reinstalled items.

3.5 REMOVAL AND REINSTALLATION

- A. General: Where items are required to be removed to allow for other work and then be re-installed when the other work is done, comply with the following.
- B. Removal: Carefully remove items to prevent damage and in a manner to allow for reinstallation. Remove all related items to the extent needed to allow for the Work.

- C. Package: Package item to allow for transport and storage without damaging. Label packaging to identify contents; include unique identifier number, brief description, and location (room number) item was removed from.
- D. Documentation: Compile list of removed items and documentation needed to allow for their reinstallation.
- E. Storage: Store items in secure and protective area until ready for reinstallation.
- F. Reinstallation:
 - 1. Reinstall items and accessories as completion of other work allows. Provide all necessary connections and services to allow item to function properly; not all such connections are illustrated on the plans.
 - 2. Provide new fasteners, supports, anchors, gasketing, seals, pipe connectors, unions and related items to allow for complete and proper connections and operation of reinstalled items.

3.6 HAZARDOUS MATERIALS

- A. Hazardous Materials Discovery: If materials containing hazardous materials (other than those indicated) are discovered, do not disturb. Notify Owner to allow review and determine resolution. Assume in bidding and scheduling that there will be two occurrences of finding such materials, causing a 5 day project work stoppage each occurrence.

END OF SECTION 200503

SECTION 200519
PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

- A. Unions.
- B. Flexible Connectors.
- C. Access Doors.

1.3 SUBMITTALS

- A. General: Comply with Section 20 05 00.
- B. Product Data: Submit product information data for all items to be used.

1.4 REFERENCES

- A. ANSI Z21.24: Connectors for Gas Appliances.
- B. ASME B16.18: Cast Copper Alloy Solder Joint Pressure Fittings.
- C. ASME B16.39: Malleable Iron Threaded Pipe Unions: Classes 150, 250, and 300.
- D. ASME B40.3 - Bimetallic Activated Thermometers.
- E. ASME B40.100 - Pressure Gauges and Gauge Attachments.
- F. IFGC: International Fuel Gas Code.
- G. IMC: International Mechanical Code.
- H. UPC: Uniform Plumbing Code.

1.5 GENERAL REQUIREMENTS

- A. Domestic (Potable) Water Systems: All items in contact with potable water shall be lead free in accordance with ANSI/NSF 61. Plastic piping system components shall comply with ANSI/NSF 14.
- B. System Requirements: Products shall comply with additional requirements cited for the specific systems the products are being installed in; see specific system specification sections.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Products shall comply with Section 20 05 00, Paragraph 2.01, Acceptable Manufacturers.

- B. Unions: Anvil, Nibco, Watts, Epco, Victaulic, Ward, Jefferson Union.
- C. Dielectric Connecters: Victaulic Precision Plumbing Products, Elster Perfection.
- D. Flexible Connectors: Universal, Mason, Dormont, OPW, Unisource, Twin City Hose.
- E. Access Doors: J. R. Smith, Zurn, Josam, Acudor, Elmdoor, Kees, J.C. Industries.
- F. Escutcheons: Selected by Contractor.

2.2 UNIONS

- A. Dielectric Unions: Shall not be used. Provide "dielectric connector" with standard union where union is required at connection point of dissimilar materials.
- B. Unions on Copper Pipe:
 - 1. General: Pressure and temperature ratings to match (or exceed) piping system being installed in; minimum Class 125.
 - 2. 2-Inch Pipe and Smaller: Wrought copper solder joint copper to copper union, complying with ASTM B16.18.
 - 3. 2-1/2-Inch Pipe and Larger: Brass flange unions.
- C. Unions on Steel Pipe:
 - 1. General: Pressure and temperature ratings to match (or exceed) piping system being installed in; minimum Class 150.
 - 2. Threaded: Malleable iron union, threaded connections, with ground joints, complying with ASME B16.39. Provide with brass-to-iron seat (except provide iron-to-iron seat where the conveyed material is detrimental to brass).
 - 3. Welded and Flanged: Flange unions; see individual system specification sections.
- D. Dielectric Connector: Schedule 40 steel pipe nipple, zinc electroplated, with internal thermoplastic lining which is NSF/FDA listed and meeting all code requirements for potable water applications. Suitable for continuous use up to 225 deg F and 300 psi. "Clearflow" dielectric waterway (or approved). For systems operating at temperatures greater than 225 deg F provide flanged connections with insulating gaskets.

2.3 FLEXIBLE CONNECTORS

- A. Pump Flexible Connectors: Twin sphere type, constructed of peroxide cured EPDM with Kevlar tie cords, multilayered. Embedded solid steel rings shall be used at raised face flanged ends. Shall have an external ductile iron reinforcement ring between spheres. Rated minimum 225 psi at 230°F. Control rods shall be used as recommended by the manufacturer for the application; rods shall have 1/2-inch thick neoprene bushings, washers and accessories sized to accommodate system loads and conditions. Same size as pipe installed end, with end connections to suit connecting piping. Mason Industries "SafeFlex" SFDEJ Series, and SFDJR Series.
- B. Piping Flexible Connectors:
 - 1. General Use: Corrugated hose type with outer braided wire sheath covering. Corrugations shall be close pitch annular type. Minimum working pressure of 250 psig, minimum length of 12 inches (or 12 times the connector's nominal diameter, whichever is more), and screwed or flanged end connections. Metal for hose shall be bronze or stainless steel; braided sheath shall be stainless steel, any type of ASTM 300 series.

2.4 ACCESS DOORS

- A. Hinged lockable steel access door, for mounting on face of wall, with minimum 16 gauge frame and 16 gauge door, concealed hinge, cam and cylinder lock, and anchor straps or anchor frame with mounting holes. Provide Type 304 stainless steel construction with No. 4 finish where used in

restrooms, locker rooms, kitchens, and similar "wet" areas. Provide steel construction with prime coated finish in other areas. Door shall have rounded corners, and concealed pivoting rod hinge. Size shall be 12" x 12" (unless indicated otherwise) but shall be large enough to allow necessary access to item being served and sized to allow removal of the item (where access door is the only means of removal without disturbing fixed construction).

- B. Fire Rating: Door shall maintain fire rating of element installed in; reference drawings for required rating.
- C. Access doors shall all be keyed alike. Provide two (2) keys for each door.

2.5 ESCUTCHEONS

- A. Type: Circular metal collar to seal pipe penetrations at building elements (i.e. walls, floors, cabinets, and ceilings); one piece type except that split hinge type may be used for applications on existing piping.
- B. Construction: Constructed of chrome plated brass or polished stainless steel, sized to tightly fit pipe exterior surface (or pipe insulation where insulated) and to fully cover the building element penetration.
- C. Projection: Shallow face type with maximum projection from wall not to exceed 1.2 times inner diameter of escutcheon.
- D. Special Applications: For sprinkler heads and similar special applications see items' specification Section.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Unions: Install unions in pipe connections to, regulators, reducers, all equipment, and where it may be necessary to disconnect the equipment or piping for repairs or maintenance; and as indicated. Where flanged connections occur at equipment additional unions are not required unless indicated otherwise. Dielectric unions shall not be used.
- B. Dielectric Connectors: Install connectors between all connections of copper and steel piping (or equipment), and other dissimilar metals. Where flanged connections occur use insulating type flanges. Dielectric unions shall no be used.
- C. Flexible Connectors - Piping: Install at pipe connections to equipment with rotating elements (except not required at hydronic heating/cooling coils unless specifically noted), at building expansion joints, and where indicated. Provide flexible connector in gas piping connections to all equipment; size flexible connectors to match pipe size shown on plan, with reducer after the flexible connector to match the equipment connection size.
- D. Access Doors: Provide access doors where indicated on the drawings and where needed to provide access to trap primers, water hammer arresters, cleanouts, valves, coils, controls, mechanical spaces, and similar items requiring service or access that would otherwise be inaccessible. Consult architectural drawings and coordinate location and installation of access doors with trades which are affected by the installation. Access doors are typically not shown in the plans. Review ceiling and wall types and locations of items requiring access to determine quantity and sizes of access doors required.
- E. Escutcheons: Provide at all pipe penetrations through building elements, except where penetration is concealed (unless specifically noted otherwise). Items located in accessible cabinet spaces (e.g. below sinks) are not considered concealed.

END OF SECTION 200519

SECTION 200529
HANGERS AND SUPPORTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

- A. Pipe Hangers and Supports.
- B. Duct Hangers and Supports.
- C. Mechanical Equipment Anchors and Supports.

1.3 QUALITY ASSURANCE

- A. Pipe Hanger Standards: Manufacturers Standardization Society (MSS) Standards SP-58, SP-89, SP-69, and SP-90.
- B. General: All methods, materials and workmanship shall comply with Code; including IBC, IMC, UPC, NFPA Standards, and ASME standards.

1.4 SUBMITTALS

- A. General: Submittals shall comply with Section 20 05 00.
- B. Product Data: Submit product data for all hangers, supports, and anchors. Data to include finish, load rating, dimensions, and applicable agency listings. Indicate application for all items by system type, size, and other criteria as appropriate to project.
- C. Shop Drawings:
 - 1. General: Shop drawings shall clearly indicate dimensions, anchor and support type, anchor and support size, anchor and support spacing, finish, configuration, and systems/equipment to be applied to.
 - 2. Attachments: Submit shop drawings for proposed attachment methods to building structure where the method of attachment has not been shown on the drawings, or where attachment methods other than those shown on the drawings are desired to be used.
 - 3. Fabricated Supports: Submit shop drawings for all fabricated supports.
 - 4. Finished Areas: Submit shop drawings for all supports that will be exposed in finished areas.

1.5 GENERAL REQUIREMENTS

- A. Seismic: Provide adequate hangers, supports, anchors, and bracing to serve as seismic restraints. Seismic restraints shall comply with Section 20 05 48. Provide seismic restraint calculations and information per Section 20 05 48 and as required by code.
- B. Design and Manufacture: All pipe hangers and supports shall be designed and manufactured in accordance with MSS-SP 58.

1.6 REFERENCES

- A. ADC: Air Duct Council - Flexible Duct Performance and Installation Standard, 5th Edition.
- B. ASHRAE-F: American Society of Heating, Refrigeration, and Air Conditioning Engineers, Handbook of Fundamentals.
- C. ASME B31.1: Power Piping.
- D. ASME B31.9: Building Services Piping.
- E. ASTM A36: Standard Specification for Carbon Structural Steel.
- F. ASTM A108: Standard Specification for Steel Bar, Carbon and Alloy, Cold - Finished.
- G. ASTM A123: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- H. ASTM A153: Standard specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- I. ASTM A653: Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.
- J. ASTM A907: Standard Specification for Steel, Wire, Epoxy - Coated.
- K. ASTM A924: Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot Dip Process.
- L. IBC: International Building Code.
- M. IMC: International Mechanical Code.
- N. Federal Spec QQ-W-461H: Wire, Steel, Carbon (Round, Bare, and Coated).
- O. Mason SRG: Mason Industries Seismic Restraint Guidelines for Suspended Piping, Ductwork, Electrical Systems and Floor Mounted Equipment, 6th Edition.
- P. MSS SP-58: Pipe and Hangers and Supports - Materials, Design and Manufacture.
- Q. MSS SP-69: Pipe and Hangers and Supports - Selection and Application.
- R. MSS SP-89: Pipe Hangers and Supports - Fabrication and Installation Practices.
- S. MSS SP-90: Guidelines on Terminology for Pipe Hangers and Supports.
- T. SMACNA-DCS: HVAC Duct Construction Standards, 3rd Edition.
- U. SMACNA SRM: Seismic Restraint Manual Guidelines for Mechanical Systems, 2nd Edition.
- V. UPC: Uniform Plumbing Code.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Products shall comply with Section 20 05 00, Paragraph 2.01, Acceptable Manufacturers.
- B. Hangers and Supports: Grinnell, B-Line Systems, Unistrut, Erico, PHD, Basic-PSA, Pate, Caddy, Unisource, Metraflex, American Insulation Sales, Thermal Pipe Shields, Miro Industries.
- C. Anchors: Rawplug, Phillips, Hilti, Michigan, Simpson, Fastenal, Red Head, Grinnell, B-Line Systems, Unistrut, PHD, Basic-PSA, Metraflex.

2.2 GENERAL

- A. Finish:
1. Indoor Applications: Electro-plated zinc in accordance with ASTM B 633, or hot-dip galvanized after fabrication in accordance with ASTM A 123; except that hanger straps may be formed from pre-galvanized steel.
 2. Outdoor Applications: Hot-dip galvanized after fabrication in accordance with ASTM A 123, ASTM A 153, or ASTM A 653 (as applicable to item).
- B. Identification: Steel pipe hangers and supports shall be stamped with the manufacturer's name, part number, and size.
- C. C. Hanger Rods: Threaded hot rolled steel. Hanger rods shall be sized so that the total load imposed (including pipe or duct, insulation, hangers, and fluid) does not exceed the following:

<u>Nominal Rod Diameter</u>	<u>Maximum Load</u>
1/4 Inch	240 Pounds
5/16 Inch	440 Pounds
3/8 Inch	610 Pounds
1/2 Inch	1130 Pounds
5/8 Inch	1810 Pounds
3/4 Inch	2710 Pounds
7/8 Inch	3770 Pounds
1 Inch	4960 Pounds

- D. Hanger Straps: Galvanized steel, minimum 1" x 22 gauge (except where required by Code to be heavier or noted otherwise), of lock-forming grade conforming to ASTM A924, G90 (minimum) galvanized coating conforming to ASTM A 653. Minimum yield strength of 30,000 psi. Straps shall be sized so that the total load imposed does not exceed the following:

<u>Strap Size</u>	<u>Maximum Load</u>
1" x 22 Gauge	230 Pounds
1" x 20 Gauge	290 Pounds
1" x 18 Gauge	380 Pounds
1" x 16 Gauge	630 Pounds
1-1/2" x 16 Gauge	990 Pounds

- E. Beam Attachments: Constructed of malleable iron or steel, MSS standard types designed for clamping to building structural support beam. "C" clamp type shall have cup point set screws with locknuts and retaining straps. Center loaded type beam clamps shall have horizontally adjustable clamping bolt (or rod with nuts).
- F. Concrete Anchors: Wedge type expansion anchors, with hex nut and washer, and stainless steel split expansion rings. Tested to ASTM E 488 criteria, UL listed, with exposed anchor head stamped with code to identify anchor length.
- G. General Anchors (Screws, Nuts, Bolts, Fasteners):
1. General: Constructed of materials suitable for the conditions exposed to and materials being joined, with minimum 50 year service life. Stainless steel construction where exposed to corrosive conditions. Configuration, size and grade to suit application, accommodate expected forces, and provide anchoring to structural element (or allow for proper fastening of items). Minimum safety factor of 2.5 (or as required by code, whichever is greater). Comply with ASTM A307, SAE J429, SAE J78, or ASTM A 563; bolts and nuts shall have unified inch screw threads (course, UNC).
 2. Test Reports: Provide independent test report indicating fastener strength (pullout and shear) as installed in the materials and applications of this project (when required by the Engineer or AHJ).

3. Finish: In finished areas, the portion of fastener exposed to view shall match the exposed finish of item being fastened.
- H. Manufactured Strut Systems:
 1. Channels: Minimum 12 gauge, 1-5/8 x 1-5/8" (unless noted otherwise), with slots/holes to suit application.
 2. Accessories: Channel nuts press formed, machined and hardened with gripping slot, fabricated from steel conforming to ASTM A 108 or ASTM A 36. Fittings fabricated from steel in accordance with ASTM A 907.
 3. End Caps: Vinyl cap, capable of withstanding high temperatures without degradation, manufactured specifically for use with manufactured strut. Unistrut Series P2859 or P2860 (or approved).
- I. Steel: Structural steel per ASTM A 36.
- J. Wood: Only allowed to be used where building structural elements are of wood construction same type, grade used for building structural members. Where located outdoors shall be the pressure treated type; with all cut portions of wood painted with wood preservative.
- K. Field Galvanizing Compound: Brush or spray applied galvanizing treatment; consisting of a premixed ready to apply liquid organic zinc compound, with 95% metallic zinc content by weight in dry film. ZRC worldwide "ZRC Cold Galvanizing Compound".

2.3 PIPE HANGERS AND SUPPORTS

- A. Copper Pipe: All hangers used directly on copper pipe shall be copper plated or have a factory applied 1/16-inch thick (minimum) plastic coating on all contact surfaces.
- B. Cushion Clamps: Pipe clamps with a vibration dampening insert between the pipe and clamp, with a nylon inserted lock-nut on clamp. Insert shall be constructed of a thermoplastic elastomer, designed to tightly fit and match pipe size and clamp used with; suitable for system temperatures.
- C. Type: Shall be MSS type selected in accordance with MSS-69; except that MSS type 24, 26, and 34 shall not be used.
- D. Trapeze Hangers: Shall be constructed of carbon steel angles, manufactured strut channels, or other structural shapes with flat surface (or installed saddle) for pipe support. Provide steel washer where hanger rod nuts bear on trapeze hanger. Pipe anchors shall be two piece clamp type designed for use with trapeze style (i.e. inserted into strut channel opening) or one piece type designed for welded or bolted attachment to trapeze; shaped to match pipe size (or pipe size plus insulation thickness on insulated systems). Pipe guides shall comply with paragraph titled "Alignment Guides"; or be steel angles with vertical leg height equal to pipe diameter (or pipe diameter plus insulation thickness on insulated systems); or be two piece clamp type pipe anchors sized and installed to serve as a guide.
- E. Insulated Pipe Supports:
 1. Insulation material at pipe support shall consist of expanded perlite, calcium silicate or high density phenolic. Where located outdoors or used on chilled water piping, insulation material, shall be water resistant. Insert shall have a flame resistant jacket of nylon reinforced kraft paper bonded to aluminum foil cover on insulation, with galvanized steel shield. Insulation material shall have no more than 5% deformation at 100 psi and a thermal conductivity no more than 0.32 Btu/hr-sf-deg F-inch (rated at 75 deg F). Insulation shall be suitable for temperatures and conditions it will be exposed to without degradation over a 30 year life.
 2. All insulation and materials shall have a fire hazard rating not to exceed 25 for flame spread and 50 for smoke development, as tested by ASTM E84.

3. 3. Insert shall be same thickness as adjoining pipe insulation, sized to match pipe diameter used on.
4. Minimum insulation and shield lengths, and minimum shield gauge:

Nominal Pipe Diameter <u>In Inches</u>	Insulation Length <u>In Inches</u>	Shield Length <u>In Inches</u>	Minimum** Shield Gauge
1/2 to 1	*	4	20
1-1/4 to 2	6	4	20
2-1/2 to 6	6	4	18
Larger Sizes	9	6	16

* Insert not required; shield at insulation is acceptable.

** Provide with 360° shield where pipe is clamped (or has a 360° anchor).

2.4 DUCT HANGERS AND SUPPORTS

- A. Hangers: As shown in SMACNA-DCS except that wire shall not be used and all materials used shall comply with these specifications.
- B. Vertical Duct Supports at Floor: 1-1/2" x 1-1/2" x 1/8" (minimum) galvanized steel angle and to support ducts, maximum 12 foot on center, and as shown in SMACNA-DCS. For ducts over 30 inches wide provide riser reinforcing with hanger rods between the riser support and riser reinforcing.
- C. Vertical Duct Supports at Wall: 1-1/2" x 1/8" (minimum) strap or 1-1/2" x 1-1/2" x 1/8" (minimum) angle bracket and as shown in SMACNA-DCS.
- D. Hanger Attachments to Structure: As shown in SMACNA-DCS to suit building construction and as allowed on structural drawings. Provide washers at all fasteners through hanger straps (regardless of SMACNA-DCS allowances). Where C-clamps are provided, retainer clips shall be used. Friction beam clamps shall not be used.
- E. Hanger Attachments to Ducts: As shown in SMACNA-DCS except that wire shall not be used as any form of support or attachment for ducts.
- F. Flexible Duct Strap: Woven polypropylene hanging strap, minimum tensile strength of 400 lbs, minimum 1.75-inches wide, designed and intended for flexible duct support.
- G. HVAC Support Wire: Steel, minimum 12 gauge, soft-annealed wire, complying with Federal Specification QQ-W-461H, and IBC for support of ceilings and accessories installed in ceilings.

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

- A. General: Provide all necessary bolts, nuts, washers, fasteners, turnbuckles, hanger rods, rod connectors, stanchions, wall/roof/floor backing and attachments, bridging between structural members, and any other miscellaneous accessories required for the support and anchoring of all pipes, ducts, and mechanical equipment. All supports, whether from floor, walls, or hung from structure, are Contractor's responsibility. Anchors and supports shall be adequate to accommodate forces equipment will be exposed to. Any field cut pieces of galvanized materials shall be hot-dip galvanized after cutting; or be solvent and wire brushed clean and receive field applied galvanizing treatment. This field applied galvanizing (only allowed with prior permission for minor localized cuts) shall use multiple coats to provide as near equal protection as possible to factory (or hot-dip) applied coatings.

- B. Backing: Install steel or wood backing in walls (anchored to studs) and in ceiling (anchored to joists or trusses), as required to provide support for items.
- C. Installation: Install all inserts, anchors, and supports in accordance with manufacturer's instructions, code requirements, and best professional practices. The most restrictive criteria governs.
- D. Welded Assembly Finish: All welded steel support assemblies shall have a power wire brush and primer paint finish where installed indoors and be have factory applied hot-dip galvanized finish where installed outdoors (or subject to moisture); unless another finish is specified.
- E. Attachments: Attach to anchoring element (i.e. building structure, concrete pads, etc.) as shown on drawings (reference structural drawings). Where not detailed on the drawings, the Contractor shall design and submit shop drawings of proposed attachment methods to the Engineer for review.
- F. Application:
 - 1. Where not detailed on the drawings (or otherwise indicated), the selection and design of supports is the Contractor's responsibility, in compliance with code and Contract Document requirements; subject to submittal review and acceptance by the Engineer.
 - 2. Exposed supports in finished areas shall be arranged to minimize their visibility; be free of dents, scratches and labels, and be configured in a manner to match the decorum and finish of the room they are installed in. Exposed supports in finished areas shall be cleaned to allow for field painting (unless a chrome, stainless steel, or similar finish has been indicated).
 - 3. HVAC Support wire and flexible duct strap shall only be used for support of ceiling air inlets and outlets, or at flexible duct supports.
- G. Manufactured Strut ("Unistrut"): Provide end caps on all strut ends at the following locations:
 - 1. Where exposed to view in finished areas.
 - 2. Where near maintenance access paths.
 - 3. Where personnel injury could occur if the ends were not covered.
- H. Seismic: Provide bracing and added supports to restrain movement in a seismic event. Items serving as seismic restraints shall comply with Section 20 05 48.

3.2 INSTALLATION OF PIPE HANGERS AND SUPPORTS

- A. General: Aboveground pipe shall be anchored to the structure to prevent sagging, to keep pipe in alignment, and to resist the forces the pipe will be exposed to; piping shall be supported independent of equipment so that no loads bear on the equipment.
- B. Adjustment: All pipe supports shall be provided with a means of adjustment for the aligning and leveling of the pipe after installation.
- C. Applications: Selection, sizing, and installation of pipe supports and accessories shall be in accordance with the manufacturers recommendations, standards MSS SP-89 and MSS SP-69, UPC, and IMC. Refrigerant piping and similar piping subject to vibration (i.e. high pressure tubing) shall be installed with cushion clamps.
- D. Support Spacing: Provide piping support spacing according to the most restrictive of the following: UPC, IMC, ASME B31.1, B31.9, local codes, manufacturers recommendations or Contract Documents specific requirements. Provide supports at each change in direction of piping and at each side of concentrated loads (such as in-line pumps, valves greater than size 5", and similar items).
- E. Trapeze Hangers: Four or more pipes running parallel may be supported on trapeze hangers provided the slopes of such pipes allow use of common trapeze. Suspend trapeze hanger from the building structure using hanger rods; attach to the building structure using concrete inserts, beam clamps, or other approved methods. Where trapeze width exceeds 30 inches, and where building

attachment restrictions require more anchor points, provide three (or more) hanger rod supports. Provide pipe anchors to secure piping to trapeze on minimum 20 foot spacing; size and install pipe anchor to allow longitudinal movement of pipe (unless noted otherwise) with minimal vertical and transverse movement; where pipe is subject to expansion/contraction provide anchoring and alignment guides per paragraph titled "Thermal Expansion/Contraction".

- F. Vertical Piping Supports: Support piping at each floor line with pipe clamps and at intermediate points as required so that hanger spacing does not exceed allowable spacing and as required to prevent excessive pipe movement and so as to comply with the maximum spacings cited above. Support all pipe stacks at their bases with a concrete pier or suitable support. For vertical pipe drops which occur away from a wall or similar anchoring surface, provide angled bracing from nearest structure on two sides of drop to provide rigid anchoring of pipe drop.
- G. Pre-Insulated Pipe Supports: Protect all insulated pipe at point of support with pre-insulated pipe supports. Such supports shall be in place at time of installing pipe.

3.3 INSTALLATION OF DUCT HANGERS AND SUPPORTS

- A. General: Provide anchors and supports for all ductwork. Supports and hangers shall comply with SMACNA-DCS, except that hanger spacing and hanger maximum loads shall be governed by whichever is more restrictive between these specifications or SMACNA-DCS.

- B. Hanger Spacing -- Rectangular Duct:

<u>Duct Area</u>	<u>Maximum Spacing</u>
Up to 4 Square Feet	8 Feet
4.1 to 10 Square Feet	6 Feet
10 Square Feet and Up	4 Feet

- C. Hanger Spacing -- Round Duct:

<u>Duct Area</u>	<u>Maximum Spacing</u>
Up to 24 Inch Diameter	8 Feet
25 Inch to 48 Inch Diameter	6 Feet
49 Inch Diameter and Up	4 Feet

- D. Hanger Spacing - Flexible Duct: 4 feet, and at changes of direction as needed to maintain duct elevation and smooth airflow.
- E. Vertical Ducts: Support at each floor level, but in no case less than on 12 foot intervals.
- F. Flexible Duct: Support with methods shown in ADC. Metal strap in contact with the flexible duct shall have minimum 1.5-inch width.
- G. Fittings: Provide supports at each change in direction of duct for ducts with 4 square foot area or more, or for ducts larger than 24 inch diameter. Locate hangers at inside and outside corners of elbows--or at each end of fitting on each side.
- H. Concentrated Loads: Provide additional supports at each side concentrated loads such as modulating dampers (24" x 24" and larger), duct heaters (18" x 18" and larger), sound attenuators (all sizes), and similar items.
- I. End of Duct: At end of duct run, hanger shall be located no more than 1/2 the allowed hanger spacing from the end of the run.

3.4 CEILING SERVICES

- A. Less than 20 Pounds: Ceiling mounted services, air inlets/outlets, and accessories weighing less than 20 pounds shall be positively attached to the ceiling suspension main runners (or ceiling support members) or to cross runners with the same carrying capacity as the main runners (or support members).
- B. 20 to 56 Pounds: Ceiling mounted services, air inlets/outlets, and accessories weighing 20 pounds but not more than 56 pounds, in addition to the above, shall have two No. 12 gauge wire hangers (or minimum 1" x 22 gauge hangar straps) connected from the terminal or service to the ceiling system hangers or to the structure above. These added hangers may be slack.
- C. Greater Than 56 Pounds: Ceiling mounted services, air inlets/outlets, and accessories weighing more than 56 pounds shall be supported directly from the building structure by approved hangers.

3.5 MECHANICAL EQUIPMENT ANCHORS AND SUPPORTS

- A. General: Provide anchoring and supports for all mechanical equipment. All equipment shall be anchored to (or supported from) the building structure. In lieu of anchoring to the building, anchor outdoor equipment to the concrete pad serving the equipment.
- B. Suspended Equipment: Support as indicated on the plans. Where not indicated use the methods shown (or consistent with) Mason SRG and SMACNA-DCS; submit shop drawings of the proposed methods to the Engineer for review.
- C. Vibration Isolation: Equipment shall be supported and anchored in such a way so that no equipment vibration is transmitted to the building structure.
- D. Seismic: Coordinate with requirements of Section 20 05 48; provide anchors and bracing to resist seismic forces.

END OF SECTION 200529

SECTION 200530
SLEEVES AND SEALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

- A. Pipe Sleeves.
- B. Duct Sleeves.
- C. Duct Closure Collars.
- D. Firestop Seals.
- E. Non-Firestop Seals.

1.3 DEFINITIONS

- A. Firestop System: Specific firestop materials or combination of materials installed in a specific way in openings in a specific rated assembly to restore (or maintain) the fire rating and smoke passage resistance properties of the assembly.
- B. Firestop Seal: Same as "Firestop System".
- C. Rated Assembly: Wall, floor, roof, ceiling, roof/ceiling or other construction which is required (by code or the Contract Documents) to have a fire-resistance rating, be a smoke barrier, or to limit the passage of smoke.

1.4 SUBMITTALS

- A. General: Shall comply with Section 20 05 00.
- B. Product Data: Provide product data on all material to be used. Provide MSDS for all sealants, caulks and similar materials.
- C. Shop Drawings – General: Shop drawings of proposed sealing/flashing assembly for roof and exterior wall penetrations.
- D. Shop Drawings – Firestop: Provide firestop system shop drawings showing:
 - 1. Listing agency's detailed drawing showing opening, penetrating items, and firestop materials. Drawing shall be identified with listing agency's name and number or designation, fire rating achieved, and date of listing for each firestop system.
 - 2. Identify where each firestop system is to be used on the project.
 - 3. Manufacturer's installation instructions.
 - 4. For proposed systems that do not conform strictly to the listing, submit listing agency's drawing marked to show modifications and stamped approval by the firestop system manufacturer's fire protection engineer.
 - 5. Other data as required by the AHJ.

1.5 REFERENCES

- A. ASTM A 36: Standard Specification for Carbon Structural Steel.
- B. ASTM C534: Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
- C. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials.
- D. ASTM E 814: Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
- E. UL 1479: Standard for Fire Tests of Through-Penetration Firestops.
- F. UL 723: Surface Burning Characteristics of Building Materials.
- G. SMACNA-DCS: SMACNA HVAC Duct Construction Standards, 3rd Edition.
- H. SMACNA-ARCH: SMACNA Architectural Sheet Metal Manual, 7th Edition.

1.6 GENERAL REQUIREMENTS

- A. Corrosion Protection: All sleeves exposed to water, moisture, chemicals, or subject to corrosion shall be constructed of corrosion resistant materials suitable for the exposure. Steel sleeves shall be hot dip galvanized after assembly. Provide additional coatings as noted or as required to resist corrosion.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Products shall comply with Section 20 05 00, Paragraph 2.01, Acceptable Manufacturers.
- B. Firestop Seal Materials: 3M, Dow Corning.
- C. Non-Firestop Seal Materials: 3M, GE, Dow Corning, Tremco, Pecora, Sonneborn, Pipeline Seal & Insulator.

2.2 PIPE SLEEVES

- A. Diameter:
 - 1. Belowground: Inside diameter of belowground pipe sleeves shall be at least 2 inch larger than the outside diameter of the pipe or pipe covering (for covered piping systems), so as to allow free movement of piping.
 - 2. Aboveground: Inside diameter of aboveground pipe sleeves shall be at least 1-inch larger than the outside diameter of the pipe or pipe covering (for covered piping systems), so as to allow free movement of piping.
 - 3. Large Movement: Provide larger sleeves where a larger space around pipe exterior is required by code, where specifically noted, where pipe movement will occur (i.e. expansion/contraction or seismic), at expansive soils, other unusual conditions are present, and where required to accommodate large piping movement.
- B. Length: Horizontal sleeves through finished areas (where sleeve is exposed to view) shall be sized to be flush with finished surfaces; other horizontal sleeves may terminate flush to 2-inches past the element being penetrated. Vertical sleeves shall be sized to extend one inch above the final floor elevation.
- C. Structural Type: Fabricated from schedule 40 steel pipe. Waterstop shall consist of fully welded 2-inch larger diameter collar, minimum 1/4 inch thick steel, located on sleeve so as to be centered

within the element being penetrated. Provide waterstop on sleeves where sleeves are installed in the following locations: in cast-in-place concrete, where any part of the sleeve ends are exposed to water, where installed in floors with water-proofing or water stopping membranes, in rooms with floor drains, and where needed for anchoring/support purposes. Prime paint all surfaces with rust-inhibiting paint.

D. Non-Structural Type:

1. Aboveground Type:

- a. Non-Waterstop Type: Fabricated from 18 gauge galvanized sheet metal or 22 gauge spiral seam galvanized steel duct. Provide with galvanized steel angle tabs, collars, or similar to allow for anchoring where sleeve cannot be retained in place by element being penetrated.

- E. Flexible Type: Flexible cellular elastomeric insulation, complying with ASTM C 534, Type 1, minimum 1/2-inch thick. Water vapor permeance shall not exceed 0.08 perms. Operating Temperature Limits -20 degrees F to 180 degrees F. Provide in sheet or pre-fabricated pipe size; provide multiple wraps as required.

2.3 DUCT SLEEVES

- A. Size: Inside dimension of duct sleeves shall be at least 1-inch larger than the outside dimension of the duct or duct covering (for covered duct systems). For duct system conveying air or gases operating above 200 deg F provide sleeve dimension minimum 2-inch larger than duct or duct covering (for covered duct systems). Provide larger sleeves where a larger space around duct exterior is required by code, by duct or flue system manufacturer, to provide required thermal clearances, where specifically noted, where unusual conditions are present and where required to accommodate large movement.
- B. Length: Horizontal sleeves through finished areas (where sleeve is exposed to view) shall be sized to be flush with finished surfaces; other horizontal sleeves may terminate flush to 2-inches past the element being penetrated. Vertical sleeves shall be sized to extend one inch above the finished floor.
- C. Structural Type: Fabricated from schedule 40 steel pipe for round openings and 3" x 3" x 3/8" welded steel angles for other openings (unless noted otherwise). Prime paint all surfaces with rust-inhibiting paint.
- D. Non-structural:
1. Aboveground Type: 24 gauge spiral seam galvanized steel duct or 20 gauge longitudinal seam galvanized steel duct for round openings. Fabricated of 18 gauge galvanized sheet metal for other openings; configured to suit duct.
- E. Flexible Type: Flexible cellular elastomeric insulation, complying with ASTM C 534, Type 1. Water vapor permeance shall not exceed 0.08 perms. Operating Temperature Limits -20 degrees F to 180 degrees F. provide in sheet or pre-fabricated pipe size.

2.4 DUCT CLOSURE COLLARS

- A. General: Closure collars shall provide closure of opening between duct and opening in element penetrated and shall abut tight up to and overlap duct and shall consist of rolled angle material (for round ducts) and welded framed angles (for rectangular and round ducts).
- B. Size: Closure collars shall be sized to match duct and opening applied to and shall have minimum 2-inch overlap on duct side and 2-inch overlap at opening/penetrated element side but shall completely cover opening in element penetrated with minimum 1-inch overlap to undisturbed element (i.e. wall, floor, etc.).

- C. Material: Closure collars shall be fabricated of 20 gauge galvanized steel for ducts 15 inches diameter and less and shall be fabricated of 18 gauge galvanized steel duct for all larger ducts and all square and rectangular ducts.

2.5 FIRESTOP SEALS

- A. General: Commercially manufactured through-penetration and membrane-penetration firestop systems to prevent the passage of fire, smoke and gases, and to restore the original fire-resistance rating of the barrier penetrated.
- B. Listing: Firestopping shall be listed by UL in "Fire Resistance Directory" (category to match the application), or be qualified by another independent agency acceptable to the AHJ.
- C. Rating: Firestop system and devices shall be tested in accordance with ASTM E 814 or UL 1479, with "F" and "T" ratings as required to maintain the fire-resistance rating of the barrier penetrated, and as required by code.
- D. Fire Hazard: Materials shall have a flame spread of 25 or less, and a smoke development rating of 50 or less; when tested in accordance with ASTM E 84 or UL 723.
- E. Cabling Applications: Firestop systems used with loose electrical cabling shall be the type that allows for removal of the cable or installation of new cables without damage to the firestop system, or the need to replace or repair firestop materials.
- F. Insulation: Firestop system shall be applicable to insulated systems to allow the insulation to run continuous through the firestop system (unless noted otherwise).

2.6 NON-FIRESTOP SEALS

- A. Indoor Sealants:
 - 1. Smoke or Sound Sealant Applications: For use where a firestop seal is not required, but smoke or sound seal is required. Single component, elastomeric or acrylic latex type sealant with STC ratings per ASTM E90. Sealants shall be of the following types, or approved equal:
 - a. 3M "Smoke and Sound Sealant SS100".
 - b. Tremco "Tremstop".
 - 2. Other Areas - Dry (Not Normally Exposed to Water/Moisture): Single component, latex sealant complying with requirements of ASTM C834. Sealants shall be of the following types, or approved equal:
 - a. Tremco Corporation "Tremflex 834".
 - b. Pecora Corporation "AC-20 Arylic Latex".
 - c. Sonneborn Building Products "Sonolac".
 - 3. Other Areas - Wet (Exposed to Water/Moisture): Single component, mildew resistant silicone sealant complying with requirements of ASTM C920, Type S, Grade NS, Class 25. Color white. Sealants shall be of the following types, or approved equal:
 - a. Dow Corning "786 Mildew Resistant Silicone".
 - b. Pecora Corporation "898 Silicone Sanitary Sealant".
 - c. Tremco "Tremsil 200".
- B. Outdoor Sealants:
 - 1. General: Single component, non-sag, low modulus, silicone elastomeric sealant conforming to requirements of ASTM C920, Type S, Grade NS, Class 100/50. Sealant shall be of the following types, or approved equal.
 - a. Dow Corning "790 Silicone Building Sealant".
 - b. Pecora Corporation "890 Silicone".
 - c. Tremco "Spectrem 1".

2. Adjacent to Aluminum: Single component, non-sag, medium modulus, silicone elastomeric sealant conforming to requirements of ASTM C920, Type S, Grade NS, Class 50. Sealant shall be primer-less type for use in joints adjacent to fluoropolymer coatings. Sealants shall be of the following types, or approved equal:
 - a. Dow Corning "795 Silicone Building Sealant".
 - b. GE Silicones, Momentive, SCS2000 and SCS7000.
 - c. Pecora "895 Silicone".
 - d. Tremco "Spectrem 2".
- C. Expanding Foam Sealant:
 1. General: Single component, polyurethane insulating sealant with flame spread index of 25 or less and smoke development rating of 50 or less. Shall expand and fully cure within 24 hours to a semi-rigid, closed cell, water and air resistant foam. Sealant shall be of the following types, or approved equal.
 - a. DAP "Kwik Foam".
 - b. Fomo Products "Handi-Foam".
 - c. Todol Products "EZ Flo Gun Foam".
- D. Full Water Immersion Sealant: Polysulfide or Polyurethane; ASTM C920, M or Type S, Grade NS, Class 25, uses M and A; approved by manufacturer for "continuous water immersion", single or multi-component.
 1. Tremco "Vulkem 116".
 2. Sonneborn "Sonalastic Polysulphide Sealant".
- E. Specialty: Packed fiberglass or wool insulation; with silicone sealant rated for use with temperatures and other conditions encountered.
- F. Grout: ASTM C 1107, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout. Nonshrink; recommended for interior and exterior applications. Design mix shall provide 5000-psi, 28-day compressive strength. Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPE SLEEVES

- A. General: Provide sleeves for all piping passing through walls, floors, partitions, roofs, foundations, footings, grade beams, and similar elements. Except that sleeves are not required at core drilled penetrations through solid concrete or where formed openings equivalent to a core drilled opening are provided. Sleeves shall be the following type (horizontal/vertical refer to position of sleeve):
 1. Horizontal, Aboveground:
 - a. Concrete and Masonry Walls: Non-structural aboveground non-waterstop type.
 - b. Other Walls: No sleeve required unless needed as part of the seal system or specifically noted to be provided (i.e. for acoustic, thermal, seal retention, or other purposes). Provide clearances around pipe same as sleeve would provide (see specified sleeve size).
 2. Vertical, Slab on Grade: Structural type; except at piping serving individual fixtures or individual heating units in finished areas, the flexible type may be used. Where not installed to be concealed (as in a plumbing chase) install height of flexible type so it is concealed by the floor finish, cabinet base, or an escutcheon.
 3. Vertical, Not Slab on Grade:
 - a. Concrete Floors/Roofs: Structural type where not concealed; non-structural aboveground type where concealed.
 - b. Other Floors/Roof: No sleeve required unless needed as part of the seal system or specifically noted to be provided (i.e. for acoustic, thermal, seal retention, or other purposes). Provide clearances around pipe same as a sleeve would provide (see specified sleeve size).

- B. Installation: Set sleeves plumb or level (or sloped as required for sloped pipes) in proper position, tightly fitted into the work. Set sleeves properly in element for specified projection past adjacent surfaces (see sleeve product specification); cut ends of sleeve as necessary.
- C. Insulation: Insulation shall run continuous through sleeves (unless noted otherwise).

3.2 DUCT SLEEVES

- A. General: Provide sleeves for all ducts passing through walls, floors, partitions, roofs, foundations, footings, grade beams, and similar elements, except that sleeves are not required at core drilled penetrations through solid concrete or where formed openings equivalent to a core drill and provided and where no floor drain serves the room where the penetration occurs. Sleeves shall be the following type aboveground:
 - 1. Horizontal, Aboveground:
 - a. Concrete and Masonry Walls: Non-structural aboveground type.
 - b. Other Walls: No sleeve required unless needed as part of the seal system or specifically noted to be provided (i.e. for acoustic, thermal, seal retention, or other purposes). Provide clearances around pipe same as sleeve would provide (see specified sleeve size).
 - 2. Vertical, Slab on Grade: Non-structural aboveground type.
 - 3. Vertical, Other than Slab on Grade:
 - a. Concrete Floors/Roofs: Structural type where not concealed; non-structural aboveground type where concealed.
 - b. Other Floors/Roof: No sleeve required unless needed as part of the seal system or specifically noted to be provided (i.e. for acoustic, thermal, seal retention, or other purposes). Provide clearances around pipe same as a sleeve would provide (see specified sleeve size).
- B. Installation: Set sleeves plumb or level (or sloped as required for sloped duct) in proper position, tightly fitted into the work. Set sleeves properly in element for specified projection past adjacent surface (see sleeve product specification); cut ends of sleeve as necessary.
- C. Insulation: Insulation shall run continuous through sleeves (unless noted otherwise).

3.3 DUCT CLOSURE COLLARS

- A. General: Closure collars shall be provided for all exposed ducts on each exposed penetration where the duct passes through any floors, walls, ceilings, roofs, partitions, and similar elements. Closure collars shall additionally be provided where so noted on the drawings and at all duct penetrations into mechanical rooms, boiler rooms, and rooms housing mechanical equipment (on both sides of the penetration).
- B. Installation: Collar shall be installed tight against surfaces and shall fit snugly around the duct or duct covering. Sharp edges of the collar around insulated duct shall be ground smooth to preclude tearing or puncturing the insulation covering or vapor barrier of insulated ducts. Collars shall be anchored to element penetrated, with fasteners appropriate to material fastening to, on maximum 6 inch centers.

3.4 FIRESTOP SEALS

- A. General: At each through-penetration and membrane-penetration in rated assemblies, where required to limit the passage of smoke, and as required by code or in the Contract Documents, provide a firestop system. Firestop system shall be installed in accordance with the manufacturer's instructions and listing.
- B. System Selection: Contractor is responsible to select the firestop systems to be utilized, corresponding to the construction of the assembly penetrated, and types of penetrations.

Contractor shall submit proposed firestop systems to be utilized, shall also review such systems with the AHJ and obtain AHJ approval.

- C. Preparation: Prepare surfaces as recommended by firestop material manufacturer. Examine and confirm that conditions are acceptable to proceed with the installation. Provide maskings and temporary coverings to prevent contamination or defacement of adjacent surfaces.
- D. Installation Review:
 - 1. Notify Architect/Engineer when firestopping work is complete and ready for review. Provide minimum 7 days notice to allow scheduling of review. An independent testing agency may be utilized to perform an inspection.
 - 2. Notify AHJ when firestopping work is complete and ready for inspection. Provide sufficient advance notice to allow scheduling of the inspection without adversely impacting project schedule.
 - 3. Do not cover or conceal firestopping until all inspections have been satisfactorily completed.

3.5 NON-FIRESTOP SEALS

- A. General: Provide seals around all ducts, conduit, and piping passing through sleeves, walls, floors, roofs, foundations, footings, partitions, and similar elements. Seals shall be watertight where the penetration may be exposed to water or moisture. Provide type of sealant to suit the application. Provide smoke and sound type at all penetrations of rooms which contain mechanical equipment on both side of element penetrated to a depth of 5/8-inch (unless noted otherwise).
- B. At Sleeves:
 - 1. Between Sleeve and Penetrated Element: Fill openings around outside of pipe sleeve with same material as surrounding construction, or with material of equivalent fire and smoke rating and properties that allow a tight seal between the sleeve and the surrounding construction. Seal full depth of sleeve for vertical penetrations.
 - 2. Between Pipe and Inside of Sleeve: Provide sealant between outside of pipe or pipe covering (for covered piping systems) and inside of sleeve. Seal depth shall be minimum 1-inch each side. Provide Link Seal type for belowground penetrations, vault wall penetrations, and slab-on-grade penetrations (not required where flexible type sleeves are used).
- C. Preparation: Remove loose materials and foreign matter impairing adhesion of seal. Perform preparation in accordance with recognized standards and sealant manufacturers recommendations. Protect elements surrounding area of work from damage or disfiguration due.
- D. Installation: Install sealants immediately after joint preparation. Install sealants free of air pockets, foreign embedded matter, ridges, and sags. Tool exposed joint surface concave and with a neat finished appearance.

END OF SECTION 200530

SECTION 200593
TESTING, ADJUSTING, BALANCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

- A. Air Balancing.
- B. Report.

1.3 SUBMITTALS

- A. General: Comply with Section 20 05 00.
- B. Company: Submit name of Company proposed to do the balancing and sample balancing forms. Where the Company has not been pre-qualified, and substitutions are allowed after bidding (see Division 00 and 01), submit information regarding firm qualifications.
- C. Personnel: Submit list of personnel that will be assigned to the project and their qualifications, and list of past projects.
- D. Reports: Preliminary and final balancing reports.

1.4 REFERENCES

- A. AABC-NS: Associated Air Balance Council, National Standards for Field Measurements and Instrumentation.
- B. ASHRAE: Handbook of Fundamentals.
- C. ACGIH-IV: American Conference of Governmental Industrial Hygienists, Industrial Ventilation, A Manual of Recommended Practice.
- D. NEEB-PS: National Environmental Balancing Bureau Procedural Standard for Testing, Adjusting and Balancing Environmental Systems.

1.5 GENERAL REQUIREMENTS

- A. General: Balancing shall be done by a company which specializes in this type of work and is totally independent and separate from the Company which has installed the systems to be balanced.
- B. Balancers Qualifications:
 - 1. General: Work of this Section shall be performed by balancing firms meeting the following and having prior approval from the Engineer:
 - a. Professional Affiliation: Firm shall be an Associated Air Balance Council (AABC) member balancer or National Environmental Balancing Bureau (NEBB) certified balancer.
 - b. Experience: Firm shall have satisfactorily completed the balancing work for at least 5 similar projects in the last 3 years. Similar is defined to mean: within 10% of the

- same quantity of units and air inlets/outlets, involve same type of systems, be the same type of facility (i.e. school, hospital, etc.). The lead field balancer (i.e. the individual who will be on site directing and participating in the balancing efforts) shall have at least 5 years of experience performing balancing work on similar projects.
- c. References: Have five references for similar projects which have been completed in the last three years that will give a good or better performance rating. References shall be engineers, architects, or building owners. As part of the qualification process at least three of these references will be contacted and a rating obtained for the following: timeliness of work (i.e. able to complete work on schedule), cooperative nature of balancer's staff (i.e. ability to work well as a team with other project trades and professionals), overall quality of balancing work, quality of balancing report. Each item will be rated on a scale of 1 to 5 (5 being excellent), with the result averaged, score must be of 4 or better.
 - 2. Pre-Qualified Balancers: As a convenience to the Contractor, the following balancing firms have been pre-qualified. This is not in any way intended to limit competition or prevent other firms from submitting qualifications, but is intended as an aid to Contractors by identifying firms that have been confirmed as meeting the qualification requirements.
 - a. Hardin and Sons
 - b. Airtest Company
 - c. Advanced Mechanical Services
 - d. Testing and Commissioning (TAC) Services
 - e. AccuABC
 - 3. Qualification Process: Firms not pre-qualified who desire to perform the balancing work shall submit a substitution request form in accordance with Contract Document requirements (reference Division 00 and 01). In addition to the information required on the substitution request form, submit: Company information, resumes of staff to be assigned, lists of projects, and references (with name of project, staff assigned to project, and contact name and phone number).
- C. Balancing Issues: Notify the Engineer in writing of all problems or discrepancies between actual conditions and what design documents show as work proceeds.
- D. Engineer's Authority: The Balancer shall be directly responsible to the Engineer and shall perform this work and make system adjustments as directed by the Engineer.
- E. Lead Balancer: The Balancer shall assign an individual as "lead balancer" to work in the field to directly supervise the balancing work and field technicians. This lead field balancer shall have at least 5 years of experience performing balancing work on similar projects.

PART 2 - PRODUCTS

2.1 GENERAL INSTRUMENTATION

- A. General: Balancing equipment shall comply with Associated Air Balance Council recommendations for field measurement instrumentation.
- B. Calibration: All measuring instruments shall be accurately calibrated and maintained in good working order. Calibration dates and certifications shall be available at Engineer's request.
- C. Instruments: Shall be capable of:
 - 1. Air velocity instruments, direct reading in feet per minute with 2% accuracy.
 - 2. Static pressure instruments, direct reading in inches water gauge with 2% accuracy.
 - 3. Tachometers, direct reading in revolutions per minute with 1/2% accuracy; or revolution counter accurate with 2 counts per 1,000.
 - 4. Thermometers, direct reading in degrees Fahrenheit with 1/10 of a degree accuracy.
 - 5. Pressure gauges, direct reading in feet of water or psig with 1/2% accuracy.

PART 3 - EXECUTION

3.1 GENERAL

- A. Workmanship: All measurements and adjustments shall be in accordance with AABC-NS, NEEB-PS, and ACGIH-IV and recognized best balancing procedures. Measurements and adjustments of equipment shall be executed in a manner consistent with the manufacturer's recommendations.
- B. Flow Rates:
 - 1. General: All air and water systems shall be completely balanced and adjusted to provide the flow rates indicated (within tolerances indicated in this specification Section), and to produce an even heating and cooling effect and control response.
 - 2. Balancer Determined: Where flow rates have not been indicated the balancer shall determine such flow rates using acceptable practices in accordance with AABC-NS, NEEB-PS, and ASHRAE standards and submit the proposed flow rates to the Engineer for review.
 - 3. Confirmation: Prior to beginning balancing confirm any flow rate changes since design with the submittals and flow rates indicated therein, and with the Engineer to confirm changes made since design. Assume that new flow rates will be issued.
- C. Controls: Consult and coordinate with the Control Contractor for the adjustment and setting of all control devices to allow for the balancing work, and for proper system operation and proper flow rates. Set all controls and valves as required to maintain design flow rates and temperatures as shown on the drawings. Make measurements and provide data to the Control Contractor to allow for proper control of items.
- D. Comfort Adjustments: Make final adjustments for flow rates in order to optimize each space's comfort, including such considerations as temperature, drafts, noise, pressurization, and air changes. Where variances are made from design values, state reasons in report (e.g., "too noisy", "too drafty," etc.). All such variances are subject to approval by the Architect/Engineer.
- E. Deficiency Reports: Submit deficiency reports where the work does not allow balancing to occur or balancing issues develop. Indicate date, system and equipment involved, location, description of deficiency, and related information to allow for diagnosing the problem. Provide suggestions for resolution where possible.

3.2 AIR BALANCING

- A. Pre-check of System: Prior to beginning balancing, perform, as a minimum, the following:
 - 1. Verify that clean filters have been installed, that system is free from debris, and that all inlets/outlets are not obstructed.
 - 2. Check all fans and equipment to verify that proper start-up and system preparation has been done by the installing contractor.
 - 3. Check all door/window and similar building opening status to insure building is ready and proper pressurization can be obtained.
 - 4. Open all dampers to full flow position, check positions and operation of all motorized dampers to allow full system flows.
 - 5. Review controls and sequences of operation.
- B. Tolerances: All air flow rates (supply, return, and exhaust) shall be adjusted to within plus 5 percent and minus 5 percent of the values shown in the contract documents, except that relative space-to-space pressure relationships shall always be maintained (e.g., restrooms shall be negative relative to other areas, general offices shall be positive, etc.).
- C. Draft and Noise Adjustments: All diffusers, grilles, and registers shall be adjusted to minimize drafts and to eliminate objectionable noise.

- D. Filters: Air balancing shall be done with new, clean air filters installed. Adjust air deliveries so that design quantities will be obtained when filters are half dirty. This condition shall be simulated by covering a portion of the filter area.
- E. Fan Speeds and Drives:
 - 1. Adjust fan speeds and fan drives (adjustable sheaves) as required to produce design flow rates.
- F. Marking: Upon completion of flow readings and adjustments permanently mark the balanced position of all balancing valves by stamping the indicator plate of the valve.
- G. Duct Traverse: Rectangular duct traverses shall measure the center of equal areas in the air flow stream, with centers not more than 6 inches apart. Round duct traverses shall measure at least 20 locations, with locations being the centers of equal annular area. Reference ACGIH Industrial Ventilation Manual.
- H. One Open Run: Balance each branch run so that there is at least one wide open run; balance branches relative to one another so that at least one branch damper is wide open (except that where unique conditions exist, and the Engineer gives prior approval, one open damper on runs or branches is not required).
- I. Data: Data to be measured/recorded and provided in report for all air handling systems and equipment:
 - 1. Floor plans clearly showing and identifying all diffusers, grilles, OA louvers, ducts and all other items where air flow rates were measured.
 - 2. Identify manufacturer, model number, size, and type of all air inlets/outlets.
 - 3. Initial, trial, and final air flow measurements for all diffusers, grilles, OA louvers, ducts, and all other items where air flow rates were measured.
 - 4. Design air flow rates and percentage final air flow rates are of design values.
 - 5. Final damper (or other balance device) final position (as a percentage of full open).
 - 6. The connected voltage and corresponding nameplate full load amps, and the initial and final amperages of all fan motors.
 - 7. Initial and final RPMs of all fans.
 - 8. Static pressures on inlet and outlet of all fans.
 - 9. Fan initial and final CFMs.
 - 10. Outdoor air CFMs (record minimum and maximum values).
 - 11. Entering and leaving air temperatures across coils with coils operating at 100% capacity.
 - 12. Static pressure drop across each filter bank and coil.
 - 13. Final position of any speed controls (as percent of full).
 - 14. In addition to data noted elsewhere, provide the following for all equipment which are part of balanced systems:
 - a. Equipment name and number (as used on drawings).
 - b. Service.
 - c. Equipment manufacturer and model number.
 - d. Sheave and belt sizes (where applicable).
 - e. Filters sizes and quantities (where applicable).
 - f. Motor manufacturer and complete nameplate data.
 - g. Design operating conditions.
 - h. Actual operating conditions (flows, pressure drops, rpm, etc.).
- J. Main Duct Airflows: Air flow measurements in main ducts shall be made with a duct traverse using a pitot tube and micromanometer. Summation of air terminal outlets and inlets is not sufficient. Quantity of duct leakage (difference between main duct airflow and sum of air inlets/outlets) shall be indicated.

3.3 BALANCING REPORT

- A. General: A balancing report shall be submitted as specified herein, documenting all balancing procedures and measurements.
- B. Report Organization: The report shall be divided into logical sections consistent with the building or system layout (i.e. by floors, building wings, air handling units, or other convenient way). Tabulate data separately for each system. Describe balancing method used for each system.
- C. Preliminary Report: Two preliminary review copies of the balancing report shall be submitted to the Architect/Engineer when the balancing work is 90% complete (or as near 90% complete as possible due to uncompleted work of other trades). In addition to containing all the information required of the final report, the preliminary report shall contain a list of all the work required of other trades in order to allow the balancing work to be completed. The Architect/Engineer will review the preliminary report and inform the Contractor of any additional items or revisions required for the final report. Preliminary reports may be omitted where the Architect/Engineer grants approval.
- D. Final Report: Shall be included in the Operation and Maintenance Manual. Submit reports to Contractor for inclusion in Manuals (or, when manuals have been already sent to Engineer, send report to Engineer who will insert report into Manual). Provide number of reports as required to match quantity of O&M Manuals, but in no case less than five.
- E. Format: 8-1/2" x 11" size, neat, clean copies, drawings accordion folded. Report shall be typed, shall have a title page, table of contents, and divider sheets with identification tabs between sections. Information shall be placed in a three hole notebook, with the front cover labeled with the name of the Job, Owner, Architect/Engineer, Balancing Contractor, and Report Date.
- F. Electronic Copy: Provide copy of reports in *.pdf format; submit final report with closeout documents per Divisions 00 and 01.
- G. General Balancing Information Required:
 - 1. At the beginning of the report, include a summary of problems encountered, deviations from design, remaining problems, recommendations, and comments.
 - 2. List of instruments used in making the measurements and instrument calibration data.
 - 3. Names of personnel performing measurements.
 - 4. Explanation of procedures used in making measurements and balancing each system.
 - 5. List of all correction factors used for all diffusers, grilles, valves, venturi meters, and any other correction factors used.
 - 6. Areas where difficulties were encountered in obtaining design flow rates, or where unstable operating conditions may exist.
 - 7. Note any parts of the system where objectionable drafts or noises may be present and efforts made to eliminate same and why they may still be present.
 - 8. Note where variances from design values occur; explain why.
 - 9. All specified measurements, balancing data, any additional recorded data, and observations.
 - 10. Mechanical floor plans with call-outs to correlate to balance measurement locations.

END OF SECTION 200593

SECTION 200700
MECHANICAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

- A. Duct Insulation.
- B. Pipe Insulation.
- C. Equipment and Specialties Insulation.

1.3 DEFINITIONS

- A. R: Thermal resistance of insulation, in units of hr-sf-deg F/Btu.
- B. Rainleader Piping: Any piping or conduit that is used to carry rain water, including overflow drain piping, that is located within the building or enclosed by any building construction.
- C. Subject to Damage: Items installed exposed less than 8 feet above the walking surface (i.e. floor, platform, roof, grade, etc.) adjacent to the item.
- D. Cold Surfaces: Surfaces that will have operating temperatures below the temperature of the surrounding air by at least 5 deg F or more; includes chilled water piping, cooling condensate piping, air conditioning ductwork, outdoor air ductwork, and similar systems. Surfaces shall be considered a cold surface unless specifically indicated otherwise.

1.4 QUALITY ASSURANCE

- A. All insulation and materials shall have a fire hazard rating not to exceed 25 for flame spread and 50 for smoke development, as tested by ASTM E 84, NFPA 255, and UL 723.

1.5 SUBMITTALS

- A. General: Comply with Section 20 05 00.
- B. Product Data: Provide product data on all insulation materials to be used. Indicate thicknesses to be used.

1.6 GENERAL REQUIREMENTS

- A. Code Compliance: Contractor shall insulate all systems with the materials and thicknesses as required by code, but in no case shall the insulation be less than that specified herein. In some cases the specified insulation exceeds code, and shall be provided as specified. Not all systems requiring insulation by code are specified, but shall be provided with insulation where required by code.
- B. Insulation at Hangers: Insulation shall be continuous through hangers on all insulated systems (except ductwork). Inserts at hangers are specified in Section 20 05 29 and are considered as part

of the hanger and support system. Inserts are required to be installed at the time of pipe installation and are intended to be installed by the Contractor installing the pipe hangers/supports. See Section 20 05 29.

1.7 REFERENCES

- A. ASTM A 653: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.
- B. ASTM B 209: Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- C. ASTM C 411: Standard Test method for Hot-Surface Performance of High Temperature Thermal Insulation.
- D. ASTM C 547: Standard Specification for Mineral Fiber Pipe Insulation.
- E. ASTM C 1136: Standard Specifications for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.
- F. ASTM C 1290: Standard Specification For Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts.
- G. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials.
- H. NCIIS: National Commercial & Industrial Insulation Standards, published by Midwest Insulation Contractors Association, 5th Edition.
- I. NFPA 255: Standard Method of Test of Surface Burning Characteristics of Building Materials.
- J. UL 723: Tests for Surface Burning of Building Materials.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Products shall comply with Section 20 05 00, Paragraph Part 2.01, Acceptable Manufacturers.
- B. Insulation: Johns Manville, Armacell, Owens-Corning, Knauf, Rubatex, Aeroflex, Pittsburgh Corning, GLT, Halstead, Gilsulate, Manson.
- C. Accessories: Johns Manville, Armacell, Owens-Corning, Knauf, Rubatex, Aeroflex, Pittsburgh Corning, GLT, Halstead, Duro Dyne, Gustin Bacon, Childers, RPR, Tee Cee, Lewco Specialty Products, JPS, Buckaroos, Manson.

2.2 DUCT INSULATION

- A. Flexible Glass Fiber:
 - 1. Type: Flexible blanket type, constructed of inorganic glass fibers bonded by a thermosetting resin, complying with ASTM C 1290, Type III. Johns Manville "Microlite" (or approved).
 - 2. Jacket: FSK type, vapor proof, consisting of an aluminum foil cover reinforced with glass fiber mesh, and laminated to kraft. Water vapor permeance shall not exceed 0.05 perms. Provide with joint sealing tape, minimum 2 inches wide, constructed of jacket material with adhesive to seal all joints.
 - 3. Thermal Conductivity: Shall not exceed 0.27 Btu-in/hr-sq ft-deg F at 75 deg F.
 - 4. Operating Limits: 40 degrees F to 250 deg F.
- B. Corner Angles: 0.016 inch thick aluminum, alloy 3003 or 5005, with factory applied Kraft backing, complying with ASTM B 209.

- C. Weather Barrier Mastic: Water based vinyl-acrylic mastic for outdoor weather protection of thermal insulation; fire resistant, UV deterioration resistant. Childers "Vi-cryl" (or approved equal).
- D. Glass Fiber Mesh: Open weave glass fiber reinforcing mesh for use with insulation coatings to bridge gaps and add strength to the coating. Minimum 5 strands x 5 strands per square inch. Non-combustible Childers "Chil-Glas" (or approved equal).
- E. Duct Insulation Types:
 - 1. Aboveground-Inside Buildings:
 - a. Exposed-Subject to Damage:
 - 1) Rectangular Ducts: Rigid glass fiber with metal corner angles.
 - 2) Round/Oval Ducts: Flexible glass fiber with PVC or metal jacket.
 - b. Exposed - Not Subject to Damage: Flexible glass fiber.
 - c. Concealed: Flexible glass fiber.
- F. Duct Insulation Thickness:
 - 1. General: Provide insulation densities and thicknesses to achieve the R values cited below. R values are for the insulation only, in their installed thickness, considering installed duct wrap stretch and in accordance with code.
 - 2. Lining: Where ducts have internal lining, the insulating properties of the lining may be credited toward meeting the required insulation R value; use R-3.65 per inch of installed liner.
 - 3. Supply Air Ductwork:
 - a. Inside Building and Within Building's Thermal Envelope: R-3.3 (except where ran exposed in conditioned spaces, no insulation is required).
 - b. Inside Building But Not Within Building's Thermal Envelope: R-7.3.
 - 4. Return Air Ductwork:
 - a. Inside Building and Within Building's Thermal Envelope: No insulation required; except where duct contains air that may vary by 10 deg F or more from the space the duct passes through, R-3.3 insulation shall be provided.
 - b. Inside Building But Not Within Building's Thermal Envelope: R-7.3.
 - c. Outside of Building: R-8.
 - d. Underground: R-5.3.
 - 5. Outside Air Ductwork: Shall be insulated same as required for the building envelope; except where allowed by code to be insulated less than the building envelope, shall be R-8; insulation is not required where duct run outside the building.
 - 6. Exhaust, Relief, and Special Ductwork:
 - a. Inside Building and Within Building's Thermal Envelope:
 - 1) Temperature of Air in Duct within 10 Deg F of Temperature of Air in Spaces Duct Passes Through: No insulation required except ductwork from the system's backdraft damper (or motorized damper) to outside the building shall be insulated same as required for the building envelope.
 - 2) Temperature of Air in Duct more than 10 Deg F Different from temperature of Air in Spaces Duct Passes Through: R-8.3; except ductwork from the system's backdraft damper (or motorized damper) to outside the building shall be insulated same as required for the building envelope (but no less than R-8.3).
 - b. Inside Building But Not Within Building's Thermal Envelope: R-8.3.

2.3 PIPE INSULATION

- A. Glass Fiber:
 - 1. Type: Rigid molded type, constructed of glass fibers bonded by a thermosetting resin, complying with ASTM C 547 Type I. Insulation factory molded to match pipe size applied to. Johns Manville "Micro-Lok" (or approved).
 - 2. Jacket: ASJ type, vapor proof, consisting of a white kraft paper cover reinforced with glass fiber and bonded to aluminum foil, with longitudinal self sealing closure system. Provide with

- butt strips constructed of jacket material with adhesive to seal all joints. Water vapor permeance shall not exceed 0.02 perms.
3. Thermal Conductivity: Shall not exceed 0.24 Btu-in/ hr-sq ft-deg F at 75 deg F.
 4. Operating Temperatures: 0 deg F to 850 deg F.
- B. Elastomeric Insulation:
1. Type: Flexible cellular elastomeric insulation, factory formed to match pipe sizes applied to, complying with ASTM C 534, Type 1. Armacell "AP/Armaflex SS" (or approved).
 2. Thermal Conductivity: Shall not exceed 0.27 Btu-in/ hr-sq ft-deg F at 75 deg F.
 3. Water Vapor Transmission: Water vapor permeance shall not exceed 0.08 perms.
 4. Operating Temperatures: -200 deg F to 220 deg F; shall be able to withstand 250 deg F temperatures for 96 hours per ASTM C 411 without damage or deformation.
 5. Weather Protection: Where installed outdoors provide with metal jacketing to protect from UV and weather exposure.
- C. Cellular Glass Insulation:
1. Type: Rigid closed-cell glass insulation, factory formed to match pipe size applied to. Pittsburgh Corning "Foamglas" (or approved).
 2. Jacket: Field applied heat sealable water-proof jacketing, consisting of 3 layers of a polymer modified bituminous compound separated by glass fiber reinforcement and aluminum foil. Water vapor permeance shall not exceed 0.00 perms. Pittsburgh Corning "Pittwrap" (or approved).
 3. Thermal Conductivity: Shall not exceed 0.29 Btu-in/ hr-sq ft-deg F at 75 deg F.
 4. Operating Temperatures: -450 deg F to 900 deg F.
 5. Compressive Strength: 90 psi.
- D. Pipe Fittings: Shall be covered using any one of the following methods of the Contractor's choice:
1. Prefabricated segments of pipe insulation of same materials and thickness as the adjoining pipe insulation, formed to match pipe fitting.
 2. Pre-cut fiberglass insulation and pre-molded high impact, gloss white, UV resistant, minimum 20 mil thick, PVC covers suitable for the pipe size and insulation thickness application, PVC cover shall be Johns Manville "Zeston 2000 PVC" (or approved).
 3. Insulating plastic cement brought up the full height of the adjacent covering.
 4. Except, where colored PVC jacketing is applied to piping, fittings shall use PVC covers of the same thickness and color as the PVC jacketing specified for the piping.
- E. Metal Jacket: Aluminum roll jacketing, factory formed to match pipe size and insulation application, with smooth surface, manufactured from 3003 or 5005 aluminum alloy, H-14 temper, conforming to ASTM B 209. Shall be minimum 0.020 inches thick, with an integrally bonded interior 1 mil thick heat bonded polyethylene moisture barrier over the entire surface in contact with the insulation. Fitting covers shall be fabricated of same material as pipe runs, factory formed to match fitting.
- F. PVC Jacket: Pre-molded 30 mil thick PVC jacket; size and shape to match piping and fittings applied to. Johns Manville "Zeston Series 2000" (or approved). Provide in white color.
- G. Pipe Insulation Types:
1. Aboveground-Inside Building:
 - a. Cooling Coil Condensate: Glass fiber or elastomeric.
 - b. Refrigerant Piping: Elastomeric.
 - c. Other Systems: Glass fiber.
 2. Metal and PVC Jacketing: See "Part 3 - Execution".
- H. Pipe Insulation Thickness:
1. General: Provide minimum piping insulation thickness indicated, in inches.

INSULATION THICKNESS (INCHES)

Nominal Pipe Diameter (Inches)					
Fluid Design Operating Range, deg F	<1	1< to 1-1/2	>1-1/2 to <4	4 to <8	≥8
Above 350	4.5	5.0	5.0	5.0	5.0
251 - 350	3.0	4.0	4.5	4.5	4.5
201 - 250	2.5	2.5	2.5	3.0	3.0
141 - 200	1.5	1.5	2.0	2.0	2.0
61 - 140	1.0	1.0	1.5	1.5	1.5
40 - 60	0.5	0.5	1.0	1.0	1.0
Below 40	0.5	1.0	1.0	1.0	1.5

2. Varying Temperatures: Where a system operates over temperature ranges calling for different insulation thicknesses, the thicker insulation requirements shall be met.
3. Condensate: Cooling system condensate piping (i.e. from a cooling coil) shall be considered to operate at 50 deg F.
4. Refrigerant Piping for VRF systems: Refrigerant piping (both RG and RL piping) serving an evaporator (i.e. heat pump) shall be considered to operate at 40 deg F. Low pressure piping (RG piping) between the Branch Circuit Controller and Condensing unit shall be considered to operate at 40 deg F, or shall receive 1-inch thickness, whichever is greater. High pressure piping (RL piping) between the Branch Circuit Controller and Condensing unit shall be considered to operate at 40 deg F, or shall receive 1/2-inch thickness, whichever is greater.
5. Outdoor Piping: Piping exposed to outside air or, located outside the building/thermal envelope, shall have insulation thickness increased by 0.5 inch from that indicated above. Elastomeric insulation may be used in lieu of fiberglass, provided the insulation is manufacturer approved for temperature of the insulated piping system and application.

2.4 EQUIPMENT AND SPECIALTIES INSULATION

A. Flexible Glass Fiber:

1. Type: Flexible blanket insulation, constructed of inorganic glass fibers bonded by a thermosetting resin, complying with ASTM C 553, Type III. Johns Manville "812 Spin-Glas" (or approved).
2. Jacket: FSK type, vapor proof, consisting of an aluminum foil cover reinforced with glass fiber mesh, and laminated to kraft. Water vapor permeance shall not exceed 0.05 perms. Provide with joint sealing tape constructed of jacket material with adhesive to seal all joints.
3. Thermal Conductivity: Shall not exceed 0.24 Btu-in/ hr-sq ft-deg F at 75 deg F.
4. Operating Temperature Limits: 40 deg F to 450 deg F.
5. Density: 1.5 lb/cu ft.

B. Semi-Rigid Glass Fiber:

1. Type: Semi-rigid board insulation, constructed of inorganic glass fibers bonded by a thermosetting resin.
2. Jacket: ASJ type, vapor proof, consisting of a white kraft paper cover reinforced with glass fiber and bonded to aluminum foil, with longitudinal self sealing closure system. Provide with butt strips constructed of jacket material with adhesive to seal all joints. Water vapor permeance shall not exceed 0.02 perms.
3. Thermal Conductivity: Shall not exceed 0.29 Btu-in/hr-sq ft-deg F at 75 deg F.
4. Operating Temperature Limits: 0 deg F to 650 deg F.

C. Elastomeric:

1. Type: Flexible cellular elastomeric insulation, complying with ASTM C 534, Type II.
2. Thermal Conductivity: Shall not exceed 0.30 Btu-in/ hr-sq ft-deg F at 75 deg F.
3. Water Vapor Transmission: Water vapor permeance shall not exceed 0.08 perms.

4. Operating Temperatures: -200 deg F to 220 deg F; shall be able to withstand 250 deg F temperatures for 96 hours per ASTM C 411 with damage or deformation.
 5. Weather Protection: Where installed outdoors provide with metal jacketing to protect from UV and weather exposure.
- D. Removable Insulation Blankets:
1. Type: Flexible blanket insulation pads, for insulating valves, unions, strainers and similar items. Constructed of exterior fabric enclosure sewn around interior insulation, held in position with a closure system that allows for removal of the blanket. Contractor or factory fabricated.
 2. Enclosure:
 - a. Cold Application: Silicone impregnated glass fiber cloth; chemical and oil resistant; water proof; flame and abrasion resistant; minimum 20 ounce/square yard weight. Lewco Specialty Products 3000 SA-2 (or approved).
 3. Insulation: Thermal insulating wool, 1-inch thick, complying with ASTM C 553. Maximum thermal conductivity 0.22 Btu-in/ hr-sq ft-deg F at 75 degrees F. Provide in layers to give equivalent R value to the adjacent insulated piping. Owens Corning "Fiberglas Brand TIW, Type II".
 4. Closure System: Velcro, zipper or steel lacing. Steel lacing anchors shall have spindles and self-locking washers, fabricated of minimum 14 gauge stainless steel, with stainless steel wire ties. AGM Industries "Series NLA" (or approved). Closure shall be configured to allow for complete coverage and closure of the insulation around the object being insulated. Closure for cold surfaces (surfaces that operate below ambient air temperature) shall provide a sealed vapor barrier so that no surfaces are exposed to ambient air and so that no condensation can occur; overlap enclosure ends (or any vapor barrier penetrations, as caused by suing steel lacing anchors) with an added vapor barrier cover, minimum 2-inches past the vapor barrier penetration; with Velcro (or equivalent) closure.
- E. Corner Angles: 0.016 inch thick aluminum, alloy 3003 or 5005, with factory applied Kraft backing, complying with ASTM B 209.
- F. Metal Jacket:
1. Steel: Minimum 24 gauge galvanized steel complying with ASTM A 653. Provide with longitudinal slip joints and 2-inch laps.
 2. Aluminum: Minimum 0.020-inch thick aluminum, alloy 3003 or 5005, complying with ASTM B 209. Provide with longitudinal slip joints and 2-inch laps.
- G. Equipment and Specialties Insulation Types and Thickness:
1. Unless a specific type of insulation is specified or noted, any of the insulation materials specified in this specification section may be used provided such application is in conformance with NCIIS.
 2. Insulation Thickness: Insulation thickness shall be the same as that specified for the piping or ductwork connected to the item, or as specified for the system the item is installed in (unless noted otherwise). Insulation thickness shall in no case be less than 1 inch thick.
 3. Valves:
 - a. 2 Inches and Smaller: Insulate with same material as piping system.
 - b. 2-1/2 Inches and Larger: Removable blanket insulation.
 4. All equipment and specialties where access is required shall have removable insulation blankets; other removable insulation materials per NCIIS may be used where pre-approved by the Engineer.

2.5 ACCESSORIES

- A. Adhesive, Caulks, Mastics, and Coatings: As recommended by insulation material manufacturer and suited for the application.

- B. Bands: 1/2-inch wide, of stainless steel, galvanized steel, or aluminum construction, to match with materials used with.
- C. Weld-Attached Anchor Pins and Washers: Copper-coated steel pin for capacitor-discharge welding and galvanized speed washer. Pin length shall be as required for insulation thickness used with. Welded pin holding capacity 100 lb, for direct pull perpendicular to the attached surface. Style and type to suit application.
- D. Adhesive-Attached Anchor Pins and Speed Washers: Galvanized steel plate, pin, and washer manufactured for attachment to duct and plenum with adhesive. Pin length sufficient for insulation thickness used with. Adhesive as recommended by the anchor pin manufacturer as appropriate for surface temperatures and materials used with, and to achieve a holding capacity of 100 lb for direct pull perpendicular to the adhered surface. Style and type to suit application.

PART 3 - EXECUTION

3.1 GENERAL

- A. Pre-Insulation Review: No covering materials shall be applied until systems to be covered have had all tests satisfactorily completed, have had all required inspections, and have been satisfactorily reviewed by the Architect-Engineer. All systems shall be examined by the Contractor to confirm cleanliness and other conditions are appropriate to allow for insulation installation.
- B. Insulation Work Review: No insulated items shall be concealed in the building structure or buried until the insulation work has been satisfactorily reviewed by the Architect-Engineer, and has had all required inspections.
- C. Standards: Materials shall be installed in accordance with manufacturer's written instructions, NCIIS, and shall comply with materials and methods specified herein. The more stringent requirements govern.
- D. Joints/Seams: Joints shall be staggered on multi layer insulation. Locate seams and joints in least visible location.
- E. Insulation Protection: Insulation shall be kept clean and dry and shall be protected from dirt, damage, and moisture. Insulation that becomes dirty, damaged, or wet and cannot be restored to like new condition will be rejected, and shall immediately be removed from the jobsite.
- F. Insulation Interruptions: Insulation shall be neatly finished at all supports, protrusions and interruptions. Provide adhesive and tape seal to maintain vapor barrier integrity.
- G. Equipment and Floor Protection: Cover existing equipment and finished floors to protect such items from insulation fiber and dust. Keep all such existing areas in a "broom clean" condition at the end of each day. Take precautions in these areas to prevent glass fiber and insulation dust from entering ventilation systems or areas adjacent to the work.
- H. Glass Fiber Insulation - General:
 - 1. Finish all insulation ends with joint sealing tape or vapor barrier mastic, no raw edges allowed.
 - 2. Joints: Tightly butt adjacent insulation sections together without any voids. Provide overlap of jacket material over all joints.
- I. Items To Be Insulated: Provide insulation on all ductwork, all piping, all items installed in these duct and piping systems, all air and liquid energy conveying systems and components, all air and liquid energy storage, all equipment, and all energy consuming devices, except where such insulation has been specifically excluded.
- J. Items Excluded From Being Insulated:

1. Electric motors.
2. Fans.
3. Factory insulated or factory lined HVAC, AHU, and AC units.

3.2 DUCT INSULATION INSTALLATION

- A. Types and Thickness: Insulate all ducts with insulation type and thickness (to provide the required R value) as specified in "Part 2 - Products".
- B. General: Insulation shall be firmly butted at all joints. All longitudinal seams for flexible insulation shall overlap a minimum of 2 inches. All joints and seams shall be finished with appropriate joint sealing tape. Installation shall provide a continuous sealed vapor barrier over all surfaces; seal all jacket penetrations with vapor barrier mastic or vapor barrier jacket tape.
- C. Attachment: For rectangular ducts over 24 inches wide, duct insulation shall be additionally secured to the bottom of the ductwork with mechanical fasteners on 18 inch centers to reduce sagging. Washers shall be applied without compressing the insulation. Protruding ends or fasteners shall be cut off flush after washers are installed. All seams, joints, penetrations, and damage to the facing shall be sealed with joint sealing tape or vapor retardant mastic or appropriate joint sealing tape.

3.3 PIPE INSULATION INSTALLATION

- A. Types and Thickness: Insulate all piping with insulation type and thickness as specified in "Part 2 - Products". All piping shall be insulated except where specifically excluded.
- B. General: All ends shall be firmly butted together and secured with joint sealing tape. All jacket laps and joint sealing tape shall be secured with outward clinch staples at 4 inch spacing, or by use of a suitable adhesive. Installation shall provide a continuous sealed vapor barrier over all surfaces; seal all jacket penetrations with vapor barrier mastic or vapor barrier jacket tape.
- C. Elastomeric Pipe Insulation: Install with seams and joints sealed with rubberized contact adhesive. Insulation with pre-applied adhesive is not permitted. A brush coating of adhesive shall be applied to both butt ends to be joined and to both split surfaces to be sealed. Adhesive shall be allowed to set until dry to touch but tacky under slight pressure before joining the surfaces. Insulation seals at seams and joints shall not be capable of being pulled apart one hour after application. Provide added tape wrap around insulation to ensure seam and joint closure. Insulation that can be pulled apart one hour (or more) after adhesive installation shall be replaced. Provide metal jacketing over outdoor exposed insulation.
- D. Pipe Hangers: Provide insulation tight up to pre-insulated pipe supports at pipe hangers, seal all joints with joint sealing tape. Pre-insulated pipe supports are specified in Section 20 05 29.
- E. Pipe Sleeves: Run insulation continuous full size through sleeve. Coordinate work with fire seals and confirm fire seal system is approved for use with insulated pipes; see Section 20 05 30.
- F. Metal Jacketing:
 1. Applications: Provide metal jacket over piping insulation for the following:
 - a. Outdoor exposed piping.
 2. Outdoor Installation: Where installed on outdoor piping locate seams on bottom side of horizontal piping. Seal all jacket seams to provide a completely weatherproof enclosure; water tight.

3.4 EQUIPMENT AND SPECIALTIES INSTALLATION

- A. Types and Thickness: All equipment and items installed in insulated duct and piping systems shall be insulated except where specifically noted not to be; reference paragraph 3.01. Insulation type and thickness shall be as specified in "Part 2 - Products".

- B. General: Apply insulation as close as possible to equipment by grooving, scoring, and beveling as necessary. As required, secure insulation to equipment with studs, pins, clips, adhesive, wires or bands. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. Comply with NCIIS.
- C. Removable: All equipment and specialties where access is required for maintenance, repair, service, or cleaning shall have insulation installed so that it can be easily removed and reinstalled without being damaged and without requiring new insulation. Removable insulation shall completely cover the item being insulated with an overlap over adjacent insulation to cover all joints. Insulation on cold surfaces shall provide a sealed vapor barrier so that no surfaces are exposed to ambient air and so that no condensation can occur; overlap enclosure ends minimum 2-inches.
- D. Nameplates: Do not insulate over nameplates or ASME stamps; bevel and seal insulation around.
- E. Jacketing: Provide all equipment insulation with vapor retardant jackets.

END OF SECTION 200700

SECTION 200800

COMMISSIONING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

- A. Commissioning of Mechanical Systems.
- B. Documentation.

1.3 SUBMITTALS

- A. General: Comply with Section 20 05 00.
- B. Qualifications: Submit qualifications of the firm proposed to perform the commissioning work and for the individuals that will be assigned.
- C. Commissioning Data:
 - 1. Commissioning plan.
 - 2. Commissioning preliminary report.
 - 3. Commissioning final report.

1.4 GENERAL REQUIREMENTS

- A. General: Commissioning shall be done by a Company which specializes in this work and independent and separate from the Companies installing the systems to be commissioned.
- B. Company Experience: The Company providing the commissioning work shall be experienced in commissioning HVAC control systems, and have commissioned at least five similar projects in the last three years. Company shall be certified for such work by AABC, NEBB, AEE, BCA, or ASHRAE.
- C. Individual Experience: The individuals performing the commissioning work shall have at least five years experience in commissioning, with the individual in the field in charge or the work having commissioned at least five similar projects in the last three years.
- D. Deferred Test: Tests may be deferred to allow for proper climatic or other conditions.

1.5 REFERENCES

- A. AABC: Associated Air Balance Council.
- B. AEE: Association of Energy Engineers.
- C. BCA: Building Commissioning Association.
- D. NEBB: National Environmental Balancing Bureau.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 GENERAL

- A. General: Provide commissioning as required by code and as specified herein.
- B. Building Occupancy: Building or portions thereof, required by code to be commissioned, shall not be considered ready for occupancy until such time that the Engineer and building official determine that the preliminary commissioning report required by this Section has been completed.

3.2 HVAC SYSTEMS

- A. General: HVAC equipment and HVAC control systems shall be tested to ensure that control devices, components, equipment and systems are calibrated, adjusted and operate in accordance with approved plans and specifications.
- B. Sequences: Sequences of operation shall be functionally tested to ensure they operate in accordance with approved plans and specifications.
- C. Conditions: Testing shall affirm operation during actual or simulated winter and summer design conditions and during full outside air conditions.
- D. HVAC Equipment: Equipment functional performance testing shall demonstrate the installation and operation of components, systems, and system-to-system interfacing relationships in accordance with approved plans and specifications such that operation, function, and maintenance serviceability for each of the commissioned systems is confirmed. Testing shall include all modes and sequence of operation, including under full-load, part-load and the following emergency conditions:
 - 1. All modes as described in the sequence of operation.
 - 2. Redundant or automatic back-up mode.
 - 3. Performance of alarms.
 - 4. Mode of operation upon a loss of power and restoration of power.
- E. HVAC Controls: HVAC control systems shall be tested to document that control devices, components, equipment, and systems are calibrated, adjusted, and operate in accordance with approved plans and specifications. Sequence of operation shall be functionally tested to document they operate in accordance with approved plans and specifications.
- F. Economizers: Air economizers shall undergo a functional test to determine that they operate in accordance with manufacturer's specifications.

3.3 DOCUMENTATION

- A. Format:
 - 1. Hard Copy: Provide reports in 8-1/2 x 11 format, in 3 ring notebooks, with labeled cover and spine, clean legible, and logically organized with table of contents, divider tabs, and names of companies involved in the project, commissioning company name, commissioning personnel, and contact information. Provide 3 copies per Divisions 00 and 01.
 - 2. Electronic: Provide copy in *.pdf format; submit with closeout documents per Divisions 00 and 01.
- B. Test Plan: Prepare a written commissioning test plan and submit for approval prior to beginning commissioning work. Test plan to include:

1. Equipment and systems to be tested.
 2. Roles and responsibilities of individuals performing the commissioning and of others involved in the project.
 3. Functional test procedures and forms.
 4. Conditions under which the test shall be performed (for example, winter design conditions, full outside air, etc.).
 5. Expected systems' response or acceptance criteria for each procedure.
 6. Time schedule for performance of the work; including any deferred tests.
 7. Forms as required by the WSEC or AHJ.
- C. Preliminary Commissioning Report:
1. General: A preliminary report shall be issued to identify issues preventing the commissioning work from being completed. If all commissioning work can be fully completed and the final report completed, a preliminary report is not required.
 2. Report: Compile all system and commissioning data; including all reviews, inspections, test procedures, and tests. Report shall include field notes of commissioning activities, equipment and system data, test procedures, tests performed, actual results as compared to expected (or specified) results, WSEC and any AHJ required commissioning forms (completed to the extent possible).
 3. Items to Complete: The preliminary report shall identify items needed in order to complete the commissioning, including:
 - a. Deficiencies found during testing required by this Section, which have not been corrected at the time of report preparation.
 - b. Deferred tests which cannot be performed at the time of report preparation due to climatic (or other) conditions.
 - c. Climate (or other) conditions required for performance of the deferred tests, and the anticipated date of each deferred test.
 - d. Proposed schedule for completion of report.
- D. Final Commissioning Report: Complete all commissioning work not previously completed and included in the preliminary report. Provide a complete final report with all systems and commissioning data; including test plan, all reviews, inspections, test procedures, tests, and results. Final report shall include all documentation required for the preliminary report and documentation regarding resolution of previous coded deficiencies.

END OF SECTION 200800

SECTION 211000
WATER-BASED FIRE SUPPRESSION SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

- A. Sprinkler System Design
- B. Piping
- C. Sprinkler Heads
- D. Accessories
- E. Owner Instruction

1.3 QUALITY ASSURANCE

- A. General: Comply with 20 05 00 requirements.
- B. Listing: All materials and equipment shall be UL listed and FM approved for the application.
- C. Latest Design: Products shall be of the manufacturer's latest design.
- D. Code and AHJ Compliance: Products and installation shall comply with code and Authority Having Jurisdiction (AHJ) requirements. Contractor is responsible to review and be familiar with code and local AHJ requirements. Products submitted are represented by the Contractor as complying with code and AHJ requirements.
- E. Exceed Code: The Contract Documents indicate items in excess of code requirements; in all such cases the work shall be done so that code requirements are exceeded as indicated. Such work may include coverage of areas not strictly required by code, painting, concealing of piping, access provisions for system inspections, oversized mains to accommodate future expansion, etc.

1.4 SUBMITTALS

- A. General: Comply with Section 20 05 00.
- B. Shop Drawings:
 - 1. Submit shop drawings of entire sprinkler system to Architect/Engineer for review; label these as "Preliminary – Not for AHJ Review". After incorporating or satisfactorily resolving Architect/Engineer review comments, submit shop drawings to AHJ for approval; label these as "AHJ Review Set"; at same time submit informational copy to the Architect/Engineer.
 - 2. Shop drawings shall show head locations on reflected ceiling plans; use shop drawings from ceiling installer for ceiling layout; where these drawings are not available use information in the Contract Documents to develop a reflected ceiling plans.
- C. Product Data: Submit information on all products to be used; include evidence of product UL listing and FM approval. Submit proposed labeling and signage.

- D. Calculations: Submit all system calculations showing compliance with NFPA and AHJ requirements.
- E. Review Impacts: Architect/Engineer's review may involve changes to Contractor's design in order to comply with the Contract Documents including aesthetic issues. These changes may be substantial enough to affect drawings and calculations submitted to the AHJ and requiring a resubmittal. Contractor shall assume at least one re-submittal to the AHJ will be required and shall pay all required AHJ re-submittal and AHJ re-review fees.

1.5 GENERAL REQUIREMENTS

- A. Experience: All fire sprinkler design shall be performed by a Contractor thoroughly familiar with and knowledgeable of NFPA 13, NFPA 24, local AHJ requirements, and fire sprinkler system design and installation. By virtue of submitting a bid, the Contractor is acknowledging that he does in fact have such knowledge; and all work provided will fully comply with all the requirements of these specifications. The fire sprinkler Contractor shall be qualified, as required by the AHJ to design and install all parts of the fire sprinkler system. All portions of underground fire sprinkler piping shall be installed by a licensed fire sprinkler contractor, or by a level U certified plumbing contractor, as issued by the State's Fire Marshal's office.
- B. Professional Stamp: All fire sprinkler design drawings and calculations shall be prepared by and stamped by a licensed fire sprinkler professional as required by the AHJ.
- C. Design: System shall be Contractor designed and approval by both the Fire Marshal and Architect/Engineer. System design shall comply with Contract Documents regarding particular system configuration as may be specified or noted (i.e. routing of mains, head locations, etc.).
- D. Special Design Areas: Various portions of the building's fire sprinkler system require special design effort and coordination; including but not limited to: multiple design layouts, multiple calculations for these layouts, multiple meetings with code officials, multiple meetings with various contractors, multiple meetings with members of the design team, added coordination among trades, coordination with the AHJ, and coordination with the design team. The Contractor shall include in his bid costs for such special design and installation work.

1.6 REFERENCES

- A. AWWA C104: Cement Mortar Lining for Ductile Iron Pipe and Fittings for Water.
- B. AWWA C111: Rubber - Gasket Joints for Ductile Iron Pipe with Ductile Iron or Gray Iron Threaded Flanges.
- C. AWWA C151: Ductile Iron Pipe, Centrifugally Cast for Water.
- D. FM-AG: FM Global Approval Guide.
- E. NFPA 13: Standard for the Installation of Sprinkler Systems.
- F. NFPA 24: Installation of Private Fire Service Mains and their Appurtenances.
- G. NFPA 291: Recommended Practice for Fire Flow and Testing of Fire Hydrants.
- H. UL-FPD: Underwriters Laboratories Fire Protection Equipment Directory.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. General: All products shall comply with Section 20 05 00, Paragraph 2.01, Acceptable Manufacturers.
- B. Pipe and Fittings: Domestic manufacturer's only.
- C. Sprinkler System Components: Reliable, Viking, Potter-Roemer, Gem, Star, Victaulic, Tyco.

2.2 PIPE AND PIPE FITTINGS

- A. Aboveground Pipe and Fittings: Pipe shall be steel or copper; in accordance with NFPA 13. Fittings shall be suitable for 175 psi working pressure, and shall be cast iron or malleable iron screwed, grooved, welded, or soldered; in accordance with NFPA 13. Pipe and fittings shall have a CRR of 1.0 or better. Pipe and fittings ran outside and exposed to the outdoors shall be galvanized type. Flexible braided steel piping serving individual heads may be used where acceptable to the AHJ, and such piping is FM approved and UL listed for the application.

2.3 SPRINKLER HEADS

- A. A. Wet Type - Finished Areas:
 - 1. Pendant: Shall be low profile, glass bulb type, with temperature rating to suit application and factory chrome plated finish. Where installed through ceiling, provide with escutcheons, two piece adjustable recessed type, with factory chrome plated finish to match sprinkler heads. Quick response type.
 - 2. Upright: Shall be glass bulb type, with temperature rating to suit application, and factory chrome plated finish. Quick response type.
 - 3. Sidewall: Shall be glass bulb or fusible solder type, with temperature rating to suit application, and factory chrome plated finish. Quick response type.
- B. Wet Type - Unfinished Areas: Link/lever type or glass-bulb type, with natural bronze or chrome plated finish, temperature rating to suit application. Quick response type.
- C. Dry Type:
 - 1. General: Provide where system may be exposed to freezing temperatures with finish, length and temperature rating to suit application. Quick response type.
 - 2. Finished Areas: Polished chrome finish type with flush type chrome plated escutcheon where installed through ceilings, soffits, and similar elements.
 - 3. Unfinished Areas: Natural bronze finish with flush or deep type brass finish escutcheon where installed through a floor, ceiling, or similar element.
- D. Sprinkler Guards: Hard-wire cage sprinkler guard, designed to protect sprinkler from mechanical damage, with chrome plated finish. Where used on exposed heads, guards shall be type that clamp to pipe; where used on recessed heads, guards shall be surface anchor type having substantial attachments to material surrounding the head (soffit plywood, etc.); provide 2x backing as needed. Provide custom fabricated guards/attachments as required.
- E. Sprinkler heads shall be upright, pendant or sidewall type as required to suit application.
- F. Extended Coverage Heads: Provide as necessary to allow complete coverage of all areas.

2.4 ACCESSORIES

- A. Waterflow Alarm - Flow Type Indicator: Shall be UL listed, with polyethylene paddle water flow detector, cast metal body, adjustable time delay retard mechanism to allow indicator to absorb

fluctuations of water flow due to pressure surges to prevent false alarms. Electrical characteristics shall match alarm bell and available voltage.

- B. Sightflow Connections: Cast iron construction, with clear acrylic windows, steel covers, and Buna-N O-rings.
- C. Sway Bracing/Restraints: Contractor fabricated of riser clamps, Schedule 40 pipe and pipe fittings, all welded construction, size and configuration to suit application.
- D. Hangers/Supports: See Section 20 05 29.
- E. Sleeves Seals: See Section 20 05 30.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Installation of all equipment shall be performed by a Contractor specializing in this work and subject to Owner and Fire Marshal approval. Install all items in accordance with code, manufacturers' recommendations, and best construction practices. Provide all system design, system features, fire sprinkler coverage, system support/anchorage, and documentation as specified herein and required by the AHJ.
- B. Pipe Routing:
 - 1. Select pipe routing that maintains full personnel access to building equipment and systems, without requiring stepping over or bending down to cross sprinkler piping. Follow specific pipe routing requirements of the Contract Documents as indicated. Piping shall run parallel to building structure in a neat, workmanlike manner.
 - 2. All piping shall be run concealed in ceiling space, attic space, pipe shafts, soffits, etc. where possible. Piping may only be exposed with Engineers approval and shall be painted as directed by the Architect/Engineer. Where piping must run exposed, it shall be ran in as unobtrusive fashion as possible, in lines parallel to major building features, as high as possible, and as directed by the Architect/Engineer.
 - 3. Provide all necessary drilling of beams, trusses, etc; reference Section 20 05 00 for cutting requirements; structural Engineers approval is required prior to any such cutting or drilling.
- C. Escutcheons: Provide chrome plated escutcheon plates at exposed pipe penetrations of all ceilings, floors and walls.
- D. Conflict Prevention:
 - 1. Review all building and system plans carefully and arrange the fire sprinkler work to avoid interferences and conflicts with other trades. Discuss and coordinate proposed sprinkler routing with other trades. The fire sprinkler system has the lowest priority of all building systems and is required to accommodate the space requirements of other systems.
 - 2. If piping routes are not properly coordinated with other trades and structures, rerouting and possible re-sizing will be required as directed by the Architect/Engineer. Offset, crossover and otherwise route piping to install system in available space.
- E. System Drainage: Special care shall be taken to ensure that entire sprinkler system is drainable in accordance with code. Provide drain valves as required (with labels) to allow for drainage; valves shall be concealed (with access doors) where possible; provide valves with provisions (male pipe nipple) for attaching temporary drain lines (where needed). Extend main drain(s) and 1 inch inspector's test connections to outside for drainage.
- F. Alarm Devices: Provide alarm indicators as required by the AHJ. Connection of devices to the fire alarm system is by Division 26 (unless indicated otherwise). Adjust water flow indicator time delay as necessary to prevent false alarms due to pressure fluctuations.

- G. Labeling: Provide labeling of items per Section 20 05 00. Provide additional labeling of items per AHJ requirements. All drain valves, alarm bells, and risers shall be labeled to clearly indicate purpose and area served. Label riser with hydraulic basis of design information. All piping shall be labeled per Section 20 05 00.
- H. Sprinkler Heads: Heads shall be centered in ceiling panels. Where "scored" ceiling panels are used, heads shall be located to be centered in the flat portion of the tile between "scores".
- I. Head Protection: Provide wire cage protectors for heads susceptible to damage (this includes all heads in mechanical loft areas with sprinkler heads 7 feet or less above walking surface, all gym heads, outside soffit heads below 9 feet, and similar areas).
- J. Hangers and Supports: Shall comply with NFPA 13 and Section 20 05 29. See also structural drawings for added limitations/requirements of supports and attachments to structure.

3.2 SYSTEM DESIGN

- A. General: System shall be Contractor designed in accordance with NFPA 13, AHJ requirements, and additional requirements as cited in the Contract Documents. Design shall be based on designated occupancy, storage configurations, commodity types, and related parameters. Design with provisions for forward flow testing of backflow prevention devices. Where insufficient data is available request clarification prior to bidding.
- B. Hydraulically Designed:
 - 1. 1. General: Base system design on hydraulic calculations in accordance with recognized engineering practices and standards, acceptable to the AHJ and Engineer. Calculations shall use approved water flow test data on the water supply main serving the fire protection system. Such test data must meet the approval of the AHJ and the Engineer.
 - 2. 2. Preliminary Water Flow Data: Any water flow data indicated on the drawings is preliminary only. Where no data is indicated then no data has been provided to the Engineer; the Contractor shall obtain water flow data from other sources. In all cases a factor shall be added to account for the use of preliminary data and that updated flow data may be different; such factor shall allow for at least a 10% flow reduction and 10% pressure reduction.
 - 3. 3. Updated Water Flow Data: Obtain updated water flow data (including new water tests) and pay all associated test fees or charges. Design and calculations shall include complete system, including water main to building, and extending as far back into the local utility systems (i.e. to reservoirs, tanks, etc.) as deemed necessary by the AHJ.

3.3 TESTING

- A. Testing: The systems shall be hydrostatically and operationally tested in accordance with the requirements of NFPA 13 and the AHJ. Any changes required to meet time or flow test requirements shall be made without additional cost to the Owner. Certificates of acceptance shall be submitted to the Architect/Engineer.

3.4 OPERATING AND OWNER INSTRUCTIONS

- A. Typed Instructions: Typewritten, plastic covered, framed operational and maintenance instructions shall be mounted in the building(s) near each fire sprinkler riser. Information shall clearly indicate portion of the building covered by the system, type of system, location of sub-risers, locations of system drains, when system was placed into service, installed, installers name (company) and contact information for service, how to close and open system main valve, and other pertinent operational instructions. Provide reference to O&M manuals provided to the Owner for additional operation and maintenance instructions.
- B. O&M Manual: See Division 01 and Division 20.

- C. Owner Instructions: The Owner or his representative shall be instructed by the Sprinkler Contractor in the operation of the system. The instruction shall be given by Contractor's personnel who are considered qualified in the opinion of the Architect/Engineer and shall be for a minimum of two hours. Instruction shall include location of all valves, drains, and pipe routing, as well as proper maintenance and testing procedures.

END OF SECTION 211000

SECTION 230933

ELECTRIC AND ELECTRONIC CONTROL SYSTEM FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

- A. Control System Design.
- B. Control System for Building Heating, Ventilation, Air Conditioning, Exhaust.
- C. Control Devices, Components, and Wiring.
- D. Testing, Adjustment, and Commissioning.
- E. Owner Training.

1.3 SUBMITTALS

- A. General: Shall comply with Section 20 05 00.
- B. Product Data: Submit product information on all items to be used.
- C. Shop Drawings: Submit a complete set of shop drawings prior to installation containing the following information: interconnect drawings showing all wiring and control connections; control panel details; arrangement of devices in panels; schedule of dampers with sizes and where used; sequence of operation for all equipment; location of all control devices on scaled building plans; and list of actuators with sizes and where used.
- D. Labeling: Submit list of proposed component labeling.
- E. Operation and Maintenance Manuals: See Section 20 02 00. In addition to the information required by that Section and Division 01, provide (for inclusion in the Manual) the following:
 - 1. System description.
 - 2. Complete sequence of operation.
 - 3. Reduced size (11" x 17") copies of record drawings.
 - 4. Submittal data on all products.
- F. Commissioning Plan and Report: See Section 20 08 00. Provide commissioning plan; including a checklist of control items to be reviewed and method of testing sequence of operation. Submit final report documenting tests performed and results.

1.4 GENERAL REQUIREMENTS

- A. Design and Installation: The control system is design/build type; all design is by the contractor with the system providing the features and sequences specified. The entire control system shall be designed and installed by skilled control system designers, electricians and mechanics, all of whom are properly trained and qualified for the work they perform.

- B. Sole Responsibility: One single Contractor shall be responsible to design, furnish and install the complete Section 23 09 33 control system.
- C. Sequence: System shall have sequence of operation as specified in Section 23 09 93.

1.5 WARRANTY

- A. Warranty: After completion of the installation of the control system and acceptance by the Owner, the system shall be warranted as free against defects in manufacturing, workmanship and materials for a period of two years from date of substantial completion. In addition, the system shall be warranted to provide the sequence of operation and basic features specified, with the accuracy and flexibility also specified. The system shall be repaired or replaced, including materials and labor, if in Owner's and Engineer's reasonable opinion, system is other than as warranted.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Products shall comply with Section 20 05 00, Acceptable Manufacturers.
- B. Actuators: Belimo, Honeywell, Siemens, Johnson Controls.
- C. Dampers: Ruskin, Greenheck.
- D. Control Accessories: Idec, Hoffman, McDonnell, Tridelta, Edwards, Mamac, Penn, Belimo, Honeywell, Johnson Controls, Leviton, Arrow-Hart, Alerton.

2.2 BASIC SYSTEM

- A. System Type: The system shall be an electronic or electric type.

2.3 CONTROL DAMPERS

- A. Type: Dampers shall be parallel blade or opposed blade type, as selected by contractor to best suit application (unless a specific type is indicated).
- B. Leakage: Class 1A leakage rated in accordance with AMCA 511 (or better, as required by Code).
- C. Construction: Construct of galvanized steel, except where installed in ducts of stainless steel or aluminum construction or handling corrosive air, shall be of stainless steel or aluminum construction (to match duct material). All materials in contact with the airstream shall be suitable for the conditions without deterioration. Provide special coatings as necessary to provide corrosion resistance. Frame shall be minimum 16 gauge.
- D. Blades: Single blade type, not exceeding 6 inches in width, 16 gauge, with neoprene, extruded vinyl or butyl rubber edge seals and flexible metal jamb seals; linkage interconnecting all blades and actuator axle.
- E. Bearings: Nylon, molded synthetic or oil impregnated sintered metal bearings (or other materials as conditions require).

2.4 ACTUATORS

- A. Type: Actuators shall be a brushless DC motor type controlled by a microprocessor.
- B. Operation: Shall be compatible with control devices used with to provide specified sequence and system features. Run time shall be constant, independent of torque. Actuator shall have manual

positioning mechanism and control direction of rotation switch accessible on its cover. Provide with auxiliary switches as required for sequence of operation. Actuator shall be proportional or two position type, as required for application.

- C. Sizing: Provide actuator with sufficient power and torque to suit items being controlled and allow proper operation against system pressures liable to be encountered. Actuator shall be capable of driving controlled items from full closed to full open in less than 15 seconds.
- D. Spring Return: All actuators shall spring return upon power interruption: The spring return position shall be a "fail safe" position as dictated by freeze, fire, temperature protection, energy saving, or safe operating requirements. Outside air dampers shall spring return closed; return air dampers shall spring return open. VAV terminal units and zone dampers do not require spring return actuators.
- E. Accessories: Units shall be complete with all linkages, brackets, and hardware required for mounting and to allow for proper control and operation.

2.5 SWITCHES

- A. Interval Timer: 4 hour (unless specified longer) spring operated interval timer with wall plate indicating timer setting, and control knob. Timers shall not have a permanent HOLD position.

2.6 ACCESSORIES

- A. Wiring and Conduit: Shall comply with Division 26 specifications and with code. Wiring that performs code required life safety shutdown of equipment or fire alarm interface shall comply with NFPA standards and local codes for fire alarm system wiring.
- B. Control Cabinet: Wall mounted, NEMA construction type to suit application, minimum 14 gauge sheet metal, hinged front door with latch. Size as required to house controls.
- C. Relays: Shall be rated for the application, with a minimum of two sets of Form C contacts, enclosed in a dust-proof enclosure. Relays shall have Hand-Off-Auto switch, and LED's (or pilot lights) to indicate the energized mode. Relays shall be rated for a minimum life of one million cycles. Operating time shall be 20 milliseconds or less, with release time of 10 milliseconds or less. Relays should be equipped with coil transient suppression devices to limit transients to 150% of rated coil voltage. Contact rating, and configuration selected to suit application.
- D. Condensate Overflow Switch: Overflow switch to detect high condensate level to stop unit operation and indicate an alarm, low voltage, PVC or ABS construction, with switch rated for voltage/ampereage used with. Style to best suit application (i.e. in drain pan type, in drain line type, or type that installs in unit auxiliary drain outlet); selected by Contractor subject to Engineer review. Little Giant Nos. ACS-2, -3, -4, or -5 (or approved equal).
- E. Miscellaneous Components/Sensors/Transmitters/Transformers: Shall be manufacturer's standard, designed for application in commercial building HVAC control systems, compatible with other components so as to provide sequence of operation specified.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Provide all devices, sensors, relays, switches, dampers, actuators, conduit, tubing, wiring, motor starters and all other devices required to provide a complete integrated control system with the sequence of operation and features as specified. It is the Contractor's responsibility to coordinate with other trades for the installation of control devices in systems installed by others.

- B. Installation: Install all control components in accordance with manufacturer's instructions and recommendations and best professional practices.
- C. Coordination: Coordinate work with other trades to ensure that all trades have the information necessary so that they may properly install any necessary control components, interconnect with control components, and install their work to accommodate controls. Identify all items requiring ceiling or wall access doors (or other special requirements) to trade installing access doors or performing related work.
- D. Space Requirements and Locations: Carefully check space requirements and coordinate with other trades to ensure that items can be installed in the allotted spaces, including above finished suspended ceilings. Adjust locations of panels, equipment, devices, and the like, to accommodate work and prevent interferences. Determine the exact route and location of wiring, conduit and other control devices prior to beginning work.
- E. Mounting: Mount controls adjacent to associated equipment on vibration free elements on free standing fabricated supports; mount and locate for best access.
- F. Control Cabinets: All electrical devices, relays, and components shall be installed in protective covers (i.e. control cabinets), except where installed concealed above ceilings a cover is not required. Controls/devices shall be logically assembled in cabinet, with all devices and cabinet labeled.
- G. Thermostats: Room thermostats shall be mounted 4'-6" above finished floor unless indicated otherwise. Thermostats shall connect to the HVAC unit serving the space the thermostat is located in, unless indicated otherwise. Not all thermostats are shown on the drawings and those shown are preliminary only. Contractor shall indicate all final thermostat locations on submittal drawings. Contractor is responsible to coordinate locations to avoid tackboards, casework, and other interferences.
- H. Power: It shall be the responsibility of this Contractor to provide power for all control devices requiring power. Coordinate with the Division 26 Contractor to arrange for necessary power circuits. All control devices shall obtain power from circuits dedicated to control power.
- I. Wiring, Conduit and Electrical:
 - 1. General: Provide all electrical wiring and devices in accordance with applicable codes and Division 26 requirements.
 - 2. Conduit: All wiring shall be installed in conduit and in accordance with Division 26 specifications, except that low voltage wiring within ceiling plenum spaces, mechanical mezzanines, and attics may be installed without conduit. Wiring in walls shall be in conduit.
 - 3. Wire Labeling: Label or code wiring at each end to show location of the opposite end. Each point of all field terminal strips shall be permanently labeled or coded to show the instrument of item served. Color coded cable with cable diagrams may be used to accomplish cable identification and terminal strip.
 - 4. Service Loop: Provide minimum of 6" extra wiring at all wiring terminations for ease of future maintenance/servicing. Such extra wiring shall be neatly coiled/bundled to allow for uncoiling when the connected equipment is serviced.
 - 5. Workmanship: Install all conduit and wiring parallel to building lines, in neat bundles, supported at not less than 5 foot intervals.
- J. Component Labeling: All control components, except regular room thermostats, shall be equipped with name plates to identify each control component. Components in finished rooms shall be labeled as to generic item controlled for better user understanding; other devices shall be labeled with the same designation which appears on the Control Diagrams. Contractor shall submit list of proposed labeling prior to installing. Reference Section 20 05 00.

- K. Thermostat Setpoints: Thermostat Setpoints (all adjustable) shall be as follows unless indicated otherwise:

Occupied Heating	70 degrees F
Unoccupied Heating	65 degrees F
Occupied Cooling	75 degrees F
Unoccupied Cooling	85 degrees F

- L. Motor Starters: Shall be by Division 26; except for loads 1/2 hp and less which shall be by this Section.
- M. Device Duct Installation: All control devices installed in ductwork shall be positively anchored and attached to the ductwork by mechanical means (fasteners, straps, unistrut, etc).
- N. Miscellaneous Controls: Provide all miscellaneous control items as noted in the Contract Documents. Provide all necessary control wiring between items for proper control.
- O. Condensate Overflow: Provide all cooling coils (except not required for room exposed wall mounted AC units) with field installed condensate overflow switches wired to stop cooling unit operation upon detection of a high condensate level.

3.2 OWNER INSTRUCTION

- A. Owner Instruction: Provide instruction to Owner on the operation and maintenance of the control system. Provide field demonstrations and show Owner the locations of all control devices; explain and demonstrate how system adjustments are made; explain and demonstrate system sequences of operation.

END OF SECTION 230933

SECTION 230993
SEQUENCE OF OPERATION FOR HVAC CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

- A. Sequence of Operation.

1.3 SUBMITTALS

- A. General: Shall comply with Section 20 05 00.
- B. Sequence: Submit complete description of sequence of operation. Sequence submitted shall not be a direct copy of the sequence specified herein, but shall be written to reflect the actual control sequence provided.
- C. Shop Drawings: Provide complete control system shop drawings.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.1 GENERAL

- A. General: Provide complete control system with sequences of operation as specified. All mechanical equipment shall be automatically controlled by the Division 23 control system, unless specifically indicated otherwise. Where no sequence of operation is indicated submit a proposed sequence for Engineer review; such sequences shall match the intended equipment use, code, and ASHRAE standards for the type of equipment and application.
- B. Time Control: Section 23 81 27 system shall provide time clock control, and shall provide automatic warm-up control.
- C. Adjustability: All temperature setpoints and time control settings shall be adjustable.
- D. Thermostats: Various thermostats are not shown on the drawings but are required per the sequence of operation specified. Coordinate with Engineer for location of all such thermostats prior to installing. Indicate proposed locations on submittals.
- E. Miscellaneous Items: See plans for units with motorized dampers in the ducts and miscellaneous other items requiring control.

3.2 VRF SYSTEM – SEQUENCE OF OPERATION

- A. Heat Pumps: See Section 23 81 27.
- B. DOAS ERV Units: See Section 23 81 27 and Section 23 72 23.
- C. ERV Outside Air and Exhaust Dampers: Control per sequence in 23 81 27 with dampers and controls provided under this Section, connected to VRF contacts for tome control.

3.3 EXHAUST FANS

- A. General: See "Control" column on Fan Schedule for which of the following control methods apply to each fan.
- B. Interval Timer: Fan shall be controlled by wall mounted interval timer; fan shall be on when timer is activated and off otherwise.
- C. Time Clock Control: Fan shall run from time clock control schedule; fan shall be on for the scheduled occupied period and be off otherwise.

3.4 ELECTRIC HEATERS

- A. Wall Heaters: Shall be controlled by their integral thermostat. Heater shall be on once space temperature has fallen below setpoint, and shall be off once temperature has risen 2 deg F or more above setpoint.

3.5 ELECTRIC HEATERS – DUCT TYPE [SA TEMP CONTROL]

- A. A. General: Heater shall be controlled by a duct mounted temperature sensor and status of the energy recovery ventilator. See Sections 23 72 23 and 23 82 46.
- B. B. Interlock: Shall be hard-wire interlocked with the supply fan on the unit which serves the heater, to only allow heater operation when the unit's fan is proven on. Provide differential pressure switch or CT's at unit fan to provide interlock and proof of operation.

END OF SECTION 232128

SECTION 232128
HVAC CONDENSATE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

- A. Cooling Coil Condensate Drains.
- B. Overflow, Miscellaneous Drains.
- C. Drain Pans.
- D. Fabricated P-Traps.
- E. Testing and Inspection.

1.3 SUBMITTALS

- A. Submittals shall comply with Section 20 05 00.
- B. Submit product information on all items to be used.

1.4 REFERENCES

- A. ASME B 16.15: Cast Bronze Threaded Fitting Classes 125 and 250.
- B. ASME B 16.18: Cast Copper Alloy Solder Joint Pressure Fittings.
- C. ASME B 16.22: Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- D. ASME B 16.23: Cast Copper Alloy Solder Drainage Fittings.
- E. ASME B 16.29: Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings (DWV).
- F. ASTM B 32: Solder Metal.
- G. ASTM B 88: Seamless Copper Water Tube.
- H. ASTM B 306: Copper Drainage Tube (DWV).
- I. ASTM D 1785: Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
- J. ASTM D 2466: Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
- K. ASTM D 2564: Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.
- L. ASTM D 2665: Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Products shall comply with Section 20 05 00, 2.01, Acceptable Manufacturers.
- B. Pipe and Fittings: Domestic Manufacturers only.
- C. Fabricated P-Trap: Rectorseal.
- D. Condensate Pumps: Little Giant.

2.2 PIPE AND FITTINGS - MATERIALS

- A. Copper DWV Pipe and Fittings: Copper drainage tube per ASTM B 306. Wrought copper and wrought copper alloy solder joint fittings per ASME B 16.29; or cast copper alloy solder joint fittings per ASME B 16.23.
- B. Copper Pipe and Fittings: Seamless copper water tube, tube L or M, per ASTM B 88. Solder joint wrought copper and bronze fittings per ASME B 16.22 cast copper alloy fittings per ASME B 16.18, and cast bronze threaded fittings per ASME B 16.15 with 95/5 tin-antimony solder per ASTM B 32.
- C. PVC DWV Pipe and Fittings: Polyvinyl chloride drain waste and vent pipe and fittings per ASTM D 2665, with solvent cement joints. Solvent cement shall comply with ASTM D 2564.
- D. PVC Pipe and Fittings: Polyvinyl chloride pipe, schedule 40, per ASTM D 1785. Solvent cement socket type fittings per ASTM D 2466. Solvent cement shall comply with ASTM D 2564.

2.3 PIPE AND FITTINGS - APPLICATION

- A. Cooling Condensate Drains: Copper DWV, copper, PVC DWV, or PVC.

2.4 DRAIN PANS

- A. Fabricate of G90 galvanized steel complying with Section 23 31 00; minimum 22 gauge. Pans shall be welded, with welds power wire brush cleaned and cold-galvanizing compound applied at areas where galvanized coating has been disturbed area. Seal liquid tight all seams. Provide with watertight drain connection, located low in pan; 3/4-inch or sized to match drain line indicated on plans (whichever is larger). Overflow drain pans shall be sized to be 3-inches larger in all directions than item served.

2.5 FABRICATED P-TRAPS

- A. Type: Factory fabricated p-trap with dual cleanouts and clear trap, for cooling coil condensate. Rectorseal "EZ Trap" (or approved).
- B. Construction: Fabricated of schedule 40 PVC, with transparent plastic trap portion. Portion connection to HVAC unit (or coil) drain shall consist of a PVC cross, with top and side cleanouts having caps with integral retaining strap and ring. Outlet portion shall consist of PVC tee fitting, with top portion able to serve as vent.
- C. Size: 3/4-inch unless indicated otherwise. Trap heights shall be sized to suit HVAC unit static pressures, unit configuration (i.e. blow through or draw through), and be consistent with HVAC unit manufacturers installation recommendations.
- D. Cleaning Brush: Provide with bristled flexible shaft cleaning brush, sized for cleaning of p-trap.

PART 3 - EXECUTION

3.1 GENERAL

- A. Installation of all items shall comply with code, best professional practices, and manufacturers written installation instructions.
- B. Provide all piping as indicated and as required for all drip pans, unit condensate drains, unit p-traps, and miscellaneous drains and vent connections to all items requiring such drains (i.e. HVAC units, furnaces, boilers, AC units, etc.).
- C. Coordinate installation of items with all trades that are affected by the work to avoid conflicts.
- D. Consult manufacturers data and drawings for information on equipment before beginning drain rough-in.
- E. Verify points of connection, elevations, and grade requirements before beginning installation or ordering materials.
- F. Trap all equipment items as required by code; provide proper venting for each trap as indicated and as required by code.
- G. Run piping to nearest point of drainage, or as shown on drawings. Where routing is not shown, route to nearest point of proper drainage.

3.2 PIPE AND FITTINGS

- A. All piping in finished areas shall be installed concealed unless specifically noted otherwise.
- B. Install piping so as not to obstruct access to any items requiring routine service, maintenance, or inspection. Offset or reroute piping as required to clear any interferences which may occur. Prior to running any exposed piping, confirm with Architect/Engineer (unless is clearly noted to be ran exposed). Install exposed piping so as not to obstruct any portion of windows, doors, doorways, passageways, or items requiring service or access.
- C. Consult all drawings for location or pipe spaces, ducts, electrical equipment, structural elements, ceiling heights, door items requiring access, openings, window openings, and other details and report discrepancies or possible conflicts to Architect/Engineer before installing pipe.
- D. Install all drain lines with a slope of 1/4-inch per foot unless noted otherwise. Coordinate with AHJ if written approval is required for exceptions to 1/4-inch per foot slope.
- E. Provide escutcheons where exposed pipe passes through walls, floors, or ceilings.
- F. Install all piping parallel to equipment and nearby walls and in a neat, workmanlike manner. Horizontal straight runs of piping shall not deviate from straight by more than 1/4-inch in ten feet. Vertical piping shall not deviate from plumb by more than 1/8-inch in ten feet.
- G. Do not run any piping above electrical panels (and similar electrical equipment). Provide offsets around such panels as necessary. Such offsets are typically not shown on the plans, but are required per this paragraph.
- H. Prior to the joining of any section of pipe to a pipe run, the section shall be thoroughly cleaned inside and out, the ends shall be reamed to remove any cutting burrs and piping prepared as recommended by piping and fitting manufacturer.
- I. Threaded Connections: Cut piping carefully, ream, thread and work into place without springing. Use TFE tape or lead and graphite lubricant (on male threads only).

- J. Soldered Connections: Polish contact surfaces of fittings and pipes with emery cloth before fluxing male and female surfaces of joints. Steel wool and sandpaper not permitted for polishing.
- K. PVC Pipe:
 - 1. Solvent Joints: The outside of the PVC pipe shall be chamfered to a minimum of 1/16 inch at approximately 22 degrees. Chemicals used must penetrate the surface of both pipe and fitting which will result in complete fusion at the joint. Use solvent and cement only as recommended by the pipe manufacturer.
 - 2. Plastic to Metal Connections: Work the metal connection first. Use a non-hardening compound on threaded connections. Use only light wrench pressure. Connections between metal and plastic are to be threaded utilizing female threaded adapters only, not male adapters.

3.3 TESTING AND INSPECTION

- A. All piping shall be inspected and approved prior to being concealed or covered.
- B. Provide testing as required by code. Testing shall be by water and shall comply with governing code. Testing shall be witnessed by the plumbing inspector and the Engineer's representative (at his option).
- C. All leaks shall be eliminated and the system re-tested before proceeding with additional work or concealing pipe.
- D. All repairs to piping shall be with new pipe and fitting material's; no caulking of screwed joints or holes is allowed.

END OF SECTION 232128

SECTION 233100
HVAC DUCTS AND CASINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

- A. Environmental Ductwork Systems.
- B. Flexible Duct.
- C. Acoustical Duct Lining.
- D. Preparation of Duct for Service.
- E. Duct Pressure Testing.

1.3 DEFINITIONS

- A. Duct Sizes: All duct dimensions shown are inside clear dimensions. Where inside duct lining is specified or indicated, duct dimensions are to the inside face of lining.
- B. Environmental Ductwork Systems: Ductwork systems that are not covered by Section 23 35 00 - Special Exhaust Systems.

1.4 QUALITY ASSURANCE

- A. All work and materials shall comply with SMACNA-DCS, NAIMA-DLS, ASHRAE-F, IBC, IMC, NFPA-90A, NFPA-90B, and code. The most restrictive criteria governs.
- B. Leakage Criteria: Duct system shall be constructed and sealed so that leakage does not exceed the following:
 - 1. All Systems - Supply Duct: From fan to connection to air outlet 5%.
 - 2. All Systems - Return Duct: 5%.
 - 3. All Systems - Exhaust Duct: 5%.
- C. Fabrication Proximity: The Contractor performing the work of this section shall have fabricating facilities located within 100 miles of the project site.
- D. Drawing Review: Prior to beginning any work review all drawings, duct routing, duct connections, equipment configuration, equipment connection locations, and other work details to discover conflicts in anticipated duct arrangement and improper or incomplete connections. Review shall include the following: supply ducts not connected into return (or exhaust) ducts, ducts not crossed and improperly connected in shafts, air outlets/inlets connected to ducts, unit configuration compatible with planned duct connections, louver locations match architectural plans. Submit resolutions of such possible conflicts as submittals with shop drawings of proposed solutions; written description in lieu of shop drawings is acceptable for minor issues.

1.5 SUBMITTALS

- A. General: Comply with Section 20 05 00.
- B. Product Data: Submit product data for duct lining, flexible duct, and factory fabricated items.
- C. Shop Drawings: Submit shop drawings for all HVAC ductwork which is to be installed differently than as shown on the drawings.
- D. Conflict Resolution: Submit additional shop drawings showing proposed resolution of conflicts after review of documents and again after review of actual field conditions.

1.6 DUCT PRESSURE CLASS

- A. Constant Volume Systems: Ductwork shall be constructed to the pressure class corresponding to the static pressure indicated for the fan which serves the duct system or 2-inch pressure class (plus or minus as appropriate), whichever is higher; unless noted otherwise.

1.7 REFERENCES

- A. ADC-FLEX: Air Diffusion Council Flexible Duct Performance and Installation Standards.
- B. ASHRAE-F: ASHRAE Handbook of Fundamentals.
- C. ASTM A 653: Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.
- D. ASTM A 924: General Requirements for Steel Sheet Metallic-Coated by the Hot-Dip Process.
- E. ASTM E 84: Standard Test Method for Surface Burning Characteristics of Building Materials.
- F. IMC: International Mechanical Code.
- G. NAIMA-DLS: North American Insulation Manufacturers Association Fibrous Duct Liner Standards, 1st Edition.
- H. NFPA 90A: Standard for the Installation of Air Conditioning and Ventilating Systems.
- I. NFPA 90B: Standard for the Installation of Warm Air Heating and Air Conditioning Systems.
- J. SMACNA-DCS: SMACNA HVAC Duct Construction Standards, 3rd Edition.
- K. UL 181: Underwriter Laboratories Factory-Made Air Ducts and Air Connectors.
- L. UL 181A: Underwriter Laboratories Closure Systems for Use with Rigid Air Ducts.
- M. UL 181B: Underwriter Laboratories Closure Systems for Use with Flexible Air Ducts and Air Connectors.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Products shall comply with Section 20 05 00, Paragraph 2.01, Acceptable Manufacturers.
- B. Sheet Metal: All domestic manufacturers.
- C. Spin-in Fittings and ATTO: Sheet Metal Connectors Inc., United McGill, Royal Metal Products, Airflow Products Inc.
- D. Gasketing: Preson, Insulfab, Duraco.

- E. Duct Sealant and Tape: Carlisle (Hardcast), Ductmate, Benjamin Foster, Grace Construction Products, United McGill, Polymer Adhesives Sealant Systems, RCD Corporation, Nashua, 3M.
- F. Flexible Duct: Flexible Technology Inc., JP Lamborn Co.; Hart & Cooley, Thermaflex.
- G. Acoustical Duct Lining: Johns-Manville.

2.2 GENERAL MATERIALS

- A. Ducts: Construct of galvanized sheet steel, suitable for lock forming without flaking or cracking, conforming to ASTM A653 and A924, having a zinc coating of 0.90 ounces total per square foot for both sides of a sheet, corresponding to coating G90.
- B. Fasteners: Steel construction, electroplated zinc coated, having strength properties adequate for the application, compatible with materials being joined, and in accordance with SMACNA-DCS. Where exposed to corrosive conditions shall be of Type 304 or 316 stainless steel. Type to meet duct pressure class and duct leakage requirements. Where used for the support and anchorage of ducts shall comply with Section 20 05 29, with independent test reports regarding strength.
- C. Spin-in Fittings: Factory fabricated of galvanized steel with die-formed mounting groove and damper with raised damper quadrant where ducts are to be insulated. Collar length for flexible duct attachment shall be at least 2" long.
- D. Air-Tight Take-Off Fittings (ATTO): Factory fabricated branch duct connector, of galvanized steel. Flange shall be 1-1/2" wide with 1/8" self-adhesive gasket and pre-drilled fastener holes. Collar length for flexible duct attachment shall be at least 2" long. Where used on round duct mains, shall be saddle type appropriately sized for main duct diameter.
- E. Draw Bands:
 - 1. Metal: Worm gear type clamp, constructed of galvanized steel, stainless steel, or aluminum; minimum 1/2-inch wide band; suitable for 200 pound loading.
 - 2. Non-Metal: Nylon "zip-tie" with self-locking ability, designed for flexible duct usage, minimum 1/4 inch wide, rated for 175 pound load, suitable for temperatures from 0 to 185 deg F; listed per UL181B and labeled "UL181B-C".
- F. Gasketing: Vinyl nitrile, vinyl neoprene, or neoprene nitrile PVC blend; designed for HVAC use with size to suit the application having minimum 1.5-inch width at equipment roof curb applications. Fire hazard rating not to exceed 25 for flame spread and 50 for smoke development per ASTM E 84.
- G. Duct Sealant/Mastic: Water based duct sealant, listed per UL 181B-M and UL 181A-M, suitable for indoor and outdoor use. Fire resistant with a flame spread rating of 5 or less, and a smoke developed rating of 0. Sealant shall be resistant to ultraviolet radiation and ozone. Fiberglass mesh shall be minimum 0.006-inches thick, with minimum 9 x 9 weaves per inch, and 2-inch width; for use with mastic in sealing ductwork. Sealant system shall be suitable for duct system pressure class and materials used with. Carlisle Hardcast "Versa-Grip 181".
- H. Foil Tape: Foil back adhesive tape, listed per UL181A-P and UL181B-FX, with listing labeled on tape outer foil face. Minimum 3-inch width for metal-to-metal applications; minimum 2-inch width for flexible duct applications. 3M No. 3340 or Nashua No. 324A.

2.3 DUCT FABRICATION

- A. Duct Gauge and Reinforcement: Shall be as shown in SMACNA-DCS according to the pressure classification of the system and the duct dimensions; with heavier gauge duct used as required to minimize duct reinforcement to suit space available and other project constraints. In no case shall ducts be constructed of less than 26 gauge material.

- B. Joints and Seams: Construct in accordance with SMACNA -DCS, code requirements, and these specifications (more stringent governs). Ducts shall be constructed and sealed so that the leakage criteria is not exceeded. Round ducts shall be the spiral seam type; except that branch ducts to individual air inlets/outlets less than 16" diameter may be of other types as allowed by SMACNA-DCS. Coordinate joint spacing with duct reinforcement requirements so that transverse joints having the required stiffness may be incorporated in the reinforcement spacing schedule. Round duct transverse joints shall be made with beaded sleeve joints or flanged connections in accordance with SMACNA-DCS; except that branch ducts to individual air inlets/outlets less than 16" diameter may use other joining methods as are allowed by SMACNA-DCS.
- C. Elbows and Tees: Shall be long-radius type with a center-line radius not less than 1-1/2 times the width or diameter of the duct. Where space does not permit the use of long-radius elbows, short-radius or square elbows with turning vanes may be used. Elbows in round duct systems with duct pressure class above 2-inches shall be stamped type, welded segmented type, or standing seam segmented type.
- D. Transitions: Increase duct sizes gradually. Transitions for diverging air flow shall be made with each side pitched out not more than 22.5 degrees. Transitions for converging air flow shall be made with each side pitched in not more than 30 degrees. Except that eccentric transitions for round to flat oval may have up to a 45 degree pitch.
- E. Branch Connections: Shall comply with SMACNA-DCS, and as required herein.
 - 1. Rectangular-to-Rectangular: Rectangular take-off with 45 degree angle on "inside" of take-off, minimum 4" length. Reference SMANCA-DCS Figure 4-6. Close corner openings.
 - 2. Rectangular-to-Round:
 - a. Serving Individual Air Inlet/Outlet: Spin-in type connector or air-tight take-off (unless a different fitting type is specifically noted).
 - b. Serving Branch Duct: Rectangular to round transition, with maximum degree pitch as specified for transitions. Rectangular end size shall have free area no less than round end. Rectangular connection to rectangular main shall be made as specified for "Rectangular-to-Rectangular" connections.
 - c. Serving Individual VAV Terminal Unit: Conical type connector, with connector 2" larger on one end and maximum 15 degree pitch on sides.
 - 3. Round-to-Round:
 - a. Serving Individual VAV Terminal Unit: Conical type connector (or conical tee fitting), with connection at the main duct 2" larger than the end serving the VAV terminal unit, and a maximum 15 degree pitch on sides; or "Lo-Loss" tee fitting, equivalent to that manufactured by United McGill.
 - b. Other Connections: Air-tight take-off or constructed in accordance with SMACNA-DCS and recognized professional practices.
 - 4. Other Connections: In accordance with SMACNA-DCS and recognized professional practices.
- F. Ductmate Systems:
 - 1. Rectangular Duct: Transverse duct joints may be made with Ductmate System, or approved equal. System shall consist of companion flanges of 20 gauge galvanized steel with an integral polymer mastic seal; corner pieces of 12 gauge G90 galvanized steel; 20 gauge G90 galvanized cleats; closed cell, high density gasket type; and galvanized carriage bolts with hex nuts. The flanges shall be securely fastened to the duct walls using self-drilling screws, rivets or spot welding. Fastener spacing shall be as recommended by the manufacturer for the size of duct and the pressure class. The raw duct ends shall be properly seated in the integral mastic seal. A continuous strip of gasket tape, size 1/4" x 3/4", shall be installed between the mating flanges of the companion angles at each transverse joint; and the joint shall be made up using 3/8-inch diameter x 1-inch long plated bolts and nuts. Galvanized drive-on or snap-on cleats shall be used at spacing recommended by the manufacturer.

2. Round Duct: Transverse duct joints may be made with Ductmate "Spiralmate" system, or approved equal. System shall consist of galvanized steel round connector flanges (fitting inside each duct section to be joined) and an exterior galvanized steel closure ring with tightening bolt to form an airtight duct connection and join flanges together. Duct connector flanges shall have non-hardening integral mastic to seal between flanges and duct, and a neoprene gasket to seal flange faces.
- G. Lined Ductwork:
1. Rectangular Ducts: Contractor Fabricated ductwork with interior duct lining. Duct fabrication and liner installation shall comply with NAIMA-DLS. Lining material shall comply with paragraph titled "Duct Lining" in this specification section.
 2. Round and Oval Ducts: Shall consist of acoustic insulation in between a perforated interior duct liner and solid exterior duct. Acoustic insulation shall be 1-inch thick, except where noted to be greater. Duct sections shall connect by mechanical means to maintain positive concentricity of liner with duct. All fittings and transitions shall have perforated inner liner (except where noted otherwise). Lining material shall comply with paragraph titled "Duct Lining" in this specification section. United McGill "Acousti-k27" (or approved).

2.4 FLEXIBLE DUCT

- A. Type: Factory insulated fully lined flexible duct.
- B. Construction: Double-ply neoprene coated polyester fabric hose, reinforced with a steel wire helix. Black color. Fire hazard rating not to exceed 25 for flame spread and 50 for smoke development, as tested by ASTM E84.
- C. Thermal Characteristics: Certified thermal resistance "R" of 4.2 Hr-SF-deg F/Btu, rated in accordance with ADC-FLEX. Except where duct is installed in an unconditioned area (and where required by code) provide certified thermal resistance "R" of 8 Hr-SF-deg F/Btu, rated in accordance with ADC-FLEX.
- D. Working Pressure: As required to suit maximum pressure to be encountered on system, but no less than 4-inch wc positive, 0.5-inch wc negative.
- E. Length: Shall not exceed 8 feet where used on duct systems with a pressure class of 2-inches and less; maximum 5 feet length on higher pressure class systems.
- F. Code Compliance: Comply with code and applicable standards; including NFPA 90A, NFPA 90. Shall be UL listed and labeled as a Class 1 connector per UL 181.

2.5 DUCT LINING

- A. Material: Flexible, inorganic glass fiber material, bonded with thermosetting resin, maximum thermal conductivity of 0.24 Btu-inch/hr-sq. ft.-degree F at 75 degrees F, coated to prevent erosion, conforming to NAIMA-DLS and exceeding that standard as specified herein. Suitable for air temperatures to 250 degrees F, and duct velocities to 6000 feet per minute. Surface shall be coated with an acrylic coating having anti-microbial agents and factory applied edge coating. Johns-Manville "Permacote Linacoustic" (or approved).
- B. Thickness: Lining shall be 1-inch thick except where noted otherwise.
- C. Adhesives and Fasteners: Shall conform to NAIMA-DLS, and as suitable for the duct liner material and ductwork.
- D. Fungi and Bacteria Resistance: Conform to ASTM C 1338 and ASTM G21 for fungi resistance and ASTM G 22 for bacteria resistance.

PART 3 - EXECUTION

3.1 DUCTWORK INSTALLATION

- A. General: Install all ductwork with all accessories and connections to provide complete and operable duct systems, in accordance with plans and specifications. See Section 20 05 29 for hangers and supports. Provide quality assurance review of all drawings prior to beginning work (see paragraph titled Quality Assurance, this specification Section and see Section 20 05 00). Provide duct and plenum sizes and locations as shown on the drawings; except as adjusted for field conditions and work of other trades, and with prior approval of the Engineer. See Section 20 05 00 for offsets and transitions to be included in project.
- B. Coordination: The Contractor shall fully coordinate the work of all trades to avoid interferences and conflicts. Due to the extremely tight spaces in portions of the building, the Contractor shall coordinate duct reinforcement spacing and supports with other trades as necessary to avoid interferences. In addition, the Contractor shall select duct gauge and reinforcement types to avoid interferences. Changes required due to lack of coordination between trades, improper spacing or selection of hangers, or improper duct gauge and reinforcement selection, shall be done at no additional cost to the owner.
- C. Field Measurements: Prior to fabricating any duct materials, the Contractor shall field measure all areas where ducts will be installed to verify room available and all offsets and fittings required. Field verify connection sizes and locations to equipment, louvers, and similar items.
- D. Workmanship: All work shall comply with code, SMACNA-DCS, and other applicable standards. Ducts shall be installed level (unless noted otherwise) and in neat lines with the building construction using best professional practices.
- E. Exposed Ducts:
 - 1. All ducts are to be installed concealed unless indicated otherwise. Ducts that are exposed shall be carefully fabricated, stored, and installed for best appearance. All dents, dings, scratches and other damage shall be repaired for a high quality finished look; all dirt, debris, labels, stickers, lettering, and marks removed; and the duct completely cleaned. Any sealant shall be cleaned to form a straight and even seam adjacent to joints, have no overlap onto duct areas not needing sealant, and have all excess sealant removed (mask off adjacent areas as necessary).
 - 2. Outdoor exposed ducts shall have "hat" type channels installed over all joints (top and sides) to prevent entry of water.
- F. Flexible Duct: May only be used where specifically shown on the plans. Attach flexible duct inner core to sheet metal duct (or connector) with draw band. For insulated type, pull insulation and outer jacket completely over the inner core (at the connection to the sheet metal duct) with outer jacket covering the inner core and tucked back at its end to provide a continuous vapor barrier cover; install draw band to secure the outer jacket and insulation. Use metal type draw bands on duct systems where duct pressure class exceeds 3-inches or where temperature or other conditions do not allow the non-metal type and where indicated; use type of metal suitable for the conditions without corrosion or other deterioration. Install flexible duct with a centerline turning radius not less than one duct diameter. Where this turning radius cannot be maintained with the flexible duct use sheet metal elbows or (at air inlets/outlets) provide a plenum having a side connection.
- G. Spin-in Fittings/ATTO's: May be used for branch ducts to individual outlets only. Apply a bead of duct sealant to all spin-in fittings where fitting seals against sheet metal duct.
- H. Sealing:
 - 1. General: Use materials listed and approved for the specific application. Foil tape may only be used at duct connections to air inlets/outlets (unless specifically noted otherwise). Clean

- surfaces to be sealed of moisture and all contaminants. Seal joints in accordance with SMACNA-DCS, sealant manufacturer's instructions, and UL 181.
2. Ductwork: Seal to meet duct leakage criteria as follows:
 - a. Ducts with Pressure Class 2": Seal Class B.
 - b. Ducts with Pressure Class 1" and Less: Seal Class C.
 3. Flexible Duct: Coat connection of flexible duct to metal duct with duct sealant prior to installing the flexible duct.
 4. Air Inlets/Outlets: Seal duct connections (including "cans" or plenums) at air inlets and air outlets with duct sealant or foil tape; except at louvers and exposed ducts only sealant shall be used.
 5. Exterior Ductwork: Special attention and effort shall be applied to the sealing of exterior ductwork to prevent any entry of water. Sealant shall be applied to all seams and joints prior to assembly in order to provide a layer of sealant which is continuous through the joint or seam. Additional sealant shall then be applied to the exterior of the joint or seam to ensure a weathertight closure. Any leakage or damage from water leakage into duct or building shall be repaired at no additional cost to the Owner.
- I. Ductmate: All "Ductmate" and similar systems shall be installed in strict accordance with manufacturer's instructions.
 - J. Underground Ductwork: Shall be fiberglass reinforced duct or minimum 20 gauge galvanized steel encased in 4 inch thick concrete. Fiberglass duct installation shall be in strict accordance with manufacturer's instructions, including but not limited to, the following: duct to be installed in a trench with provision for good drainage and an allowance for a minimum of 4-inch pea gravel or dry sand to completely encase the duct. The top of the duct shall be at least 6 inches below the bottom of the concrete slab. Field joints to be watertight. Galvanized sheetmetal may be used for custom transitions, fittings, and where indicated; and shall be encased in a minimum of 4-inch thick concrete.
 - K. Protective Caps: Provide temporary sheetmetal caps or heavy visqueen covers over all open portions of ductwork to prevent debris, dirt, and dust from entering the ductwork. Such covers shall be installed at the end of each work shift, and shall remain in place until all work activities or events that may cause duct contamination will no longer occur.

3.2 ACOUSTICAL DUCT LINING INSTALLATION

- A. General: Install acoustical duct lining in ducts to extent shown on drawings, covering all interior surfaces. Round ducts shall use factory fabricated double-wall ducts as specified.
- B. Installation: Installation shall comply with NAIMA-DLS and these specifications. The liner shall be cut to assure tightly butted joints.
- C. Liner Attachments: The duct liner shall be applied with a 100% coverage of adhesive. Mechanical Fasteners shall be installed flush with the liner surface, and shall be spaced in accordance NAIMA-DLS.
- D. Horizontal Duct Runs: Tops of ducts over 12" wide and sides of duct over 16" high shall have liner additionally secured with mechanical fasteners.
- E. Vertical Duct Runs: Any side of duct over 12" in size shall have liner additionally secured with mechanical fasteners.
- F. Exposed Edges: All joints, exposed edges and any damaged areas of the liner, shall be heavily coated with fire resistant adhesive/mastic.
- G. Metal Nosing: Install metal nosings on the leading edges of the liner in ducts where the velocity exceeds 4000 feet per minute.

3.3 PREPARATION FOR SERVICE

- A. Cleaning: All ducts shall be wiped or blown clean of all dust and debris prior to the installation of grilles or diffusers. Notify the Engineer to allow for an inspection prior to installing grilles or diffusers.
- B. Contaminated Ducts: Where ducts have been contaminated by dirt or debris during the construction process, the affected duct systems shall be cleaned by an independent firm specializing in the vacuum cleaning of ductwork. All costs associated with such cleaning shall be the responsibility of the Contractor.

3.4 DUCT PRESSURE TESTING

- A. Tested Systems: All supply air duct systems shall be tested.
- B. Duct Pressure Class \leq 2-inches: Air balancers readings will be used to determine percent leakage of ductwork. Where leakage exceeds allowable by 25% or less, sealing shall be provided at all potential leak spots. Where leakage exceeds allowable by more than 25%, the system shall be re-sealed and the Sheetmetal Contractor shall pay the Balancer to re-measure and determine the new leakage rate.

3.5 COMMISSIONING

- A. The Products referenced in this section are to be commissioned per Division 01 and Section 20 08 00 - Commissioning. The Contractor has specific responsibilities for scheduling, coordination, startup, test, development, testing and documentation. At a minimum, the Contractor shall provide a documented and signed record to verify that all equipment and systems installed under this contract have been inspected and functionally tested to verify full compliance with the contract specifications. In many cases, this shall require the Contractor to create or otherwise provide procedures and checklists for approval by the Commissioning Consultant prior to the start of functional testing. Reference Division 01 and Section 20 08 00 and coordinate all commissioning activities with the Commissioning Consultant.

END OF SECTION 233100

SECTION 233300
DUCT ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

- A. Manual Dampers.
- B. Turning Vanes.
- C. Flexible Connectors.
- D. Duct Access Doors.

1.3 QUALITY ASSURANCE

- A. General: Comply with Section 20 05 00.
- B. Workmanship: Construction and installation of all duct accessories shall comply with applicable SMACNA-DCS, and exceed those standards as noted.
- C. Fire dampers, combination fire/smoke dampers, and smoke dampers shall be UL listed.

1.4 SUBMITTALS

- A. General: Submittals shall comply with Section 20 05 00.
- B. Product Data: Submit product information on all items to be used.
- C. Sound Attenuators: Submit dynamic insertion loss and pressure drop data for all sound attenuators. Submit listing of all sound attenuators by unit served, airflow application, cfm, size, velocity, and pressure drop.

1.5 REFERENCES

- A. AMCA 500D: Laboratory Methods for Testing Dampers for Rating.
- B. SMACNA-DCS: SMACNA HVAC Duct Construction Standards, 3rd Edition.
- C. UL 555S: Smoke Dampers.
- D. UL 555: Fire Dampers.
- E. UL 555C: Ceiling Dampers.

PART 2 - PRODUCTS

2.1 2.01 ACCEPTABLE MANUFACTURERS

- A. Products shall comply with Section 20 05 00, Paragraph 2.01, Acceptable Manufacturers.
- B. Manual Damper Hardware: Duro-Dyne, Young Regulator Co., Ventfabrics, Krueger, Rossi.
- C. E. Turning Vanes: Duro-Dyne, Aero-Dyne, Oil Capital Sheet Metal, Airsan.
- D. Flexible Connections: Ventfabrics, Duro-Dyne Elgen.
- E. Duct Access Doors: National Controlled Air, Ventfabrics, United-McGill, Kees, Ruskin, Vent Products, Duro-Dyne.
- F. Building Access Doors: J.R. Smith, Zurn, Acudor, Elmdoor, Kees, J.C. Industries, Milcor.

2.2 MANUAL DAMPERS

- A. Type: Manually adjustable volume dampers.
- B. Blades: Damper blades shall be fabricated of galvanized steel or stainless steel (unless a specific material is indicated), two gages heavier than duct in which installed, and in accordance with SMACNA-DCS. Maximum blade width 12 inches; fabricate multi-blade dampers with opposed blade pattern for ducts larger than 12" x 48".
- C. Regulators: Damper regulator sets shall have quadrant dial regulator with locking nut, square end bearing one side, and spring round end bearing other side (small sizes) or open end square bearing (larger sizes), axis of blade the long dimension. Multiple blade dampers shall have individual quadrants for each blade or one quadrant with interconnected blades. Regulator sets shall be Duro-Dyne model numbers (or approved equal) as follows:

<u>Max. Blade Dimension</u>	<u>Duro-Dyne Regulator Set</u>	<u>Shaft Size</u>
10" and less	KS-145, 145L	1/4"
11" to 14"	KSR-195, 195L	3/8"
15" to 23"	SRS-388, SB-138, KP105	3/8"
24" and larger	SRS-128, SB-112, KP105	1/2"

- D. Concealed Regulator: For remote damper adjustment with finished ceiling appearance. Shall consist of self-locking regulator of cast alloy construction (with serrated core, spring washer, housing, indicator, lock nut) cast into a cylindrical housing for flush ceiling installation. Housing cover shall be of steel construction, shall telescope into the regulator housing to be flush with the finished ceiling, and be secured to the housing with two screws. Provide with extension rods, linkages, miter gears, and all accessories as needed for proper damper operation. Plain Finish. Ventfabrics No. 666, 667 or Young Regulator Co. No. 301 (or approved equal).
- E. Extractor Fittings: Galvanized steel construction, 24 gauge steel blades on 2 inch centers, with worm gear operator for adjustment through face of grille. Krueger EX-88 (or approved equal).

2.3 MANUAL DAMPERS – CABLE OPERATED

- A. General: Cable operated system of dampers and rack and pinion type controller, made for use to allow remote damper adjustment.
- B. Round Dampers: Constructed of heavy duty galvanized steel duct with rolled-in stiffening beads for rigidity. Damper minimum 20 gauge galvanized steel blade secured with 1/2" diameter steel shaft and high strength Teflon bushings requiring no lubrication. Damper shall include all

necessary hardware to ensure compatibility with remote cable control system. Young Regulator Model 5020-CC (or approved).

- C. Rectangular Dampers: Opposed blade type constructed of 0.050 minimum heavy duty extruded aluminum frames and blades. Damper blades to include individual blade bushings; damper blades shall rotate between a matched pair of formed and punched 306 stainless steel connecting slide rails that facilitate smooth blade movement and ensure alignment. All necessary hardware to ensure compatibility with remote cable control system shall be included. Young Regulator Model 830A-CC series (or approved).
- D. Cable Control: Cable to consist of 0.054" stainless steel cable encapsulated in 1/16" flexible galvanized spiral wire sheath. Control hardware shall be designed for use with damper to be controlled with wall mounted. Control hardware shall include 14 gauge steel rack and pinion gear drive, controls shaft shall be flatted 1/4" diameter with 265-degree rotation provided linear travel capability. Where ceiling access is indicated provide with concealed regulator assembly; wall mounted shall have exposed knob control, with position indicator. Young Regulator Model 270-275 or 270-301 or 270-700 to suit application (or approved).

2.4 FABRIC BACKDRAFT DAMPERS

- A. Type: Airflow and gravity operated fabric blade backdraft dampers.
- B. Frame and Blades: Blades shall be made of a flexible, water-proof, fire resistant, inorganic material. Frames shall be constructed of 0.05" 6063-75 extruded aluminum.
- C. Blade Stop: 0.041" x 1/2" mesh vinyl coated galvanized steel screen.

2.5 TURNING VANES

- A. Type: Galvanized steel turning vanes to guide airflow through duct elbows to minimize pressure drop.
- B. Construction: Turning vanes shall comply with SMACNA-DCS. Vanes shall be fabricated of minimum 26 gauge galvanized steel; rails shall be fabricated of minimum 24 gauge galvanized steel. For duct widths less than 12 inches, vanes may be single wall construction; for widths 12" and greater, vanes shall be double wall "airfoil" type.
- C. Spacing: Turning vanes shall be equally spaced in accordance with SMACNA-DCS, parallel to each other, and securely attached to runners.
- D. Unequal Elbows: For elbows where the inlet and outlet dimensions are not the same, modify vane shape or angle to provide optimum turning.

2.6 FLEXIBLE CONNECTORS

- A. Type: Flexible fabric type connectors, to provide vibration isolation at equipment duct connections and to allow for movement in duct systems.
- B. Fabric:
 - 1. Width: Minimum 3" wide except at equipment 3 hp or larger with external vibration isolators fabric shall be minimum 6" wide.
 - 2. Indoor Applications: Flexible woven glass fiber fabric with neoprene coating, minimum 22 oz/sq. yard, 500 lbs x 450 lbs tensile strength. Suitable for temperatures from -40 to 200 deg F.
 - 3. Outdoor Applications and Where Exposed to Chemicals: Flexible woven glass fiber fabric with hypalon coating, ozone resistant, 24 oz/sq. yard, 225 lbs x 300 lbs tensile strength. Suitable for temperatures from -40 to 250 deg F.

4. High Temperature Applications: Fiberglass/satin weave with Teflon coating; temperature rating of minimum 500 deg F and to suit application, 400 lbs x 300 lbs tensile strength.
- C. Metal Collars: Minimum 24 gauge galvanized steel 3" wide metal edge connectors, each side of fabric, connected to fabric by folded over metal seam. Fabricate of same material as ducts connected to.
- D. Fire/Smoke Rating: Flame spread rating not over 25, and smoke developed rating not higher than 50; complying with IMC requirements and NFPA standards.

2.7 DUCT ACCESS DOORS

- A. Construction: Access doors shall be of double wall construction, made with minimum 24 gage galvanized steel, tight fitting, with sealing gasket, and cam locks (or may be hinged type with latches).
- B. Size:
 1. General: Access doors shall be of sufficient size so that items concealed in duct can be serviced and inspected, and shall be adequately sized to allow complete removal of the item being served (where removal cannot be made without disturbing fixed ductwork).
 2. Minimum size: Doors shall be minimum 14" x 14". Where duct size will not accommodate this size door, the doors shall be made as large as practicable.
 3. Large Sizes: Doors larger than 14" x 14" shall have a minimum of 4 cam locks (or where hinged type is used, have a minimum of two (2) latches).
- C. Insulation: Doors in insulated ducts shall be insulated type, with minimum 1 inch thick fiberglass insulation.
- D. Round Ducts: Access doors on round ducts shall use either lined rectangular tap off with rectangular access door or curved insulated access door (for insulated duct); or curved type un-insulated access door (for un-insulated duct).

2.8 BUILDING ACCESS DOORS

- A. Type: Hinged lockable steel access doors, for wall or ceiling installation.
- B. Construction: Minimum 16 gauge frame and 14 gauge door, concealed hinge, cam and cylinder lock, anchoring provisions, and 1" wide frame to conceal rough building opening. Provide of 18-8 stainless steel construction with No. 4 finish where used in restrooms, locker rooms, kitchens, and similar "wet" areas. Provide of steel construction with prime coated finish in other areas.
- C. Size: Size shall be 12" x 12" (unless indicated otherwise) but shall be large enough to allow necessary access to item being served and sized to allow removal of the item (where access door is the only means of removal without disturbing fixed construction).
- D. Fire Rating: Door shall maintain fire rating of element installed in; reference drawings for required rating.
- E. Keys: Access doors shall all be keyed alike. Provide two (2) keys for each door.

PART 3 - EXECUTION

3.1 MANUAL DAMPERS

- A. General: Dampers shall be fabricated and installed in accordance with SMACNA-DCS requirements for volume dampers.

- B. Locations: Install dampers at locations shown on the drawings in branch ducts to all air inlets/outlets, and at all other locations as required by the Balancer to allow for the balancing of the system. Locate dampers at a point where the damper is most accessible; orient damper regulator for best access.
- C. Non Accessible Dampers: Provide flush-mounted concealed type damper quadrants for ducts concealed in walls or non-removable ceilings and where a remote damper operator has been indicated.
- D. Initial Setting: Set and lock all dampers in the full open position prior to balancing.
- E. Extractor Fittings: Provide where indicated on the plans and at wall type inlets/outlets where such outlets cannot be served by a manual damper in the branch duct.
- F. Identification: Provide orange surveyor's tape, approximately 18" long tied to each damper regulator (except not required on dampers in ducts exposed to view in finished areas).

3.2 TURNING VANES

- A. General: Install turning vanes in all duct elbows and "T" fittings, and at locations shown on the drawings.
- B. Attachment: Securely attach turning vane runners to ductwork.

3.3 FLEXIBLE CONNECTORS

- A. General: Provide flexible connectors at all duct connections to all equipment, where ducts of dissimilar metals are connected, and where shown on the drawings. Except that flexible connectors are not required on internally spring isolated fans where the fan is located in a separate mechanical room and a flexible connector has not been shown.
- B. Round: For round ducts, the flexible material may be secured by zinc-coated, iron clinch type draw bands directly to adjoining duct; or with normal duct joining methods and using metal collars furnished with flexible connectors.
- C. C. Slack: Install flexible connections with sufficient slack to permit 1 inch of horizontal or vertical movement of ducts or equipment at flexible connection point without stretching the flexible material. At building expansion joints install sufficient flexible material to allow for 2 inch movement in any direction; provide two flexible connectors separated by a 12 inch section of duct.
- D. Outdoors: Where installed exposed to outside weather, provide a galvanized "hat" channel protecting top and vertical stretches of flexible connector from sunlight and weather.

3.4 DUCT ACCESS DOORS

- A. General: Provide duct access doors at all automatic control dampers, fire dampers, fire/smoke dampers, smoke dampers, backdraft dampers, all duct coils, thermostats, filters, control devices, and any other components in the duct system that require service or inspection. Coordinate with Division 25 to confirm quantity and location of control devices.
- B. Return and Exhaust Ducts: Provide access doors every 20 feet in return and exhaust air ductwork as required by NFPA 90.
- C. Size and Location: Access doors shall be of sufficient size and so located so that the concealed items may be serviced and inspected or completely removed and replaced.

3.5 BUILDING ACCESS DOORS

- A. General: Provide access doors in walls, floors, ceilings, etc. as indicated on the drawings and where needed to provide service access or maintenance to duct access doors, backdraft dampers, damper actuators, automatic dampers, coils, control devices, fans, HVAC equipment and similar items.
- B. Coordination: Consult architectural drawings and coordinate location and installation of access doors with trades which are affected by the installation.

END OF SECTION 233300

SECTION 233400

FANS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

- A. Ceiling Cabinet Fans.
- B. Fan Accessories.

1.3 SUBMITTALS

- A. General: Comply with Section 20 05 00.
- B. Product Data: Submit manufacturer's product data for all items to be used. Submit fan curves showing SP vs. CFM and BHP vs. CFM with system operating point clearly marked.

1.4 QUALITY ASSURANCE

- A. AMCA: Fans shall bear the AMCA certified seal unless indicated otherwise.

1.5 GENERAL REQUIREMENTS

- A. Spare Parts: Provide two complete sets of spare belts for all belt driven fans.

1.6 REFERENCES

- A. AMCA 99-0401: Classification of Spark Resistant Construction.
- B. AMCA 210: Laboratory Methods of Testing Fans for Ratings.
- C. IMC: International Mechanical Code.
- D. NFPA 96: Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.
- E. UL 762: Power Ventilators for Restaurant Exhaust Appliances.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. General: Products shall comply with Section 20 05 00. See Section 20 05 00, paragraph 2.01 for Acceptable Manufacturer requirements.
- B. Exhaust Fans: Greenheck, Twin City, Penn Barry, Cook, Carnes.
- C. Accessories: Fan manufacturers listed, NCA, Ruskin, Thybar, RPS.

2.2 GENERAL

- A. Guards: All belt drives shall be equipped with belt guards, or enclosed within fan casing. Guards shall be factory fabricated and furnished with equipment, and comply with OSHA and WISHA regulations. Exposed openings into fan housings shall be protected with substantial metal screens or gratings.
- B. Drives: Shall be sized for not less than 150% of the rated motor horsepower.
- C. Adjustable Sheaves: All belt drive fans shall have adjustable sheaves and adjustable supports for adjusting belt tension. Sheaves shall be selected so that they are at their midpoint at design conditions.
- D. Motors:
 - 1. General: Comply with Section 20 05 00. Motors on belt drive fans shall have adjustable supports for adjusting belt tension. Motor speed controllers shall be VFD type except where solid state speed controllers are provided or EC motors with integral speed controller. VFD's shall be as specified in Division 25.
 - 2. Fractional Horsepower Motors: Shall be the electronically commutated (EC) type with speed control where noted and where non-EC motors are not available which comply with code motor efficiency requirements. Unless noted otherwise, provide with manual speed control mounted at the motor for air balancers use. Motors shall be specifically designed for fan applications, have permanently lubricated ball bearings, speed controllable down to 20%, and have internal thermal overload protection.
 - 3. Belt Drive Fans: Motors shall have adjustable supports for adjusting belt tension.
- E. Performance: Fan capacity shall not be less than the values listed on the drawings. Fan performance shall be based on laboratory tests conducted in accordance with AMCA 210.
- F. Outlets and Inlets: Fans shall be furnished with attachment angles and/or flanges as required for attaching ductwork and/or flexible connections indicated.
- G. Fan Types: The type of each fan is indicated on the Fan Schedule, under the "Type" column, and corresponds to the types specified herein.
- H. Fan Arrangement and Drive: Shall be as indicated. Select motor and drive access side to allow best access and to suit available space.
- I. Electrical: Fan disconnects and motor starters shall comply with Division 26 specifications. Disconnects furnished with fan shall come factory wired to motor or shall be field wired by Division 23.
- J. Finish: All fans shall have factory applied enamel finish (manufacturer's standard color, unless noted otherwise) over a rust inhibiting primer base coat; except a painted finish is not required on rooftop type fans of aluminum or equivalent corrosion resistant construction.

2.3 CEILING CABINET FANS

- A. Type: In-line, centrifugal cabinet fan. Greenheck model CSP or approved.
- B. Housing: Shall be constructed of galvanized steel, with inlet and outlet duct connection collars, spring-loaded discharge backdraft damper, adjustable mounting brackets for wall or ceiling mounting, and minimum 1/2" - 1-1/2 lb/cubic foot density fiberglass duct liner insulation. Fan shall have access panel allowing access to fan motor and scroll without disturbing fan housing, ductwork or wiring.
- C. Fan Wheel(s): Unit shall have forward curved centrifugal type fan wheels(s). Wheel(s) shall be statically and dynamically balanced. Provide twin fan wheels when indicated on the Fan Schedule or where required to provide capacity indicated.

- D. Drive: Fan shall be direct drive, with drive assembly mounted on vibration isolators. Motor shall be energy efficient type and comply with Section 20 05 00.
- E. Electrical Disconnect Switch: Factory mounted on side of cabinet or within unit but so as to be accessible when unit is installed. Disconnect shall consist of switch or receptacle and plug-in power cord assembly; no added field devices shall be needed.
- F. Motor Speed Control: For EC type motors shall be factory wired and mounted per Section 20 05 00. For non-EC motors provide a solid state type speed controller, allowing speed reduction down to 50% of maximum. Solid state speed controller shall be for mounting in a standard junction box.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Comply with Section 20 05 00. Install in accordance with manufacturer's written installation instructions, code, applicable standards and best construction practices.
- B. Locations: Install fans at locations indicated and in accordance with the Contract Documents.
- C. Speed Controls: Fans with speed controllers shall have the speed controller mounted on the fan housing unless another location is indicated on the drawings (for use by Balancer). Install VFD's at accessible locations near item served.
- D. Connections: Provide flexible connections in ductwork connections to all fans.
- E. Vibration Isolation: Install all fans with vibration isolators so that no sound or vibration is transmitted to the structure; except not required for rooftop type fans. See Section 20 05 48 for vibration isolation specifications.
- F. Operation and Maintenance: See Section 20 05 00.
- G. Owner Instruction: Instruct Owner on the operation of each fan, including: system start-up, shut-down, emergency shut-down, normal control operation, safety aspects, maintenance and repair instructions.
- H. Start-Up: Prior to start-up inspect fans and installation to confirm proper installation and system is ready for start-up. Arrange other trades to be present as needed (i.e. balancer, electrician, etc.). Check fans for correct rotation, tighten belts to proper tension, adjust fan speeds to provide required performance, verify proper electrical and control connections, check vibration isolation (as applicable) for correct operation, and lubricate bearings per manufacturer's recommendations.

END OF SECTION 233400

SECTION 233700
AIR OUTLETS AND INLETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

- A. GRD Outlets.

1.3 DEFINITIONS

- A. GRD's: Grilles, Registers, and Diffusers.

1.4 REFERENCES

- A. AHRI 885: Procedure for Estimating Occupied Space Sound Levels in the Application of Air Terminals and Air Outlets.
- B. AMCA 500: Laboratory Methods of Testing Louvers for Rating.
- C. ASHRAE 70: Method of Testing the Performance of Air Outlets and Air Inlets.
- D. ASHRAE-F: ASHRAE Handbook of Fundamentals.
- E. SMACNA-DCS: HVAC Duct Construction Standards, 3rd Edition.

1.5 SUBMITTALS

- A. General: Comply with Section 20 05 00.
- B. Product Data: Submit product information for all items to be used.
- C. Operation and Maintenance: Submit operation and maintenance data and submittal data for inclusion in project O&M Manuals.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Products shall comply with Section 20 05 00, Paragraph 2.01, Acceptable Manufacturers.
- B. Grilles, Registers and Diffusers: Titus, MetalAire, Krueger, Price, Tuttle & Bailey, Kees, Carnes.
- C. Louvers: Ruskin, Greenheck, Leader Industries, American Warming and Ventilating

2.2 GENERAL REQUIREMENTS

- A. Type: Air outlets and inlets shall be of the size, type, and with number of throws as shown on the drawings; and shall match the appearance and performance of the manufacturers' models specified and scheduled on the drawings.

- B. Performance: Air outlet and outlet performance shall be based on tests conducted in accordance with ASHRAE 70.
- C. Sound Level: Air outlets and inlets shall not exceed a sound level of NC 30 for the size indicated and airflow rate application. Sound levels shall be determined in accordance with AHRI 885 and ASHRAE-F.
- D. Finish: Grilles, Registers and Diffusers shall have factory applied finish, color as selected by Architect/Engineer, except where indicated to have a brushed aluminum finish (or other finish type). Finish shall be an anodic acrylic paint, baked on, with a pencil hardness HB to H. Pint shall pass a 90 hour ASTM B117 salt spray test, 250 hour ASTM D870 water immersion test, and an ASTM D2794 reverse impact test with at least a 50 inch-pound force applied.
- E. Frame Style: Provide air outlets and inlets with frame style to match ceiling or wall construction installed in. Where supply air outlets or inlets are installed in T-bar ceiling systems, they shall be factory installed in 2' x 2' or 2' x 4' metal panel to match ceiling layout. Where installed against gypsum board surface, brick or similar hard surface, or where exposed, provide with 1-1/4-inch wide outer border. Where space does not permit installing 2' x 2' metal panel, provide outlets or inlets with 1-1/4-inch wide outer border. Where air outlets are installed adjacent to surface mounted light fixtures, outlets shall have 4-inch deep drop frames. (See reflected ceiling plan and/or electrical lighting plan for ceiling and lighting types).
- F. Transfer Grilles: Ceiling transfer grilles shall be same as ceiling exhaust grilles (CEG) unless noted otherwise; wall transfer grilles (WTG) shall be same as wall exhaust grilles (WEG) (unless noted otherwise).
- G. Construction: Air outlets and inlets shall be of steel or aluminum construction except that:
 - 1. Where noted to be constructed of a specific material, shall be as noted.
 - 2. In assemblies with a required fire rating and required to have fire dampers shall be of steel construction.
 - 3. In wet areas or subject to condensation (i.e., locker rooms, restrooms, kitchens, exterior soffits, etc.), where not used in fire rated assemblies, shall be of aluminum construction.
 - 4. Air outlets and inlets in the same room, area, or within common view shall be constructed of the same material.

2.3 SUPPLY AIR OUTLETS

- A. Ceiling Diffuser (CD): Aluminum or steel construction, modular core, with multiple curved (or angled) discharge blades, and square neck. Cores shall consist of four separate sections which can be repositioned to allow for one, two, three or four way discharges. Cores shall be easily removed with no tools required. Krueger 1240 Series, Titus MCD, MCD-AA Series (or approved equal).
- B. Ceiling Diffuser – Perforated (CDP): Perforated ceiling grilles used for supply, of aluminum construction, with 0.055-inch thick aluminum plate, having 3/16-inch diameter perforations on 1/4-inch staggered centers to provide no less than 51% free area.

2.4 LOUVERS

- A. Type: High performance, 6" deep, stationary, drainable louvers. Ruskin Model ELF6375DX (or approved).
- B. Frame: 6" deep, constructed of minimum 0.090" 6063t5 extruded aluminum, with integral downspouts in jambs and mullions.
- C. Blades: Shall be constructed of minimum 0.081" 6063t5 extruded aluminum, positioned at 37.5 degree angle on approximately 5-7/8" centers, with drain gutters.

- D. Bird Screen: Shall be constructed of 3/4" mesh, 0.051" aluminum.
- E. Performance: Rated in accordance with AMCA 500. For a 48" x 48" louver, minimum free area of 57%, with pressure drop not exceeding 0.10 inches w.g. at 800 feet per minute. No measurable water penetration at velocity below 1000 feet per minute.
- F. Wind Loading: Louver shall incorporate structural supports required to withstand a wind load of 25 lb. per square foot.
- G. Finish: Kynar Finish; color as selected by Architect. Provide with same finish and color as specified in Section 07600 for metal flashing.

2.5 MISCELLANEOUS

- A. Goosenecks: Shall be made of minimum 18 gauge galvanized steel, in accordance with SMACNA-DCS, and as shown on the drawings.
- B. Screen: 1/2-inch mesh, constructed of either 0.051-inch aluminum wire or 19 gauge galvanized steel wire.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install air outlets and inlets in locations indicated and so as to conform with building features and coordinated with other work. See hangers and supports specification Section for supports and additional requirements.
- B. Location Verification: Verify all air inlet/outlet locations with building features and other trades prior to installing any duct systems that will connect to the air outlets/inlets. For locations where air inlet/outlet location is noted to be verified, or location is not clear, develop shop drawings showing the proposed location, or the location that best suits field conditions, and submit for review.
- C. Connections: Furnish all necessary screws, clips, duct collars, and transitions required to allow for the installation and connection of ductwork to all air outlets/inlets. Connect all ductwork to air inlets and outlets with fasteners, minimum one each side and in compliance with SMACNA-DCS. See ductwork specification Section for sealing and additional requirements.
- D. Painting:
 - 1. Paint ductwork and accessories which are visible behind air outlets and inlets flat black. Painting to include ductwork, duct liner, turning vanes, liner attachments, and all visible items (including fastening pins for duct lining).
 - 2. Coordinate with the Division 09 Contractor for any necessary painting of air outlets/inlets/louvers prior to installation.
- E. Weather Exposure: All outlets and inlets exposed to the weather shall be adequately flashed and installed in a manner to assure complete weatherproofness. Sealing and caulking of all outlets and inlets exposed to the weather shall conform to and Section 20 05 30.
- F. Screened Openings: Provide screened openings (SO) on all duct openings where indicated and where openings do not have grilles or registers.
- G. Louver Blank-Offs: Where louvers require blanking off of unused area, use minimum 22 gauge galvanized sheetmetal, painted flat black on louver side, and insulated on building side with 2-inch duct liner (or thermally equivalent rigid fiberglass insulation). Tape off all raw edges of liner. Where exposed to view, provide galvanized sheetmetal cover (with bent over edges) to fully cover all insulation and match louver size.

- H. Louver: Slope bottom of all ducts within 18 inches of connecting to louvers at minimum 1% slope toward bottom of louver; seal all joints within 6-inches of bottom of ductwork water tight.

END OF SECTION 233700

SECTION 237223
ENERGY RECOVERY VENTILATOR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

- A. Energy Recovery Ventilators
- B. Start-up

1.3 SUBMITTALS

- A. General: Submittals shall comply with Section 20 05 00.
- B. Product Data: Submit product information on unit including fan curves, coil performance, unit construction details, wiring diagram, data showing energy recovery, filter data, and weight.
- C. Shop Drawing: Submit drawings of unit showing all dimensions, locations of unit components, and point of connection of all utilities.
- D. Operation and Maintenance: Submit Operation and Maintenance data and submittal data for inclusion in project O&M Manuals.

1.4 GENERAL REQUIREMENTS

- A. Standardization: All units of the same type shall be the product of the same manufacturer.
- B. Substituted Equipment: The drawings show design configuration based on a particular manufacturer's equipment (i.e. basis of design). Use of another manufacturer's equipment (i.e. substituted equipment) that is configured different from what is shown will require redesign of mechanical ductwork, piping, electrical, structural, unit support systems, and general building construction to accommodate the substituted equipment. Such redesign shall meet the requirements and have the approval of the Architect/Engineer prior to fabrication. Contractor shall submit complete shop drawings showing all alternate unit installation plans and details; shop drawings shall comply with Section 20 05 00. The redesign shall be equal or superior in all respects to the Architect/Engineer's design (as judged by the Architect/Engineer), including such aspects as equipment access, ease of maintenance, duct connection locations, unit electrical requirements, noise considerations, vibration unit performance, and similar concerns. Cost of redesign and all additional costs incurred to accommodate the substitutional equipment shall be borne by the contractor. Contractor is cautioned that certain aspects of the equipment cannot be fully evaluated until items are installed and operational, and all added costs after installation to make units equal to the basis of design shall be by the Contractor.

1.5 REFERENCES

- A. AMCA 230: Laboratory Methods of Testing Air Circulating Fans for Rating and Certification.

- B. AHRI 1060: Standard for Performance Rating of Air-to-Air Exchangers for Energy Recovery Ventilation Equipment.

1.6 WARRANTY

- A. General: See Division 00 and Section 20 05 00 for basic warranty requirements.
- B. Extended Warranty: The ERV core shall be warranted to be free of manufacturing defects and to retain its functional characteristics, under circumstances or normal use, for a period of ten years from the date of purchase. The balance-of-unit shall be warranted to be free of manufacturing defects and to retain its functional characteristics, under circumstances of normal use, for a period of two years from the date of installation.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Products shall comply with Section 20 05 00, Paragraph 2.01, Acceptable Manufacturers.
- B. Energy Recovery Ventilator: RenewAire, ConsERV.

2.2 GENERAL

- A. Guards: Exposed openings into fan housings shall be protected with substantial metal screens or gratings. Electrical components with shock potential shall be physically protected and labeled (label as to hazard and items being accessed).
- B. Fan Balancing: The shaft and fan wheel(s) shall be factory statically and dynamically balanced.
- C. Motors: Shall be UL listed and comply with Section 20 05 00. Motor efficiency shall comply with Code. Motors shall have integral thermal protection with automatic reset.
- D. Outlets and Inlets: Equipment shall be furnished with attachment angles and/or flanges to allow for attaching external ductwork.
- E. Fan Performance: Shall be based on laboratory tests conducted in accordance with AMCA 230. Fan capacity shall not be less than the values scheduled on the drawings and shall be constructed to be able to operate with total pressures 20% higher than that indicated.
- F. Controls: Coordinate with Division 25 Contractor for required interfaces between air handling equipment and building control system.
- G. Gasketing: Where units are furnished in sections, unit manufacturer shall furnish unit with gasketing to allow sealing of adjoining sections.
- H. Sound Tests: Shall be done by fan manufacturer in an AMCA certified sound testing laboratory. Sound tests shall be conducted in accordance with AMCA 300. Provide necessary testing and calculations to develop required sound data. Tested sound power levels shall not exceed specified levels by more than 3 dB in any octave band.
- I. Factory Tests: Every unit shall be factory tested prior to shipping. Tests shall include (as a minimum): Motor dielectric voltage-withstand test, unit dielectric voltage-withstand test, continuity of internal control circuits test, unit amperage test, proper fan operation.

2.3 RECOVERY VENTILATOR

- A. Type: Indoor energy recovery ventilator using fixed plate enthalpy heat exchanger.

- B. General:
 - 1. Unit shall be complete single package, self contained factory assembled unit, requiring only electrical, duct, and control connections to operate.
 - 2. Capacity: Shall be as scheduled at the conditions noted.
 - 3. Unit configuration shall be as shown on plans.
- C. Cabinet:
 - 1. General: Constructed of minimum 20 gauge G-90 galvanized steel, reinforced and constructed for maximum anticipated static pressures involved, but no less than 4" w.c. with cabinet leakage less than 1% of scheduled airflow.
 - 2. Liner: Interior of cabinet shall be insulated with minimum 1-inch thick, 4 pound per cubic foot density foil scrim faced fiberglass insulation to provide a cleanable surface. Double-wall construction with foam injected insulation and interior 20 gauge G-90 galvanized steel is also acceptable.
 - 3. Access Doors: Constructed same as cabinet, size to access unit internals, with full perimeter gasket. Doors shall be opened by releasing multiple latches or similar method requiring no tools.
- D. Fan(s): Integral supply and exhaust fans, direct drive, steel or aluminum construction, multi-blade centrifugal type. Motors shall be ECM type.
- E. Energy Recovery Core:
 - 1. General: Total enthalpy type, capable of transferring both sensible and latent energy between airstreams. Latent energy transfer shall be accomplished by direct water vapor transfer from one airstream to the other, without exposing transfer media in succeeding cycles directly to the exhaust air and then to the fresh air. No condensate drains shall be required.
 - 2. Certifications: The energy recovery cores used in these products shall be third party Certified by AHRI 1060 for Energy Recovery Ventilators. AHRI published certifications shall confirm manufacturer's published performance for airflow, static pressure, temperature and total effectiveness, outdoor air (OACF) and exhaust air leakage (EATR). OACF shall be no more than 1.02 and EATR shall be a 0% against balanced airflow.
- F. Filters: Unit shall be provided with filter racks for accommodating 2" thick filters (unless noted otherwise), with minimum filter area (or sizes) as scheduled. Access to filters shall be through unit access doors.
- G. Electrical:
 - 1. General: Unit shall be for use with single point electrical power connection. Unit shall be furnished with all necessary wiring, raceway, transformers, contactors, relays, motor starters, and accessories with power and controls connected to all unit devices for unit operation and with the specified sequence. Electrical shall comply with NEC and local code requirements. Unit shall have a main fused power disconnect. Disconnects shall comply with NEC, and be accessible from outside unit enclosure.
- H. Controls: Unit control shall be by Section 23 09 33 (unless otherwise noted); unit shall have limited factory controls to provide necessary safeties and to allow for control by Section 23 09 33. Section 23 09 33 shall enable unit fans when "run" terminals are connected. Unit shall be furnished with all necessary relays, starters, wiring terminal strips, timers, safety devices, etc. to allow for the sequence of operation as specified in Section 23 09 33 using the Section 23 09 33 control system. Unit wiring shall be color coded and numbered corresponding to unit's wiring diagram. Access panels to unit controls shall be hinged with latches (or equivalent device), requiring no tools to open. Provide output contact for use by Division 23 controls contractor for Electric Duct Heater. Provide contacts for use by Division 23 controls contractor for control of OA and Relief Dampers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install the units as shown on the drawings, in accordance with manufacturer's instructions, Code, and best construction practices.
- B. Locations: Install at locations indicated, to allow for maintenance access and proper clearances.
- C. Duct Connections: Provide flexible connections in ductwork connections to units.

3.2 START-UP

- A. Initial Checks: Prior to operating units, checks shall be made to insure that adequate voltage, duct connections, electrical connections, control connections, and other items as listed by the manufacturer are properly provided/connected and ready to ensure safe and proper unit operation.
- B. Testing and Adjustment: Operate unit to test for proper operation, including fan rotation, and correct interface to other controls.

END OF SECTION 237223

SECTION 238127

VRF SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

- A. VRF Split System Heat Pumps.
- B. Refrigerant Piping.
- C. System Controls and Control System Design.
- D. System Interface to Other Controls.
- E. Start-up and Commissioning.

1.3 QUALITY ASSURANCE

- A. Listing: Units shall be listed by an approved testing agency for the use and application intended.
- B. Ratings and Certification: Unit performances shall be tested and rated in accordance with AHRI Standards and shall be AHRI certified.
- C. Energy Efficiencies: Equipment energy efficiencies shall not be less than code requirements and shall exceed code efficiencies as indicated.
- D. Installer Qualifications:
 - 1. General: The installer shall have experience installing VRF systems by the manufacturer being used for this project. Installer shall be certified by the VRF system manufacturer as a "certified installer".
 - 2. Refrigeration Components: Shall be installed by a licensed refrigeration mechanic having experience with VRF systems, and the work shall be supervised by personnel trained by the VRF system manufacturer.
 - 3. Controls: Control work shall be done by individual trained and certified by the VRF manufacturer for the installation of the specified controls.

1.4 SUBMITTALS

- A. General: Comply with Section 20 05 00.
- B. Product Data: Provide complete product information submittals on all units; include performance capacities as a function of indoor and outdoor coil db/wb temperatures and indoor coil air flow rates, supplementary heater capacity, fan performance (cfm vs. esp), and information on all filters and accessories.
- C. Refrigerant Piping: Submit proposed refrigerant pipe sizes, schematic of routing, and refrigerant system accessories.

- D. Control Shop Drawings: Submit shop drawings of complete control system, including the following information: interconnect drawings showing all wiring and control connections, all control device locations, sequence of operation for all controlled systems, building floor plans with all proposed thermostat and other control device locations shown.
- E. Installer Qualifications: Submit qualifications of the personnel installing the refrigeration system components and the system controls (when requested by the Engineer).

1.5 GENERAL REQUIREMENTS

- A. System Type: System shall be a Variable Refrigerant Flow (VRF) heat pump system, allowing for simultaneous heating and cooling modes operation of indoor units, with indoor units operating independently of other indoor units, changeover from one mode to the other (heating to cooling, cooling to heating) with no interruption to system operation, and the recovery of energy between units in different modes. The system shall be capable of accommodating a range of the sum of all indoor unit capacity, from 50% to 150% of outdoor unit capacity.
- B. Standardization: In interests of Owner's standardization, all system heat pumps and heat pump controls shall be the product of the same manufacturer.
- C. Alternate Manufacturers: The project has been designed around equipment by the manufacturer scheduled on the drawings. Alternate manufacturers may be used (see Acceptable Manufacturers, Section 20 05 00); however, any redesign (from what is shown on the drawing) to mechanical, electrical, structural, or general construction to accommodate such an alternate manufacturer shall be provided by the Contractor. Furthermore, such redesign shall meet the requirements and have the approval of the Architect/Engineer prior to fabrication. Contractor shall submit complete shop drawings showing all alternate installation plans and details; shop drawings shall comply with Section 20 05 00. The redesign shall be equal or superior in all respects to the Architect/Engineer's design, including such aspects as equipment access, ease of maintenance, duct connection locations, unit electrical requirements, noise considerations, unit performance, and similar concerns. Cost of redesign and all additional costs incurred to accommodate the alternate heat pumps shall be borne by the Contractor.
- D. Refrigerant Pipe Sizing: Due to the use of proprietary selection criteria by the heat pump manufacturers, the heat pump supplier shall size all refrigerant piping between the indoor and outdoor units and provide such sizes to the installing Contractors prior to the bid date. The heat pump supplier shall also determine the need for any additional accumulators, solenoid valves, and similar accessories and size/select such devices and inform potential installing contractors to allow proper bids. The heat pump supplier is obligated to furnish complete heat pump units, with properly calculated pipe sizes and accessories so as to allow the unit performances as scheduled.
- E. Electrical and Controls: Component wiring shall comply with NEC and be color coded and numbered and match unit wiring diagrams. All necessary terminal blocks, fuse, wiring, junction boxes and electrical/control accessories shall be factory installed within the unit cabinet (unless noted otherwise).

1.6 WARRANTY

- A. General: See Division 00 and 01 for general warranty requirements.
- B. Warranty - VRF System Equipment:
 - 1. Basic: Entire heat pump (outdoor and indoor sections) shall be warranted by the manufacturer to be free from all manufacturing defects and capable of providing satisfactory operation for the project warranty period. Repair and/or replacement of defective items (labor and parts) during the project warranty period shall be at no additional cost to the Owner.

2. Extended: Compressors and all coils shall be warranted by the manufacturer to be free from defects and capable of operating satisfactorily for a period of 5 years beyond the basic project warranty. Extended Warranty shall cover all warranted parts and associated shipping to the site, with repair labor by the Owner.
- C. Warranty - VRF System Controls:
1. Basic: System shall be warranted for the project warranty period to provide the sequence of operation and basic features specified, with the accuracy and flexibility specified. The system shall be repaired or replaced, including materials and labor, if in Owner's reasonable opinion, system is other than as warranted.
 2. Emergency Service: During the warranty period maintain a 24-hour emergency phone service and be able to respond by a trained and qualified Controls Engineer familiar with the installed system.
 3. Warranty Service Allowance: Include 8 hours of control technician/programmer's time for special service (i.e. software changes, system consultation, setting up additional trends, etc.) and other services during the warranty period as required by the Owner or Engineer. The Owner and Contractor will jointly track the amount of time used. Only time directly authorized and agreed to by the Owner may be tracked as part of this allowance. This allowance is for work outside of other required project work, and is for specific tasks assigned to the Contractor by the Owner or Engineer.
 4. End of Warranty Service: At the end of the warranty period, the Contractor shall provide a re-check of the entire system operation, including calibration testing of a sample number of components and providing any necessary control adjustments for proper system operation. Such work shall be for a minimum of 8 hours on site.
 5. Extended Warranty: Controls and control system shall be warranted for 2 years, beyond the project warranty period.

1.7 REFERENCES

- A. AHRI 210/240: Standard for Unitary Air Conditioning and Air Source Heat Pump Equipment.
- B. AHRI 350: Standard for Sound Rating of Indoor Air Conditioning Equipment.
- C. AHRI 270: Standard for Sound Rating of Outdoor Unitary Equipment.
- D. AHRI 1060: Performance Rating of Air-to-Air Exchangers for Energy Recovery Ventilation Equipment.
- E. ASME B16.22: Standard for Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- F. ASME B16.26: Standard for Cast Copper Alloy Fittings for Flared Copper Tubes.
- G. ASME B280: Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Products shall comply with Section 20 05 00, Paragraph 2.01, Acceptable Manufacturers.
- B. VRF Heat Pumps: Mitsubishi, Carrier, Toshiba, Samsung, Daikin.
- C. Refrigerant Pipe and Fittings: Domestic made products only.

2.2 SPLIT SYSTEM HEAT PUMP - OUTDOOR UNIT

- A. Type: VRF air-to-air heat pump, outdoor section, for serving multiple indoor units.

- B. Capacity: Units shall allow the indoor units to have the minimum cooling and heating capacities scheduled on the drawings at the conditions shown; rated in accordance with AHRI standards.
- C. General: Unit shall be fully factory assembled and shall be complete with casing, coils, fans, compressor, piping, wiring, controls, and all other accessories required to be ready for field connections and operation. Unit shall be capable of operating in the cooling mode from 30 to 125 degrees F ambient, and in heating mode from 0 to 65 degrees F ambient. Unit shall be factory run-tested to verify proper heating, cooling, defrost, control, and fan operation.
- D. Unit Casing: Shall be constructed of galvanized steel, bonderized and finished with manufacturer's standard color. Casing shall be able to withstand 960 hours per ASTM B117 criteria.
- E. Compressor(s): Shall be high performance, inverter driven, modulating capacity scroll type. Compressor shall have internal overcurrent protection and thermal overload protection, high pressure safety switch, and crankcase heaters. Compressor(s) shall be mounted to avoid transmission of vibration.
- F. Refrigerant Circuit: Units shall be for use with refrigerant R-410A and shall be fully charged at the factory for the piping and indoor units used with. Unit shall include an accumulator with refrigerant level sensors and controls.
- G. Coils: Shall be of nonferrous construction with lanced or corrugated plate fins on copper tubing, with a factory applied corrosion resistant finish and integral metal guard protector.
- H. Fan: Shall be direct drive, variable speed propeller type with a raised guard to prevent contact with moving parts. Fan motor shall have permanently lubricated bearings and inherent overcurrent protection.
- I. Electrical and Controls: Units shall be for use with power of voltage and phase as scheduled on the drawings. Unit shall have over-current protection and DC bus protection. Unit shall include all controls for units components, interconnection to other system components for automatic operation, safeties to prevent unsafe operation, to accommodate system defrost, and to allow for 8 stages of operation. Units controls shall be 24 volt.
- J. Sound: Unit shall have a sound rating not higher than 60 db(A) individually, and 64 dB(A) where twinned. In "night mode" unit shall have a sound rating not higher than 50 db(A) individually, and 53 dB(A) where twinned.

2.3 SPLIT SYSTEM HEAT PUMP – INDOOR - CEILING CASSETTE

- A. Type: Indoor VRF heat pump for overhead suspended installation in a ceiling (or at ceiling height).
- B. General: Unit shall be fully factory assembled and shall be complete with fan, four-way discharge outlet, evaporator coil, refrigerant metering device, heavy gauge steel chassis, refrigerant piping controls, condensate pan, drain connection, and related accessories to operate properly with VRF system.
- C. Capacity: Unit shall have minimum cooling and heating capacities as scheduled on the drawings at the conditions shown and with the outdoor unit indicated; rated in accordance with AHRI standards.
- D. Unit Casing: Fabricated of galvanized steel, with support provisions for hanging from building structure. Unit shall have bottom discharge grille, adjustable for two, three, or four-way discharge. Grille vane angles shall be adjustable via room wall thermostat. Exposed portion of unit shall have finished paint, manufacture's standard color.
- E. Refrigerant Circuit: Shall be fully factory piped and shall include an electronic linear thermostatic expansion device to allow for both heating and cooling operation. Units shall be factory charged with dehydrated air (or an inert gas).

- F. Coil: Non-ferrous construction with plate fins on copper tubing, with all joints silver brazed. Coils shall be factory tested to a minimum of 1.5 time's normal working pressure. Coil shall have corrosion resistant drain pan and drain fitting; configured to allow draining either end of unit. Unit shall have an integral condensate pump, rated for unit condensation rate and 2.5 feet of head.
- G. Fan: Direct drive, multi-speed type, statically and dynamically balanced, with permanently lubricated motor, manually adjustable guide vanes for side to side discharge, and a motorized discharge louver directing air up and down automatically. Fan speed shall be adjustable via room wall thermostat to a set level, or be able to be set to vary according to heating or cooling demand.
- H. Filter: Unit shall have an integral washable filter, easily removable.
- I. Electrical and Controls: Unit shall be for use with power of voltage and phase as scheduled on the drawings. Unit shall include all controls for unit's components, interconnection to other system components, and to provide the specified sequence of automatic operation. Unit shall include controls providing self-diagnostic checks, auto restart (on power outage or loss of control communication), test run switch, auxiliary contacts for control of an external heat source, four digital inputs for custom control applications, and three digital outputs for custom control applications.
- J. Condensate Pump:
 - 1. Provide unit with condensate pump. Where not available internal to unit, or where internal pump doesn't meet the pumping capacity required, provide external type, with controls, and gpm capacity to suit unit maximum condensate rate, at 10 feet of head. Provide mounting assembly, accessories for complete connections, and an architectural cover to match the finish of the unit to minimize visibility.
 - 2. Provide unit with high level condensate overflow sensor. Sensor shall detect high condensate levels in the indoor unit and stop indoor unit operation before an overflow can occur. Provide mounting assembly and accessories required to install on specified indoor unit.

2.4 SPLIT SYSTEM HEAT PUMP – INDOOR - WALL MOUNT

- A. Type: Wall mounted indoor VRF heat pump, ductless.
- B. General: Unit shall be fully factory assembled and shall be complete with fan, adjustable discharge outlet, evaporator coil, refrigerant metering device, heavy gauge steel chassis, refrigerant piping controls, condensate pan, drain connection, and related accessories to operate properly with VRF system.
- C. Capacity: Units shall have minimum cooling and heating capacities as scheduled on the drawings at the conditions shown and with the outdoor unit indicated; rated in accordance with AHRI standards.
- D. Unit Casing: Fabricated of galvanized steel, with wall mounting plate, and manufacturers standard white painted finish on exposed portion of unit. Unit shall have manually adjustable guide vanes for side to side discharge, and a motorized discharge louver directing air up and down automatically. Discharge louver automatic operation and position shall be adjustable via room wall thermostat.
- E. Refrigerant Circuit: Shall be fully factory piped and shall include an electronic linear thermostatic expansion device to allow for both heating and cooling operation. Units shall be factory charged with dehydrated air (or an inert gas).
- F. Coil: Non-ferrous construction with plate fins on copper tubing, with all joints silver brazed. Coils shall be factory tested to a minimum of 1.5 time's normal working pressure. Coil shall have corrosion resistant drain pan and drain fitting; configured to allow draining either end of unit.

- G. Fan: Direct drive, multi-speed type, statically and dynamically balanced, with permanently lubricated motor. Fan speed shall be adjustable via room thermostat to a set level; or be able to be set to vary according to heating or cooling demand.
- H. Filter: Unit shall have an integral washable filter, easily removable.
- I. Electrical and Controls: Unit shall be for use with power of voltage and phase as scheduled on the drawings. Unit shall include all controls for unit's components, interconnection to other system components, and to provide the specified sequence of automatic operation. Unit shall include controls providing self-diagnostic checks, auto restart (on power outage or loss of control communication), test run switch, auxiliary contacts for control of an external heat source, four digital inputs for custom control applications, and three digital outputs for custom control applications.
- J. Condensate Pump:
 - 1. Provide unit with condensate pump. Where not available internal to unit, or where internal pump doesn't meet the pumping capacity required, provide external type, with controls, and gpm capacity to suit unit maximum condensate rate, at 10 feet of head. Provide mounting assembly, accessories for complete connections, and an architectural cover to match the finish of the unit to minimize visibility.
 - 2. Provide unit with high level condensate overflow sensor. Sensor shall detect high condensate levels in the indoor unit and stop indoor unit operation before an overflow can occur. Provide mounting assembly and accessories required to install on specified indoor unit.

2.5 SPLIT SYSTEM HEAT PUMP – INDOOR – FAN COIL

- A. Type: Suspended indoor VRF heat pump, ducted, fan coil.
- B. General: Unit shall be fully factory assembled and shall be complete with fan, motor, evaporator coil, refrigerant metering device, heavy gauge steel chassis, refrigerant piping controls, condensate pan, drain connection, and related accessories to operate properly with VRF system.
- C. Capacity: Units shall have minimum cooling, heating, and airflow capacities as scheduled on the drawings at the conditions shown and with the outdoor unit indicated; rated in accordance with AHRI standards.
- D. Unit Casing: Fabricated of galvanized steel, with provisions for hanging from above. Provide with access doors for side access.
- E. Refrigerant Circuit: Shall be fully factory piped and shall include an electronic linear thermostatic expansion device to allow for both heating and cooling operation. Units shall be factory charged with dehydrated air (or an inert gas).
- F. Coil: Non-ferrous construction with plate fins on copper tubing, with all joints silver brazed. Coils shall be factory tested to a minimum of 1.5 time's normal working pressure. Coil shall have corrosion resistant drain pan and drain fitting; configured to allow draining either end of unit.
- G. Fan: Direct drive, multi-speed type, statically and dynamically balanced, with permanently lubricated motor. Air speed shall be adjustable via room wall thermostat to a set level, or set to vary according to heating or cooling demand.
- H. Filters: Unit shall have factory filter box, sized to accommodate filters (size and type) as indicated, with side or bottom access, requiring no tools to access filters. Filter MERV rating shall be rated in accordance with ASHRAE 52.2.
- I. Electrical and Controls: Unit shall be for use with power of voltage and phase as scheduled on the drawings. Unit shall include all controls for unit's components, interconnection to other system

components, and to provide the specified sequence of automatic operation. Unit shall include controls providing self-diagnostic checks, auto restart (on power outage or loss of control communication), test run switch, auxiliary contacts for control of an external heat source, four digital inputs for custom control applications, and three digital outputs for custom control applications.

J. Condensate Pump:

1. Provide unit with condensate pump. Where not available internal to unit, or where internal pump doesn't meet the pumping capacity required, provide external type, with controls, and gpm capacity to suit unit maximum condensate rate, at 10 feet of head. Provide mounting assembly, accessories for complete connections, and an architectural cover to match the finish of the unit to minimize visibility.
2. Provide unit with high level condensate overflow sensor. Sensor shall detect high condensate levels in the indoor unit and stop indoor unit operation before an overflow can occur. Provide mounting assembly and accessories required to install on specified indoor unit.

2.6 BRANCH CIRCUIT CONTROLLER

- A. Type: Refrigerant Branch Circuit (BC) Controller controlling refrigerant flow and with controls and accessories for system heating/cooling operation.
- B. General: The BC Controller shall be fully factory assembled, and complete with all piping, valves, controls, and wiring. Unit shall be factory run tested. Provide unit size and capacity appropriate for the system and number/size of indoor units.
- C. Unit Cabinet: Fabricated of galvanized steel, sized to enclose all components. An integral condensate pan and drain connection shall be provided. Provided with factory supplied condensate pump.
- D. Refrigerant Circuit: Unit shall have multiple tow-position automatic refrigerant valves to control refrigerant flow, and each branch line shall have a service valve to allow servicing any indoor unit without interruption of service to other units. Unit shall have a liquid-gas separator a tube-in-tube heat exchanger. Linear electronic expansion valves shall be provided for control of refrigerant flow.
- E. Electrical: Unit shall be for use with power of voltage and phase as scheduled on the drawings. Unit shall include all controls for proper operation interconnection to other system components.

2.7 VRF SYSTEM CONTROLS

- A. General:
 1. System shall have VRF manufacturer's controls to control all space indoor units, heat recovery unit, outdoor unit, and additional HVAC system components, as a unified system. System shall provide the sequence of operation specified.
 2. The control system shall consist of a low voltage communication network of controllers and control devices, communicating over a high-speed communication bus, with a web-based operator interface. A web controller with a network interface shall gather data from the VRF and HVAC control system and generate web pages accessible through a conventional web browser for PC's connected to the network. Operators shall be able to perform all normal operator functions through the web browser interface.
 3. System shall be capable of email generation for remote alarm annunciation.
 4. Provide all control system software, programming, and control devices to allow for the system operation, the specified sequence, specified features, and to allow remote access via a standard web browser. Provide graphics accessible by the web browser which display the systems in a schematic fashion with system data overlayed on the graphics. Provide all software licensing to the project Owner.

- B. EMCS Interface: System controls shall have BACnet interface for connection to a future building EMCS to allow the EMCS to monitor complete system operation and to allow enable/disable of the overall system components (i.e. placing in off or auto modes remotely).
- C. Room Thermostats: Shall provide space temperature control for indoor units, completely independent of other indoor units. Thermostats shall include: occupant setpoint adjustment of plus or minus 3 deg F, room temperature display, room setpoint display, fan speed adjust, indoor unit diagnostics, discharge vane/louver adjust (where indoor units are specified with adjustable vanes/louvers), and related features as specified with the system equipment.
- D. Master Controller:
 - 1. General: Shall provide time schedule, warm-up, optimum start, night setback, monitoring system status, unit on/off control, unit airflow control, temperature settings, and other control functions for the system and to serve as one of the users' interface. Shall allow for system programming, start-up, trouble-shooting, setup, and provide the specified sequence of operation. Wall mounted, backlit, color touch panel, with visual display of all settings, and system diagnostics.
 - 2. Communication Ports: Controller shall be equipped with two RJ-45 Ethernet ports to support interconnection with a network PC via a closed/direct Local Area Network (LAN) or to a network switch for IP communication to other controllers for display of up to two hundred indoor units.
 - 3. Scheduling:
 - a. Time Schedules: The Control System shall provide time clock schedule with at least 20 time schedules. Each schedule to be 8-day type, 5 entries per day. All entries to be in 12 hour AM/PM format. The complete schedule shall be displayed at one time on the master controller for easy editing. Each time program shall be able to include on/off, high/low speeds, temperature setpoints, duty cycle commands, as required to provide the specified sequence of operation.
 - b. Holiday Schedules: A minimum of 20 holiday time schedules shall be available and shall be assigned to any number of available points. Holiday schedule shall display entire year and shall also allow for an interval holiday time, program showing holiday start date to end date (example: December 24 to January 2).
 - 4. Warm-up Mode: Control System shall have warm-up mode prior to occupied mode on heating to pre-warm building prior to occupancy. Time of beginning warm-up cycle shall be determined by an optimum start/stop program.
 - 5. Optimum Start/Stop: Control System shall have optimum start/stop program to reduce run time of HVAC equipment. Optimum start/stop program shall consider building mass, building temperatures, outdoor air temperatures, and other system factors in determining time of system start-up or shut-down. Program shall record previous warm-up times versus actual warm-up times and shall adjust the program algorithm so that program calculated warm-up time corresponds to actual.
 - 6. Standard software functions shall be available so that the user can securely log into each master controller via the PC's web browser to support operation monitoring, scheduling, error email, interlocking and online maintenance diagnostics.
- E. Sub-Controllers: Controllers providing control system equipment in conjunction with the VRF system and master controller. Controller capabilities shall be as required to provide the specified sequence of operation and communicate via the VRF control system network. Controls to include inputs/outputs as required for the application for adjustment of system setpoints, control HVAC equipment (VRF and non-VRF), detect system errors, and monitor system (and equipment) status. See specified sequence of operation for requirements and specified system features.
- F. Input/Output Devices: Devices with binary and analog inputs/outputs to control general HVAC equipment in conjunction with the VRF system, master controller, and sub-controllers. Device capabilities shall be as required to provide the specified sequence of operation and communicate

via the VRF control system network. See specified sequence of operation for requirements and specified system features.

G. Wiring and Conduit:

1. General: As manufacturer's system requires; complying with Division 26, and in accordance with NEC.
2. Low Voltage: Multi-conductor, 16 AWG, twisted, stranded shielded wire; unless required otherwise by the VRF system manufacturer.
3. Network Wiring: CAT-5 with RJ-45 connection; unless required otherwise by the VRF system manufacturer.

H. Labels:

1. General: Shall comply with Section 20 05 00.
2. Control Devices: Labels on control devices shall use the same designation that appears on the control shop drawings and an indication as to purpose; except that devices in finished rooms shall be labeled as to the generic item controlled for better user understanding (i.e. "Room Exhaust Fan", "Hood Fan").
3. Wiring: Wiring labels shall be the self-laminating or heat shrink type with numbering, lettering, or an alpha-numeric identifier indicating the wire signal/power purpose and matching the designation that is used on the control drawings

I. Control Cabinets: Wall mounted, NEMA rated construction, type and rating to suit location environment, UL listed, minimum 14-gauge sheet metal, hinged front door with latch. Size as required to house controls. Controls/devices shall be logically assembled in cabinet, with all devices and cabinet labeled.

J. Relays/Contactors: Shall be the single coil electrically operated, mechanically held type. Positive locking shall be obtained without the use of hooks, latches, or semi-permanent magnets. Contacts shall be doubled break silver to silver type protected by arching contact where necessary. Number of contacts and rating shall be selected for the application intended. Operating and release times shall be 100 milliseconds or less. Contactors shall be equipped with coil transient suppression devices to limit transients to 150% of rated coil voltage. Relays shall have mechanical switching to allow manual operation of relay and LED light to indicate the energized state.

K. Miscellaneous Control Components: Complying with Section 20 05 00 and Division 26. Standard components, for use in commercial and institutional occupancies, rated and designed for the application and able to provide the specified sequence of operation.

2.8 REFRIGERANT PIPING AND ACCESSORIES

A. Piping and Fittings: Rated for system pressures per VRF system manufacturer. Hard drawn ACR copper tubing per ASTM B280, Type L, with silver brazed joints and wrought copper fittings per ASME B16.22. Use only long radius elbows. Flared fittings (at equipment connections only) shall comply with ASME B16.26. Soft copper tubing may only be used on runs less than 50-feet or where necessary (i.e. when routing through sleeves, or similar poor access areas) and where acceptable to VRF system manufacturer.

B. Isolation Valves: Brass ball valve, full port, rated for system pressures and temperatures, but no less than 700 psig and -40 deg F to 300 deg F. Compatible with refrigerant used with, UL listed, with rupture proof encapsulated stem, extended copper connections for ease in brazing. Provide in configuration (i.e. angle, straight, with access port) as required to suit application.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install system in accordance with code, manufacturers written installation instructions, and best construction practices. Set units in locations as shown on the drawings and maintenance to units.
- B. Location and Arrangement: Install all equipment at locations and as shown on the drawings. Install so as to allow maximum access to units. Prior to selecting unit final location, confirm that: Proper unit clearances and access will be provided; no adverse airflow conditions are present; confirm location and installation details with other trades. Units shall be level and aligned with building walls. Set outdoor unit on concrete pad (or roof sleepers); anchor to pad (or sleepers).
- C. Complete Connections: Connect and install all items shipped loose with units; provide and connect all utilities and accessories as required for proper unit operation.
- D. Refrigerant Piping: Shall be silver brazed. Bleed dry nitrogen through piping during brazing to minimize oxidation. Keep all open ends of piping capped when not being worked. Soft copper shall have long radius bends; install without kinks or excess bends. Piping shall be routed concealed, except where routed outdoors and where noted. Piping shall be ran plumb and square to building walls, and in a neat professional manner.
- E. Refrigerant Charge: System shall be checked for proper refrigerant charge and oil level and charged to proper levels after all leak testing and evacuation work has been completed. Refrigerant to be added to the system shall be delivered to the site in factory charged containers and charged into the system through a filter/drier.
- F. Unit Protection: Units shall be protected during construction to prevent mud, dirt, paint overspray, plaster materials, and similar debris from depositing on the unit. Units shall be clean and in new condition prior to Owner acceptance.
- G. Cleaning: Units shall be thoroughly cleaned of all debris prior to operation. Units shall be clean and in new condition prior to Owner acceptance.
- H. Operation: Units shall not be operated until all construction activities that generate dust, dirt, fumes, or odors are complete; system checkout has occurred; and the Engineer has reviewed the system and granted approval.

3.2 VRF SYSTEM CONTROLS

- A. General: Installation shall comply with VRF system manufacturer written instructions and recommendations. Provide all software, hardware, licensing, sensors, relays, switches, dampers, actuators, conduit, tubing, wiring, transformers, motor starters and all other devices required to provide a complete integrated VRF control system with the system features and sequence of operation specified. Control system shall be contractor designed to comply with Contract Document requirements.
- B. Room Sensors: Room sensors (i.e. thermostats) shall be mounted at an ADA accessible height (unless indicated otherwise). Thermostats shall control the equipment which affects the temperature serving the space the thermostat is located in (unless indicated otherwise). Not all room sensors are shown on the drawings and the locations shown are preliminary only. Contractor shall review all drawings, coordinate with other trades, and indicate all final proposed room sensor locations on the submittal shop drawings. Contractor is responsible for coordinating locations to avoid chalkboards, tack boards and other interferences.
- C. Electrical Power:

1. General: Provide all electrical wiring and devices in accordance with codes, and Division 26 requirements.
 2. Sources: It shall be the responsibility of the installer of the VRF control system to provide power for all VRF control devices requiring power. Coordinate with the Division 26 Contractor to arrange for necessary power circuits. System Master Controller shall obtain power from a UPS (uninterruptible power supply); unless the unit has an internal battery back-up adequate for 24 hours.
 3. Conduit: All wiring shall be installed in conduit and in accordance with Division 26, except that low voltage wiring within the ceiling plenum spaces may be ran without conduit provided that plenum rated cable is used. Install all conduit and wiring parallel to building lines.
- D. Equipment Interconnect Wiring: In addition to control wiring between equipment and control devices (furnished under this Section) to accomplish the specified sequence, provide added control wiring to interconnect equipment and to interconnect equipment and associated control/safety devices. Provide as required by the equipment manufacturers to allow for proper operation of the equipment and system.
- E. Component Labeling: All control components, except regular room thermostats, shall be equipped with name plates to identify each control component. Components in finished rooms shall be labeled as to generic item controlled for better user understanding; other devices shall be labeled with the same designation which appears on the Control Diagrams. Contractor shall submit list of proposed labeling prior to installing.
- F. Complete System: Provide all devices as required to allow for automatic control with sequence of operation specified. Provide all control interconnections between indoor and outdoor units, and other equipment.
- G. Adjustability: All setpoints and differentials shall be adjustable. Setpoints indicated are initial settings.
- H. Confirm Settings: Confirm with Owner all setpoints, all time schedules, and all other adjustable programming parameters before substantial completion.
- I. Thermostats Setpoints: Shall be adjustable, with initial settings as follows unless indicated otherwise:
- | | |
|--------------------|--------------|
| Occupied Heating | 70 degrees F |
| Unoccupied Heating | 65 degrees F |
| Occupied Cooling | 76 degrees F |
| Unoccupied Cooling | 85 degrees F |
- J. Sequence Terminology: Wherever the control sequences refer to an article, device or piece of equipment in the singular number, such reference shall mean to include as many of such articles, devices, or equipment as are shown on the plans, required for the sequence, or required to complete the installation. Wherever the control sequence refers to an operating stage in the singular number, such reference shall mean to include as many stages as are specified for the equipment and shall mean analog (i.e. proportional) type control where specified for the equipment (reference drawings and equipment specifications).
- K. EMCS Interface: Provide interface device with proper protocol to allow communication of exchange of system data with the Division 25 EMCS.
- ### 3.3 VRF HEAT PUMPS - SEQUENCE OF OPERATION
- A. General: VRF controls shall provide time schedule control and heating/cooling/fan operation of indoor units, with BC and outdoor units automatically operating in response to system loads and needs using their integral controls.

- B. Occupied Mode:
 - 1. Fan: Indoor fan shall run continuously when heating or cooling is required; fan shall cycle to low speed (or as an option cycle off) when no heating or cooling is required.
 - 2. Heating: Indoor heat pump section shall operate in heating as required to satisfy the space setpoint. Airflow shall vary from minimum to maximum depending on load, and shall be programmable to remain at a fixed value instead of varying.
 - 3. Cooling: Indoor heat pump section shall operate in the cooling mode as required to satisfy the space setpoint. Airflow shall vary from minimum to maximum depending on load, and shall be programmable to remain at a fixed value instead of varying.
- C. Unoccupied Mode: Indoor fan and indoor heat pump heating/cooling shall cycle on and off as required to maintain unoccupied setpoints.
- D. Mode Control: Units' mode of operation shall be determined by time schedule and time schedule override; warm-up mode shall be initiated by optimum start controls.
- E. Outdoor unit and Refrigerant Controller: Shall operate to provide adequate and correct refrigerant flow to serve indoor units and to reject or recover heat.

3.4 ENERGY RECOVERY UNIT (SEE SECTION 23 72 23) - SEQUENCE OF OPERATION

- A. General: VRF controls shall provide time schedule control of the Energy Recovery Unit (ERU) in conjunction with the heat pump units. ERU mode shall match the mode for the VRF system served, except that when any heat pump (served by the ERU) is in the occupied mode, the ERU shall be on in the occupied mode.
- B. Occupied Mode:
 - 1. Fans: Supply and exhaust fans are on.
 - 2. Outside Air and Exhaust Air Dampers: 100% open (dampers and actuators provided with units).
 - 3. Bypass Damper and Economizer: The bypass damper shall be closed (to allow energy recovery) unless: the outside air temperature is above 60 deg F (adjustable) and is lower than the exhaust air temperature and the majority of areas served by the ERU are in cooling then the outside air bypass damper shall be activated so that outside air bypasses the energy recovery coil (for economizer cooling).
- C. Unoccupied Mode: Unit shall be off.
- D. Warm-Up Mode: Unit shall be off.
- E. Frost Control: Controlled by ERU integral controls. When the exhaust air temperature drops below the frost control setpoint (initial setting 35 deg F), the outside air damper shall bypass the energy recovery coil to prevent frost buildup due to freezing condensate.
- F. Duct Heater: Shall be controlled by Division 25

3.5 REFRIGERANT LEAK TESTING AND EVACUATION

- A. Notification/Witnessing: Prior to beginning any testing, notify the Architect/Engineer when the testing will occur. The Architect/Engineer will witness (at his option) various parts of the test. Failure to notify the Architect/Engineer will be cause to re-test all piping in the presence of a representative of the Architect/Engineer.
- B. Disconnect and isolate from the system any components that may be damaged by the test pressure.
- C. Connect oil-pumped, dry nitrogen to the system through a pressure reducing gauge manifold. Charge enough nitrogen into the system to raise the pressure to 50 psig. Let stand for 2 hours and

check for signs of leakage. If no leakage is noted, slowly increase pressure to 300 psig (or as required by local code, whichever is higher). Tap all brazed connections with a rubber or rawhide mallet sufficiently hard to start any leak that might subsequently open from thermal expansion/contraction or vibration. Check the manifold gauge for any drop in pressure. Let the system stand pressurized for 24 hours. Re-check the manifold gauge. If no change in pressure is noted (after adjusting for temperature) the system may be considered free of leaks.

- D. If leakage is suspected or apparent, check joints with a glycerin soap solution or other means to locate the leaks. Repair any leaks found by completely disassembling the connection, cleaning the fitting and remaking the connection. Re-test the system after repairs are made both with pressure (300 psi for 24 hours) and at the leak location with a glycerin soap solution or other means of determining leaks.
- E. When the system has been proven free of leaks with the above methods, the system shall be completely evacuated of all air and moisture. Connect a vacuum pump to the system and pump the system down to 500 microns and let stand for a minimum of 2 hours. If the vacuum reading remains unchanged, the system may be charged with refrigerant.
- F. After satisfactory pressure testing and vacuum evacuation, fully charge the system with refrigerant. Any final connections that were not subject to the full test pressure (e.g. connections at unit, etc.) shall be carefully checked with a halide or electronic leak detector after the system has been charged.

3.6 START-UP/TESTING AND ADJUSTMENT

- A. Initial Checks: Prior to operating units, checks shall be made to insure that adequate voltage, air flow, duct connections, electrical connections, control connections, crankcase heaters (where applicable), and other items as listed by the manufacturer are properly provided/connected and operating to insure safe and proper unit operation.
- B. Testing and Adjustment: Manufacturers representative shall provide start-up. Operate unit in various modes of operating to test for proper operation, including fan rotation, proper damper travel (where applicable), proper cooling/heating, correct interface to other controls (time clock, fans, etc.), etc. Make necessary adjustments.
- C. System Commissioning: As the systems become operational, the VRF system installer shall test and observe the operation of each and every air moving and heating/cooling unit and shall adjust all controls so that the items function according to the intent of the specifications. The VRF system installer shall commission the VRF system controls, including a point-to-point check of all devices, and provide documentation substantiating the work. This commissioning work is separate from the Section 20 08 00 commissioning, and is to occur prior to the commissioning work of Section 20 08 00.
- D. Report/Statement: After making all necessary system testing and adjusting, the Contractor shall submit a report to the Engineer indicating all testing/adjustment work done and comment on how system is operating. Such report shall be signed by the individual directly responsible for supervision of the installation of the control system. When the Contractor feels that the system is complete and ready for review by the Engineer, Contractor shall submit a written statement (signed by same individuals as for report) stating that the system is in compliance with the project requirements and ready for review.

3.7 OWNER INSTRUCTION

- A. General: Comply with Section 20 05 00. After all testing and adjustments have been satisfactorily completed for the first phase of the project, the Owner shall be provided with operator instructions (including start-up, shut-down, emergency, maintenance, and repair instructions). Instruction shall be by the manufacturer's authorized service representative.

- B. Time Period: Instruction period shall be for a minimum of three separate sessions of four hours each. Training to be provided to three Owner staff members.

3.8 COMMISSIONING

- A. The Products referenced in this section are to be commissioned per Section 20 08 00 - Commissioning. The Contractor has specific responsibilities for scheduling, coordination, startup, test, development, testing and documentation. At a minimum, the Contractor shall provide a documented and signed record to verify that all equipment and systems installed under this contract have been inspected and functionally tested to verify full compliance with the contract specifications.

END OF SECTION 238127

SECTION 238246
ELECTRIC HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

- A. Electric Heaters.

1.3 SUBMITTALS

- A. General: Comply with Section 20 05 00.
- B. Product Data: Submit product information on all items.

1.4 GENERAL REQUIREMENTS

- A. Listing: All heaters shall be listed by an independent testing laboratory for the application indicated.
- B. Installation Verification: Prior to ordering units confirm finishes at heater location and type of installation and associated trim required; i.e. fully recessed, semi recessed, surface mount, etc.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Products: Shall comply with Section 20 05 00 Part 2.01 - Acceptable Manufacturers.
- B. Unit Heaters: Q-Mark, Chromalox, Aztec, Berko.
- C. Duct Heaters: Indeeco, Berko, Markel, Q-Mark, Warren, Brasch.

2.2 UNIT HEATERS

- A. Type: Fan forced, horizontal discharge unit heater. Q-mark "MUH" series or approved.
- B. Casing: Shall be die formed heavy gauge steel with factory baked enamel finish. Casing shall entirely enclose unit, and have adjustable louvers on unit discharge side.
- C. Heat Elements: All steel or aluminum finned copper clad/steel type.
- D. Motor and Fan: Draw through fan design; motor shall have permanently lubricated sealed bearings with built in overload protection. Airflow rate shall be such that the temperature rise is no less than 30 deg F and no more than 50 deg F.
- E. Controls: Safety controls shall include automatic reset high temperature cut-out and fusing (element, motor, and transformer primary) as required by the NEC. Unit shall include all contactors, relays and accessories to automatically operate heater upon a call from energy recovery ventilator.

Duct heater shall be provided with a remote mounted temperature sensor. Duct heater controls shall modulate SCR controls to provide min 72°F discharge air from duct heater whenever the energy recovery ventilator is operating.

- F. Accessories:
 - 1. Support: Steel support bracket for wall mounting.
 - 2. Control: Low voltage thermostat, wall mounting type, adjustable 40 to 55 deg F.

2.3 DUCT ELECTRIC HEATERS

- A. Type: Open coil type electric duct heaters; of size and capacity as shown on the drawings.
- B. Listing: Heaters shall be UL listed for zero clearance to combustibles, and shall be built to meet all requirements of the National Electric Code and NFPA.
- C. Construction: Heating coils shall be made of 80% nickel and 20% chromium coiled resistance wire. Coils shall be supported in an aluminized steel frame and insulated by floating ceramic bushings. Heaters shall be of the configuration to suit the application as shown on the drawings.
- D. Overtemperature Protection: All heaters shall be equipped with primary and secondary overtemperature safety devices. The primary safety device shall be a disc or liquid filled bulb type with automatic reset; the secondary device shall be a disc type with manual reset, wired in series with each heater stage, set to trip at a higher temperature than the primary safety device.
- E. Overcurrent Protection: Fuses shall be provided for overcurrent protection; fuse capacities shall be rated for at least 125% of the circuit amperage.
- F. Proof of Air Flow: Where project's control system is the DDC type, and heater is controlled by the DDC, proof of airflow is to be provided via the DDC system; no proof of airflow devices are required to be furnished integral with the heater. For non-DDC control systems or where the DDC control system is not providing heater control, provide heater with differential air pressure device and sensing tube (or sail flow switch), interlocked with the heater to prevent heater operation in case of insufficient airflow across the coil. Differential air pressure device (or sail flow switch) shall have sufficient sensitivity to suit velocity and duct pressures of the application. Configure and arrange differential air pressure device (or sail flow switch) for proper operation as the application requires. Air differential air pressure device shall have a pitot tube on high pressure side installed to sense duct total air pressure; except where heater is used on the suction side of a fan, the air differential air pressure device shall be connected to the low pressure side and be configured sensor to measure static pressure only. Where sensitive enough differential air pressure devices (or sail flow switches) are not available, provide heater with 24 volt relay for interlocking to a fan proof device (i.e. motor starter auxiliary contacts, fan start relay, or equivalent).
- G. Terminal Box: All heater controls shall be mounted in a side mounted terminal box, unless a separate remote mounted terminal box is shown on the drawings. Terminal box shall be insulated from the heater casing.
- H. Disconnect: Heaters shall be provided with a built-in power disconnect switch, having a terminal door interlock.
- I. Controls: Heaters shall be furnished with 24 volt transformer and shall be for use with 24 volt controls unless indicated otherwise. Transformer shall have secondary fusing, and transformers which are not class 2 shall have primary fusing. Mercury control contactors shall be used for controlling heater stages unless indicated otherwise. Where SCR control has been indicated the heater shall be furnished with a solid state proportional power controller allowing modulation of heater capacity from 0 to 100% of full capacity. The SCR control shall energize the heater only for the number of AC cycles necessary to produce the amount of heat required. For heaters with loads greater than 90 amps SCR control combined with a step controller in a vernier configuration

(still providing full proportional control) is acceptable. (Backup or safety contactors - where used - shall be magnetic type).

- J. Electrical: Heaters shall be for use with electricity of the voltage and phase indicated, and provide the output and number of control stages indicated. Three phase heaters shall have equal balanced three phase circuits. Heater element circuits shall be subdivided so that no circuit load exceeds 48 amperes. All internal wiring shall be suitable for 220 degrees.
- K. Pressure Plate/Baffle: Provide plate to allow for uniform flow across heater; fabricate of galvanized steel; pressure drop shall not exceed 0.20" wc.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General: Comply with Section 20 05 00. Install in accordance with manufacturer's written instructions, code, applicable standards and best construction practices.
- B. Coordination: Coordinate heater power and control requirements with other trades; confirm location of any required heater contactors, relays, thermostats, and similar devices. Provide any required wiring for proof of fan operation between fan devices and heater; wiring shall comply with the HVAC control portion of the specifications and Division 26.
- C. Location and Trim Verification: Install equipment at locations indicated in accordance with the Contract Documents. Review and confirm installation locations, that proper clearances are provided, unit controls are accessible, and installation has been coordinated with other trades.
- D. Complete Connections: Connect and install all items shipped loose with units; provide and connect all contactors, relays, wiring, interconnections and accessories as required for proper unit operation.
- E. Cleaning: Units shall be thoroughly cleaned (internally and externally) of all debris prior to operation. Units shall be clean and in new condition prior to Owner acceptance.
- F. Owner Instruction: Instruct Owner on equipment operation and maintenance.

3.2 START-UP

- A. Pre Start-Up Inspection: Inspect equipment and connecting systems to confirm equipment and connecting systems to confirm equipment has been installed properly and is ready for start-up. As a minimum, check for: proper voltage and phases, correct electrical connections, complete control connections, all unit safety devices properly set and connected, coils clear of obstructions, and other items as listed by the manufacturer are properly provided/connected and operating to ensure safe and proper start-up. If items are discovered that prevent start-up to be completed, notify the installing Contractor and Engineer of issues. Coordinate and re-schedule start-up after items are corrected.
- B. Start-Up: Perform start-up in accordance with manufacturers written start-up procedures. Observe proper operation of all unit components.
- C. Adjustments: Adjust and set unit components to allow for proper operation. Observe unit to detect any unusual vibration, leakage, loose wiring, or other situations that could affect unit operation.

3.3 COMMISSIONING

- A. General: The Products referenced in this section are to be commissioned. The Contractor has specific responsibilities for scheduling, coordination, testing, and documentation of the commissioning. The Contractor shall provide a documented and signed record to verify that all

equipment and systems installed under this contract have been inspected and functionally tested to verify full compliance with the contract specifications. See Section 20 08 00.

END OF SECTION 238246

SECTION 255000
INTEGRATED AUTOMATION FACILITY CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.2 SECTION INCLUDES

- A. Control System Design.
- B. Complete Mechanical System Controls.
- C. Control Devices, Components, and Wiring.
- D. Control System Commissioning.

1.3 SUBMITTALS

- A. General: Comply with Section 20 05 00.
- B. Product Data: Submit manufacturer's product data for all items to be used. Provide a complete materials list, labeled to match labeling used on shop drawing, with manufacturer and model number. Clearly indicate specific each item's control features (e.g. range of operation, accuracy, electrical characteristics, material of construction, etc.). Provide a schedule listing all control valves, control dampers, sizes, flow rates, pressure drops, Cv's, and related data to clearly identify application.
- C. Shop Drawings: Submit shop drawings of complete control system, including the following information: interconnect drawings showing all wiring and control connections, all control device locations, sequence of operation for all controlled systems, building floor plans with all proposed thermostat and other control device locations shown.
- D. Labeling: Submit list of proposed component labeling.

1.4 QUALITY ASSURANCE

- A. Listing: All network controllers, central system controllers and local user displays shall be UL Listed under Standard UL 916, category PAZX.
- B. Electrical Interference: All electronic equipment shall conform to the requirements of FCC 15, governing radio frequency electromagnetic interference and be so labeled.
- C. Skilled Workers: The entire control system shall be installed by skilled electricians, technicians, and programmers, all of whom are experienced, properly trained and qualified for the work they perform. Contractor shall submit evidence of workers' experience and training upon request of the Engineer.

1.5 GENERAL REQUIREMENTS

- A. Single Contractor: One single Company shall be responsible to design, furnish and install the complete Division 25 control system. Any subcontracted installation work shall be done by firms experienced and qualified in the work they perform, and subject to approval by the Engineer.
- B. Bidder Design: The control system is bidder design, subject to the requirements of the Contract Documents.
- C. Local Contractor: The Division 25 work (i.e. all control system design, programming, commissioning, and all required work) shall be done by local office personnel, with their office facilities, located within 100 miles of the project location.
- D. Qualifications: Firms performing the Division 25 work shall meet the qualifications listed below. Firms listed below have been pre-qualified as a convenience to bidders.
 - 1. Have installed control systems of the type required for this project in at least 6 projects of similar or greater complexity in the last 2 years. These similar or more complex projects shall involve integrating controls of another contractor.
 - 2. Be qualified by the manufacturer of the system being installed to install the type of controls and of the magnitude required for this project. Such pre-qualifications shall include titles as "Authorized Control Integrator", "Independent Field Office", "Authorized Factory Representative" or similar.
 - 3. Have installed control systems similar to the type for this project in at least 6 projects in a campus setting where the work could affect the control systems in multiple buildings.
 - 4. Pre-qualified firms: ATS Automation.
- E. Licensing: Provide licensing which allows the Owner to make modifications, additions, expansion, and interconnections to all aspects of the system without limitation. Manufacturer's software licensing agreements shall be configured to allow the system to be "open" and non-proprietary. The Owner shall have full ownership for the system and access.
- F. Payments: The Contractor is advised that in addition to payments held out for retainage and project final completion (i.e. punchlist work) as specified elsewhere, the work of this specification Section may be limited to a maximum payment of 90% of the scheduled value of the work until all system are proven operational and have been properly checked out by the installing Contractor.
- G. All DDC Control: All controls and sequences shall be provided by the Division 25 DDC control system, unless specifically noted otherwise. Where interval timer, switch control, or a similar manual control is indicated, the control device shall provide an input to the DDC system with the DDC system providing an output for control. No line voltage controls or other controls which do not "pass through" the DDC control system are allowed, unless directly stated that is the method of control to be used; see the Control Sequences Specification Section for exceptions.
- H. Service Allowance: Include 8 hours of control labor for special work (i.e. software changes, system consultation, relocation of control devices and other services) during construction as required by the Owner or Engineer. The Engineer and Contractor will jointly track the amount of time used. Only time directly authorized and agreed to by the Engineer may be tracked as part of this allowance. This allowance is for work outside of other required project work, and is for specific tasks assigned to the Contractor by the Owner or Engineer.
- I. Existing Systems:
 - 1. Existing Controls: Existing local building controls are conventional. Central District (remote from project building) controls are DDC type, by Alerton. New controls shall be the DDC type and shall be an extension of the existing Central District system, by the same manufacturer, with the same capabilities extended to include new equipment. Revise and add system graphics at Central District to reflect all project work and to include new equipment.

2. Wiring and Component Reuse: Verify existing system wiring and existing components to be reused, to confirm they will operate properly with the new system. Existing components that are indicated to be reused shall be assumed to be in working condition (i.e. temperature sensors, actuators, etc.); however, Contractor shall review their operation and functionality to confirm their condition and notify the Owner of any issues or component failure.

J. Warranty:

1. Basic: System shall be warranted to provide the sequence of operation and basic features specified, with the accuracy and flexibility specified. The system shall be repaired or replaced, including materials and labor, if in Owner's reasonable opinion, system is other than as warranted.
2. Emergency Service: During the warranty period maintain a 24 hour emergency phone service and be able to respond by a trained and qualified Controls Engineer familiar with the installed system. The Contractor shall be able to communicate with the system for purposes such as program algorithm alterations, operational evaluations, trouble-shooting, etc.; said response shall be within six hours, with site visits (as necessary) in no less than two weekdays.
3. Warranty Service Allowance: Include 4 hours of control technician/programmer's time for special service (i.e. software changes, system consultation, setting up additional trends, etc.) and other services during the warranty period as required by the Owner or Engineer. The Owner and Contractor will jointly track the amount of time used. Only time directly authorized and agreed to by the Owner may be tracked as part of this allowance. This allowance is for work outside of other required project work, and is for specific tasks assigned to the Contractor by the Owner or Engineer.
4. End of Warranty Service: At the end of the warranty period, the Contractor shall provide a re-check of the entire system operation, including calibration testing of a sample number of components and providing any necessary control adjustments for proper system operation. Such work shall be for a minimum of 4 hours on site.

1.6 REFERENCES

- A. UL 916: Energy Management Equipment.
- B. FCC 15: Code of Federal Regulations, Title 47, Part 15, Federal Communications Commission Regulations.
- C. AMCA 500-D: Laboratory Methods of Testing Dampers for Ratings.
- D. ANSI/ASHRAE 15: Safety Standard for Refrigeration Systems and Designation and Classification of Refrigerants.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. General: Products shall comply with Section 20 05 00. See Section 20 05 00, paragraph 2.01 for Acceptable Manufacturer requirements.
- B. Control System Manufacturer: Alerton.
- C. Actuators: Belimo.
- D. Control Dampers: Ruskin, American Warming and Ventilating, Greenheck.

- E. Other Control Components and Accessories: Idec, Hoffman, McDonnell, Tridelta, Veris, Kele, Edwards, Mamac, APC, Barksdale, Mark-Time, Functional Devices, and manufacturers listed for microprocessor based products.

2.2 BASIC SYSTEM

- A. General: The system shall be a distributed processing type direct digital control (DDC) system. System shall provide complete stand-alone temperature control/monitoring and energy management for this project, using a network of various independent controllers, sensors and associated devices interconnected in a communicating network.
- B. System Protocol: System shall utilize an open (i.e. non-proprietary) communications protocol which allows the use of control components by different manufacturers to be installed as part of the system with automatic adaption and incorporation into the system with minimal programming. System shall be a BACnet compliant type with all component communication using the protocols and standards as defined by ANSI/ASHRAE 135. LAN type shall be Contractor selected (complying with Contract Document requirements). System shall be internet accessible using standard web browsers such as Windows Explorer and be based on Tridium "Niagara AX" software utilizing Jace controllers.
- C. Version: System shall be latest version of the manufacturer's standard commercial building DDC system.
- D. Expansion: System shall have a fully modular architecture, allowing expansion through the addition of controllers, and control devices. System shall have capability to increase capacity by 100% (i.e. as many points as system currently has) without requiring software upgrades or revised licensing.
- E. Network: All controllers shall be interconnected in a communicating network to provide facility wide access to work stations and sharing of information. A Local Area Network (LAN) shall be provided to interconnect controllers for high speed data transmission. Failure of a single or multiple controllers shall not cause loss of communication between other LAN-connected controllers still active. The control system LAN shall be separate and independent from other building LAN's (except for a single data terminal connection at a single system workstation).
- F. System Performance:
 - 1. Graphics: System shall display a graphic with at least 20 dynamic points with all current data within 10 seconds of being initially displayed. System shall refresh a graphic with at least 20 dynamic points with all current data within 8 seconds.
 - 2. Object Command: Commands of a binary object entered at local workstations shall be executed at the commanded device within 2 seconds of being entered; analog objects shall start to adjust within 2 seconds.
 - 3. Current Data: Any data used or displayed at a controller or local workstation shall be current within the previous 6 seconds.
 - 4. Alarm Response: Maximum time between an alarm event at it being annunciated shall be 45 seconds.
 - 5. Program Execution Frequency: Applications shall be capable of running as often as every 5 seconds; select execution times that are consistent with the process under control and provide optimum comfort and control of setpoints without excess deviation. Controllers shall be able to execute PI and PID control loops at a selectable frequency of at least once per second; with the process value and algorithm output updated at this same frequency.
 - 6. Reporting Accuracy: Control system reporting end-to-end accuracy shall be no less than the following:
 - a. Space, Duct, Water Temperatures: Plus/minus 1 deg F.
 - b. Outside Air Temperatures: Plus/minus 2 deg F.

- c. Airflow at VAV Terminal: Plus/minus 10% of full scale.
 - d. Airflow at Measuring Stations: Plus/minus 5% full scale.
 - e. Water Flow: Plus/minus 5% full scale.
 - f. Air Pressure in Spaces: Plus/minus 0.01-inches wg.
 - g. Air Pressure in Ducts: Plus/minus 0.1-inches wg.
 - h. Water Pressure: Plus/minus 2% of full scale.
7. Stability: System shall provide stable and accurate control operation without excessive variation of controlled variables; variation shall in no case be more than 1.5 the reporting accuracy for temperatures, and the same as the reporting accuracy for other variables. System shall operate without invalid alarms or with excessive alarms.

2.3 SYSTEM FEATURES

- A. General: Controllers, control components, and accessories shall all be combined to form a complete system providing the sequences of operation/functions specified and having the features specified. System shall monitor and control all functions relating to building environment, utilities, energy usage, and mechanical systems operation.

2.4 CONTROLLERS

- A. General: Shall be manufacturer's standard controllers used for commercial DDC systems complying with the system communication protocol specified and allowing the system to provide the specified features and sequence of operation. Controllers shall be listed, certified, or in some definitive way deemed compliant by an appropriate independent agency that they comply with the system communication protocol being utilized.
- B. Types: Type, capacities, arrangement and features shall be Contractor selected to provide an overall system complying with Contract Document requirements.
- C. Operating Conditions: Controllers shall be capable of operation over a temperature range of 32 deg F to 130 deg F and a humidity range of 5% to 95% (non-condensing).
- D. Network Area Controller (NAC): Shall be modular, multi-tasking, microprocessor based direct digital controller, capable of forming a complete interconnected/communications. Shall provide the interface between the LAN and the field control devices, and provide global supervisory control functions over the control devices connected to the NAC. It shall be capable of executing application control programs to provide:
- 1. Calendar functions.
 - 2. Scheduling.
 - 3. Trending.
 - 4. Alarm monitoring and routing.
 - 5. Time synchronization.
 - 6. Network management functions for control devices.
 - 7. The NAC must provide all hardware features and accessories as necessary, including ethernet port and battery backup, to provide a complete and operational control system.
 - 8. Provide with flash memory for long term data backup (if battery backup or flash memory is not supplied, the controller must contain a hard disk with at least 1 gigabyte storage capacity).
 - 9. The NAC shall support a standard Web browser access via the Intranet/Internet and provide multiple user access.
- E. Terminal Unit Controllers (TUC's): Controller specifically designed for control of individual air handling units, fans, VAV terminal units, and similar type units; controllers shall be microprocessor based and shall contain a non-volatile resident program to allow for proper sequencing of controlled equipment. TUC shall interface to the building control system a multi-drop

communications network. Each terminal controller shall be accessible for purposes of control and monitoring from a central or remote operator's terminal as specified herein.

2.5 TEMPERATURE SENSORS

- A. Room Temperature Sensors: Solid state electronic type, employing a resistance type output. Factory calibrated to an accuracy of plus/minus 0.5 deg F with a temperature range of 32 to 130 deg F in normally occupied areas and -40 to 140 deg F in other areas, with the following features:
 - 1. Space temperature display.
 - 2. Momentary push button for placing room's system into occupied mode when pressed.
 - 3. Means for adjusting temperature setpoint up or down with setpoint display.
 - 4. System heating or cooling mode indication.
- B. Room Temperature Sensor Guards: Lockable, slotted, clear plastic type.
- C. Outside Air Temperature Sensor: Solid state electronic type device, for outdoor installation, factory calibrated accuracy of plus/minus 0.5 deg F, with a temperature range of -20 to 180 degrees F. Provide a sun shield and weatherproof assembly.

2.6 ACTUATORS

- A. General: Actuators shall use a brushless DC motor controlled by a microprocessor with protection from overload at all angles of rotation. Run time shall be constant, independent of torque. Actuator shall have manual positioning mechanism and direction of rotation control switch and visual position indicator. Housing shall be NEMA rated to suit the conditions at the actuator location.
- B. Type: Proportional or two position or floating point type, as required for application. Proportional type shall modulate in response to a 2-10 VDC, or 4 to 20mA control input. Provide with auxiliary switches as required for sequence of operation and to allow for safe operation of items served (and interlocked items), switches shall meet requirements for "double insulation" so an electrical ground is not required.
- C. Automatic Closure: Actuator shall spring return upon power interruption, spring return position shall be fail-safe as dictated by freeze, fire or temperature protection requirements; except that actuators required to be the fast operating type may utilize a capacitor discharge for fail-safe closure in lieu of spring (subject to Engineer's approval). Spring return is not required for air terminal unit dampers or for zone dampers.
- D. Performance: Actuator power and torque shall be sufficient to match dampers or valves being controlled and allow proper damper and valve operation against system pressures liable to be encountered. Actuator shall be capable of driving control devices from full closed to full open in less than 90 seconds (unless indicated otherwise) and where fast operating type are required (i.e. where interlocked with equipment operation). Where actuators serve valves or dampers directly serving equipment (e.g. boiler water flow control valves) or are interlocked with equipment operation (e.g. make-up air equipment dampers) verify required operating time of actuator with equipment manufacturers and timing of other system components to allow for proper system operation without nuisance shutdowns of equipment or creating undesirable effects due to improper actuator response time.
- E. Accessories: Units shall be complete with all brackets, and hardware required for mounting and to allow for the proper control for the application.

2.7 CONTROL DAMPERS

- A. Type: Low leakage control dampers, parallel blade or opposed blade type as selected by Division 25 contractor to best suit application (unless a specific type is indicated).

- B. Leakage: Class 1A leakage rated in accordance with AMCA 500-D.
- C. Construction: Construct of galvanized steel, except where installed in ducts of stainless steel or aluminum construction or handling corrosive air, shall be of stainless steel or aluminum construction (to match duct material) or have corrosion resistant coating. All materials in contact with the airstream shall be suitable for the conditions without deterioration. Frame shall be minimum 16 gauge with reinforced corners.
- D. Blades: One-piece airfoil shape, not exceeding 6 inches in width, minimum 16 gauge, with neoprene, extruded vinyl or butyl rubber edge seals and flexible metal jamb seals; linkage interconnecting all blades and actuator axle.
- E. Bearings: Nylon, molded synthetic, or oil impregnated sintered metal bearings (or other materials as conditions require).

2.8 SWITCHES

- A. Wall On/Off Switch: Standard wall box type switch, single or double pole, and contact type as required to suit application; with illuminated switch for when controlled item is on; volt/ampere ratings to suit application. Provide with stainless steel wall plate; label as to function.
- B. Interval Timer - Push Button Type: Momentary contact type illuminated pushbutton with metal operator, amber LED light, and stainless steel cover plate. Sized to suit standard electrical wall junction box. Label as to function.

2.9 ACCESSORIES

- A. Wiring and Conduit:
 - 1. Basic Materials: As specified in Division 26.
 - 2. Power Wiring: 18 AWG minimum and rated for 300 VAC service. Wiring for circuits greater than 24 V shall be as specified in Division 26.
 - 3. Analog Signal Wiring: Field-installed analog signal wiring shall be 18 AWG single or multiple twisted pair. Each cable shall be 100 percent shielded and have a 20 AWG drain wire. Each wire shall have insulation rated for 300 VAC service. Cables shall have an overall aluminum-polyester or tinned-copper cable-shield tape.
 - 4. Life Safety Applications: Wiring that performs code required life safety control (e.g. shutdown of equipment), control of engineered smoke systems, fire alarm interface and similar functions shall comply with code and NFPA standards for fire alarm system wiring and the specific application.
- B. Labels:
 - 1. General: Shall comply with Section 20 05 00.
 - 2. Control Devices: Labels on control devices shall use the same designation that appears on the control shop drawings and an indication as to purpose; except that devices in finished rooms shall be labeled as to the generic item controlled for better user understanding (i.e. "Room Exhaust Fan", "Hood Fan").
 - 3. Wiring: Wiring labels shall be the self-laminating or heat shrink type with numbering, lettering, or an alpha-numeric identifier indicating the wire signal/power purpose and matching the designation that is used on the control drawings
- C. Control Cabinets: Wall mounted, NEMA rated construction, type and rating to suit location environment, UL listed, minimum 14 gauge sheet metal, hinged front door with latch. Size as required to house controls. Controls/devices shall be logically assembled in cabinet, with all devices and cabinet labeled.

- D. Relays/Contactors: Shall be the single coil electrically operated, mechanically held type. Positive locking shall be obtained without the use of hooks, latches, or semi-permanent magnets. Contacts shall be doubled break silver to silver type protected by arcing contact where necessary. Number of contacts and rating shall be selected for the application intended. Operating and release times shall be 100 milliseconds or less. Contactors shall be equipped with coil transient suppression devices to limit transients to 150% of rated coil voltage. Relays shall have mechanical switching to allow manual operation of relay and LED light to indicate the energized state.
- E. Miscellaneous Sensors/Transmitters/Switches/Transformers: Shall be manufacturer's standard, designed for application in commercial building HVAC control systems, compatible with other components so as to provide sequence of operation specified. Transformers shall have integral circuit breakers with push-button reset.

2.10

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Provide complete control system design, all computer software and hardware, operator input/output devices, sensors, relays, switches, dampers, actuators, conduit, tubing, wiring, motor starters, transformers, control cabinets, power panel circuit breakers, and all other components required to provide a complete control system with the system features and sequence of operation specified. Select control components with proper characteristics to suit the application, meet specified system performance, provide specified system features, and provide the specified sequence of operation. Coordinate work with other trades. Develop as-builts of existing systems as needed to perform the Work. Perform field reviews prior to developing shop drawings.
- B. Room Sensors: Room sensors (i.e. thermostats) shall be mounted at 48" above finished floor, unless indicated otherwise. Thermostats shall control the equipment which affects the temperature serving the space the thermostat is located in, unless indicated otherwise. Not all room sensors are shown on the drawings and those shown are preliminary only. Contractor shall indicate all final room sensor locations on submittal drawings. Contractor is responsible for coordinating locations to avoid chalkboards, tack boards and other interferences.
- C. Electrical Power and Wiring:
 - 1. General: All work shall comply with code and Division 26 requirements. Run conduit and wiring in neat lines, parallel with building construction and coordinated with other trades. Use wire type and size as required by code and recommended by component manufacturers and to suit the application conditions.
 - 2. Conduit: All wiring shall be installed in conduit and in accordance with Division 26 section of these specifications, except that low voltage wiring within ceiling plenum spaces and in mechanical mezzanine areas may be ran without conduit provided that plenum rated cable is used. Install all conduit and wiring parallel to building lines.
 - 3. Electrical Power:
 - a. Scope: It is the responsibility of the Division 25 Contractor to provide power for all control devices requiring electrical power. Coordinate with the Division 26 Contractor to confirm which panels and circuits are to be utilized. Provide all electrical wiring, conduit, junction boxes, circuit breakers, grounding, panel circuit breakers (of proper size/type), transformers, enclosures and all other components as needed to power all control devices in accordance with code and Division 26 requirements.
 - b. Sources: Power for control devices shall be obtained from electrical panels and not from power serving the equipment (unless noted otherwise or the Engineer gives approval). Utilize panels located closest to the items served to the greatest extent

- possible. Where the building has a generator, equipment served by the generator shall also have their control power (i.e. power to control devices which allow the item to be controlled and monitored) shall also be served by the generator (this is in addition to any required UPS').
4. Service Loop: Provide minimum of 6" extra wiring at all wiring terminations for ease of future maintenance/servicing. Such extra wiring shall be neatly coiled/bundled to allow for uncoiling when the connected equipment is serviced.
- D. Equipment Interconnect Wiring:
1. General: In addition to control wiring between equipment and control devices (furnished under this Section) to accomplish the specified sequence, provide added control wiring to interconnect equipment components and associated control/safety devices. Provide as required by the equipment manufacturers to allow for proper operation of the equipment and system.
 2. Minimal Wiring Required: For bidding purposes, assume a minimum of four wiring connections for each piece of equipment to an adjoining/connecting piece of equipment and/or device(s), and special wire type and special connectors as required by the equipment manufacturer. Coordinate and review all requirements with manufacturers, contractor installing the equipment, and local representatives to confirm scope.
 3. Equipment: This work applies to:
 - a. Split system HVAC Equipment: Connect between indoor and outdoor units, and between the indoor unit and its thermostat.
 - b. Chillers: Connect between chillers and devices for field installation in the chilled water system (includes flow switch and temperature sensors).
 - c. Boilers: Connect between the boilers and devices for field installation in the boiler system (includes outside air temperature sensor, system temperature sensors, and connections between boilers).
 - d. Kitchen Hoods: Connect hood safety devices to HVAC equipment serving the hood (or kitchen), connect hood automatic fan on/off and speed control outputs to fans, hood fire suppression contacts to HVAC equipment serving the kitchen, hood shunt trip circuit to circuit serving gas solenoid valve.
- E. Labeling: All control components, except regular room thermostats, shall be labeled. All control wiring shall be labeled except where color coded wiring is used and the control shop drawings clearly identifier wiring for each color and it is fully consistent through-out the entire project. Submit list of proposed labeling prior to installing.
- F. Complete Functions: Provide complete system totally programmed to provide all specified functions, including but not limited to:
1. Time and Holiday Schedules.
 2. Alarm Limits.
 3. Optimum Start of Each Zone.
 4. Dynamic Graphic of Each Distinct Floor Area; include graphic key to allow changes in graphic display.
 5. Dynamic Graphic of Each Mechanical System; include graphic key to allow changes in graphic display.
 6. Summary of All Zone Temperatures.
 7. Summary of Data for Each Zone.
 8. All Displays Specified in Sequence of Operation.
 9. Master Menu and Graphics as requested by the Owner.
 10. All Controller Setpoints and Operational Values Required.
 11. Demand Limiting.
 12. Optimum Start/Stop and Warm-up.

- G. On/Off Status Indication: All devices which indicate on/off status to GUI, shall have this on/off status manually or automatically controlled from GUI, and shall have positive proof of on or off by differential pressure switch or other applicable device.
- H. OA Sensors: Provide at least two OA sensors for this project, with display at the GUI; use average of two for control purposes. Provide logic to allow disuse of "Bad" OA sensor and indicate alarm.
- I. TUC: To simplify controls and mechanical service and trouble-shooting, the TUC shall be mounted inside a waterproof cabinet on the side of rooftop units. This shall allow all controls maintenance and trouble-shooting to be made while at the unit location.
- J. Programming: Provide complete system totally programmed to provide all specified sequences, monitoring data, communications and features.
- K. Condensate Overflow: Provide all cooling coils (except not required for exposed AC units) with field installed condensate overflow switches wired to stop unit operation upon detection of a high condensate level and to indicate an alarm at the system graphics.

3.2 MONITORING DATA

- A. General: Monitoring information shall be provided at graphic user interface. Provide all necessary controls/devices to provide the data indicated. Monitoring data listed is not a "points list" but is a list of items that shall be monitored and is in addition to data (or "points") required by the sequence of operation and other specification requirements. A complete "points list" shall be compiled by the Division 25 Contractor based on all system requirements and sequence.
- B. Heat Pump Air Handling Units (all units with fans and ability to heat or cool environmental air):
 - 1. Zone temperature.
 - 2. Zone temperature setpoint.
 - 3. Unit commanded mode (heating/cooling).
 - 4. Supply air temperature off unit.
 - 5. Percent commanded heating or cooling.
 - 6. Override status.
 - 7. Fan on/off.
Fan commanded position (on/off).
 - 8. Alarm Status
- C. Ceiling Cassettes and Wall Mount Heat Pumps:
 - 1. Zone temperature.
 - 2. Zone temperature setpoint.
 - 3. Unit commanded mode (heating/cooling).
 - 4. Percent commanded heating or cooling.
 - 5. Override status.
 - 6. Fan on/off.
Fan commanded position (on/off).
 - 7. Alarm Status
- D. VRF Condensing Units:
 - 1. Compressor Status.
 - 2. Compressor Speed.
 - 3. Alarm Status
- E. Electric Heaters:
 - 1. On/Off Status.
 - 2. Space temperature.
 - 3. Space temperature setpoint.

- F. Miscellaneous:
 - 1. Outside Air Temperature (two locations).

3.3 START-UP

- A. Calibration and Commissioning: As each part of the systems become operational, this Contractor shall calibrate all sensing and readout devices and shall test and observe the operation of each and every air moving and/or heating unit and shall adjust all controls so that the items function according to the intent of the specifications. The control contractor shall commission all controls prior to the work of Section 20 08 00 being done. This commissioning work shall include a point-to-point check of all devices, check of sequences, check of proper wiring, and documentation substantiating the work.
- B. Report/Statement: After making all necessary system testing and adjusting, the Contractor shall submit a report to the Engineer indicating all testing/adjustment work done and comment on how system is operating. Such report shall be signed by the individual directly responsible for supervision of the installation of the control system. When the Contractor feels that the system is complete and ready for review by the Engineer, Contractor shall submit a written statement (signed by same individuals as for report) stating that the system is in compliance with the project requirements and ready for review.
- C. Owner Instruction: See Section 20 05 00.
- D. Start-up Trend Logs: The Contractor shall submit to and review with the Engineer daily for a period of four weeks after substantial completion a hard copy log of the following:
 - 1. Five Owner selected room temperature values at 15 minute intervals.
 - 2. Outside air temperature values at 15 minute intervals.
- E. Warranty Trend Logs: Two months after Owner acceptance of the work, the Contractor shall submit to and review with the Engineer a single tabulated 30 day hard copy printout of the systems historical data containing the following information:
 - 1. Date.
 - 2. Hour by hour zone temperature, for five Owner selected rooms.
 - 3. Hour by hour OA temperature.
- F. Documentation: Contractor shall provide a hard copy documentation of the software application program for each digital controller (TUC, NAC). Documentation provided shall include block software flow chart showing the interconnection between each of the control algorithms and sequences for systems utilizing program listings. A program listing shall be printed onto the same blueprint, along with the program flow chart, and description of the sequence of operation. A hard copy of this document shall be stored and maintained in each stand-alone digital controller panel. System acceptance shall not be completed until this documentation is provided and located in each panel.

3.4 ENGINEER REMOTE ACCESS

- A. Provide programming and coordination to allow remote access to the control system graphics by the Engineer, accessed from the Engineer's office via Internet Explorer (or similar web-browsing software). Provide separate login/password for Engineer for such access. Contractor shall also provide efforts for setting up Trends and instructing the Engineer in setting up trends. This remote access shall be maintained prior to Substantial completion, through the warranty period.

3.5 COMMISSIONING

- A. The Products referenced in this section are to be commissioned per Division 01 and Section 20 08 00. The Contractor has specific responsibilities for scheduling, coordination, startup, test, development, testing and documentation.

END OF SECTION 255000

SECTION 259000
INTEGRATED AUTOMATION CONTROL SEQUENCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and Division 01 Specification Sections, apply to this Section.
- B. Requirements of Section 20 05 00 apply to this Section.

1.2 WORK INCLUDED

- A. Control System Design.
- B. Control System Sequence of Operation.

1.3 SUBMITTALS

- A. General: Comply with Section 20 05 00.
- B. Sequences: Submit complete description of sequence of operation for all systems. Sequence submitted shall not be a direct copy of the sequence specified herein, but shall be written to reflect the actual control sequences provided and to more closely match the actual programming used.
- C. Programming: Submit copy of system programming logic.

1.4 GENERAL REQUIREMENTS

- A. Bidder Design: The control system is bidder designed subject to the requirements of the Contract Documents.
- B. Modifications: Software, graphics, and sequences shall be revised and updated as necessary to reflect Owner or Engineer desired changes. Contractor to include in bid no less than 16 hours of control technician's/programmer's time to accomplish the required system modifications.
- C. Sequence Terminology: Wherever the control sequences refer to an article, device or piece of equipment in the singular number, such reference shall mean to include as many of such articles, devices, or equipment as are shown on the plans, required for the sequence, or required to complete the installation. Wherever the control sequence refers to an operating stage in the singular number, such reference shall mean to include as many stages as are specified for the equipment and shall mean analog (i.e. proportional) type control where specified for the equipment (reference drawings and equipment specifications).
- D. Division 25 Scope, General: Division 25 Controls are an Alternate Bid Item (Base bid controls are stand-alone local controls by Division 23). Under the Alternate Bid Item, provide Division 25 controls that integrate the Division 23 controls to DDC and connect controls to central city owned facilities. In lieu of Division 23 controls of the duct heater control by integral control, provide DDC interlocks and controls of duct heaters, to show duct heater status and discharge air temperature on graphics. In lieu of Division 23 controls of OA and Exhaust Dampers, provide DDC control of dampers, and show damper status on graphics.

PART 2 - PRODUCTS

NOT USED

PART 3 - INSTALLATION

3.1 GENERAL

A. Complete System:

1. General: Provide complete control system design, all software, programming, wiring, and control devices as required to allow for automatic control of all mechanical equipment and other systems as indicated; with sequences of operation and features specified. Provide all control interconnections between indoor and outdoor units, all required control connections between equipment components, and to any other devices needed for proper operation. See also Section 25 50 00 for related requirements.
2. Various thermostats, motorized dampers, and other devices are not shown on the drawings but are required per the sequence of operation specified. Coordinate with Engineer for location of all such devices prior to installing. Indicate proposed locations on submittals.

B. Sequences:

1. Additional Sequences: See Section 25 50 00 for system requirements that relate to control sequences; see drawings for additional control sequences and requirements.
2. Control Action: Sequences which involve maintaining a setpoint in response to variable conditions shall use proportional-integral (PI) or proportional-integral-derivative (PID) control (unless noted otherwise). Sequences shall comply with the system performance requirements and other requirements of Section 25 50 00.
3. Missing Sequences: Where no sequence of operation is indicated submit a proposed sequence to the Engineer for review. Such sequences shall match the intended equipment use, code, and ASHRAE standards for the type of equipment and application. HVAC equipment shall have control of heating/cooling operation by area thermostats and control of unit components (i.e. fans dampers) to allow for distribution of heating/cooling and control of ventilation air; fans and similar on/off items shall have time schedule and thermostat control (unless the application clearly implies a different method).

C. Settings:

1. Adjustability: All settings, setpoints, and differentials shall be adjustable. All setpoints indicated are initial settings.
2. Confirm Settings: Confirm with Owner all setpoints, all time schedules, and all other adjustable programming parameters before substantial completion.
3. Thermostat Setpoints: Shall be adjustable at operator's workstation, with initial settings as follows unless indicated otherwise:

Occupied Heating	70 degrees F
Unoccupied Heating	65 degrees F
Occupied Cooling	75 degrees F
Unoccupied Cooling	85 degrees F

D. Time Control:

1. Control system shall provide time schedules for occupied/unoccupied mode switching for all items having sequences with occupied/unoccupied modes, and for all items indicated as having time schedule control.
2. Provide independent time schedules for all mechanical equipment, except where equipment is indicated to be interlocked to other equipment.
3. Provide seasonal (i.e. time of year) control for all mechanical equipment.

4. Provide a single Holiday Schedule or Master Holiday schedule for logical equipment groups as directed by the Owner at submittal time and revised by the Owner during the Owner training. At the end of the warranty period readjust the grouping of equipment as directed by the Owner.
 5. Provide independent optimum start schedules (i.e. warm-up cycles) for mechanical equipment indicated to have (or required to have) optimum start.
 6. VRF Heat Pump System: Shall operate under its own controls with interface to DDC System. See Section 23 81 27 for VRF sequences.
- E. Hand-Off-Auto Control: Provide all control devices and connections to allow Hand-Off-Auto (HOA) control of all controlled items; where unit starters or VFD's provide HOA control no additional controls are required, but this Section controls shall be arranged to allow for HOA controls.
- F. Average Thermostats: Where average thermostats are indicated on plans combine and average requirements from each sensor and use these average requirements to control unit. Averaging shall combine the deviation from setpoint from each thermostat and rate of change of this deviation combined to create control values as if they are from a single thermostat to determine control actuation. Each thermostat shall have the same functions as the other. Provide means (at GUI, in single screen command) the ability to select between use of either thermostat.
- G. Variable Speed Operation: On variable speed (including staged) equipment, start equipment low speed (or other appropriate speed as recommended by equipment manufacturer or system requirements) and control speed changes at a rate that is coordinated with other equipment to provide proper system operation without undesirable effects, nuisance trips and system alarms.
- H. Alarms: Provide alarms for the following:
1. Status of item does not equal commanded status (where proof of status is monitored, e.g. supply fan not proven on when commanded on).
 2. Equipment in alarm (where equipment alarm state is monitored).
 3. System response is not consistent with commanded response (e.g. air handling unit SA temperature is not less than MA temperature and unit is commanded to cooling).
 4. Freezestat alarm (for all hydronic coils).
 5. Safety device alarm (where device is monitored by or connected to the control system).
 6. Space temperature in alarm range (10 deg F or more above cooling setpoint; 10 deg F or more below heating setpoint).
 7. Sensor failure (out of range).
- I. Automatic Restart:
1. General: Equipment shall automatically restart after being shut-off by a power outage, fire alarm, smoke detector, or similar alarm (or fault); upon clearing of the alarm (or fault). System shall revert to its normal operation for the conditions at the time of restarting.
 2. Controlled Restart: Provide controlled re-start by building wing or building floor and in a manner to prevent pressure differentials, equipment issues, or other undesirable effects. Provide time delay on the re-start of equipment 2.5 KW and larger to minimize electrical surges.
- 3.2 VRF SYSTEM – SEQUENCE OF OPERATION
- A. Heat Pumps: See Section 23 81 27.
 - B. DOAS ERV Units: See Section 23 81 27.
 - C. ERV Outside Air and Exhaust Dampers: Control per sequence in 23 81 27 with dampers and controls provided under this Section, connected to VRF contacts for to me control.
 - D. VRF Off/Auto: Provide output to VRF controls to enable (in auto) or disable (off) the VRF system.

- E. OA/Relief Damper serving DOAS HRUs: Shall open when the system is in the occupied mode, and shall close when the system is in the unoccupied mode.
- F. DDC system shall provide interface to allow reset of temperature setpoint, occupied/unoccupied schedule, and VRF system alarms at the campus facilities office.

3.3 EXHAUST AND TRANSFER FANS

- A. General: See "Control" column on Fan Schedule for which of the following control method is required. See notes on plans for control of fans not listed below and other requirements. Where interval timer, switch control, or a similar manual control is indicated, the control device shall provide an input to the DDC system with the DDC system providing an output for control. No line voltage controls or other controls which do not "pass through" the DDC control system are allowed, unless directly stated that is the method of control to be used.
- B. Wall Switch: Fan shall be controlled by on/off wall switch. Fan shall be on when switch is in the on position, and be off otherwise.
- C. Interval Timer: Fan shall be controlled by interval timer, to be on when timer is activated and off otherwise.
- D. Time Schedule: Fan shall run from time schedule.
- E. Time Schedule and Interval Timer: Fan shall run in low speed via time schedule, and operate in high speed when interval timer is activated (regardless of time schedule).

3.4 ELECTRIC HEATERS – DUCT TYPE

- A. General: Heater shall be controlled by a space thermostat to provide heating to satisfy space conditions.
- B. Operation, SCR Heaters: Provide proportional control of heater to vary heater output to match space heating requirements.
- C. Interlock: Shall be hard-wire interlocked with the supply fan on the unit which serves the heater, to only allow heater operation when the unit's fan is proven on. Provide differential pressure switch or CT's at unit fan to provide interlock and proof of operation.

3.5 ELECTRIC UNIT HEATERS

- A. General: Shall cycle on and off via integral thermostat. No DDC monitoring shall be required. Provide roll-up door end switch and relay to prevent heater operation while the door is not closed.

END OF SECTION 259000

SECTION 260126
ACCEPTANCE TESTING OF ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes requirements for acceptance testing by the contractor and testing required to be completed by contractor.
- B. Related Documents: The provisions and intent of the Contract, the General and Supplementary Conditions, and Division 1 Specification Sections, apply to the Work as if specified in this Section.
- C. This facility is a historical structure and subject to City of Tacoma Historical Building requirements and restrictions.

1.2 APPLICABLE PUBLICATIONS

- A. All inspections and tests shall be in accordance with the following applicable standards and codes. These publications form a part of this specification to the extent referenced.
 - 1. American Society for Testing and Materials (ASTM):
 - D877 Dielectric Breakdown Voltage of Insulating Liquids Using Disk Electrodes.
 - 2. Insulated Cable Engineers Association (ICEA):
 - S-68-516 Ethylene-Propylene-Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
 - 3. National Electrical Manufacturers Association (NEMA):
 - WC8 Ethylene-Propylene-Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy. (ICEA S-68-516)
 - AB3, AB4 Evaluation and field testing of circuit breakers.
 - 4. Institute of Electrical and Electronic Engineers (IEEE):
 - 81Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System.
 - 400Guide for Making High-Direct-Voltage Tests on Power Cable Systems in the Field.
 - 5. National Electrical Code – NEC
 - 6. American National Standards Institute - ANSI
 - 7. National Fire Protection Association - NFPA
 - 8. Occupational Safety and Health - OSHA 29CFR Part 1910.269
 - 9. International Electrical Testing Association – NETA
 - 10. Nationally Recognized Testing Laboratory Approved - NRTL
 - 11. State of Washington Administrative Code – WAC

1.3 SAFETY

- A. The Contractor shall adhere to safety procedures as required by the following:
 - 1. Occupational Safety and Health Act.
 - 2. Accident Prevention Manual for Industrial Operations, National Safety Council.
 - 3. ANSI/NFPA 70E, Electrical Safety Requirements for Employee Workplaces.
 - 4. American National Standards for Personnel Protection: Lockout/Tagout.
 - 5. Applicable state and local safety operating procedures.
- B. Perform all tests with apparatus de-energized, except where specifically required.
- C. Designate a Project Safety Representative to supervise operations with respect to safety.

1.4 WORK INCLUDED:

- A. The Contractor shall perform tests of the electrical system to assure code compliance and proper system operation according to the intent of the contract documents.

- B. Applicable Codes, Standards and References for Tests:

All inspections and tests shall be in accordance with the following applicable codes and standards except as provided otherwise herein.

1. National Electrical Code - NEC
2. National Electrical Manufacturer's Association - NEMA
3. American Society for Testing and Materials - ASTM
4. Institute of Electrical and Electronic Planss - IEEE
5. National Electrical Testing Association - NETA
6. American National Standards Institute - ANSI
7. State and Local Codes and Ordinances
8. Insulated Cable Plans Associate - ICEA
9. Association of Edison Illuminating Companies - AEIC

1.5 CIRCUIT TESTS:

- A. The Contractor shall perform routine insulation resistance, continuity and grounding tests for all distribution and utilization equipment prior to their connection and energization.
- B. A standard megger-type instrument shall be used to demonstrate insulation values are 200 megohms, ground system is continuous and the neutral system is isolated from the grounding system except at the systems' single ground point.
- C. System defects, indicated by the circuit tests, shall be corrected. Tests shall be repeated until satisfactory results are obtained.

1.6 GROUNDING TEST:

- A. Measure the ohmic value of the Electrical Service Entrance "System Ground" with reference to "Earth Ground" using multiple terminal, fall of potential methods and suitable test instruments.
- B. Maximum resistance to ground shall be less than 10 ohms. Notify the Engineer if this resistance value is not obtained for the initially installed system; and then Contractor shall recommend and provide corrective measures required to reduce ground resistance to less than 10 ohms.

1.7 PHASE BALANCE TESTS:

- A. Verify the balance of the electrical system's phase currents. Re-assign load connections necessary to obtain a balance that is acceptable to the Engineer.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

- A. Utilize test equipment in good mechanical and electrical condition with shape and frequency output waveforms appropriate for the test and the tested equipment.
1. Accuracy shall be appropriate for the test being performed, but not in excess of 2% of the scale being used.
- B. Field test meters used to check installed power system instrument calibration must have an accuracy higher than the instrument being checked.

2.2 MATERIALS AND INSTRUMENTATION:

- A. Contractor shall include all costs associated with testing in bid proposal.

PART 3 - EXECUTION

3.1 TESTING

- A. General requirements: Test all wire, cable, electrical equipment, generator, automatic transfer switch, and diesel fuel piping/distribution system installed and connected by the Contractor to assure proper installation, setting, connection, and function as indicated or to conform to Contract Documents and manufacturer's instructions. After the installation has been completed, the Contractor shall conduct an operating test demonstrating all equipment and devices operate in accordance with the requirements of the plans and specifications.
 - 1. Perform tests recommended by the equipment manufacturer.
 - 2. Perform additional tests requested by the Engineer which are required due to field conditions.
 - 3. Be responsible for all damage to equipment or material due to improper test procedures or test apparatus handling.

3.2 IDENTIFICATION

- A. Upon completion of the tests and inspections noted in these specifications, attach a label to all serviced devices indicating the date serviced and the testing company responsible.

3.3 TESTING PROCEDURE:

- A. All tests shall be conducted according to applicable industry standards.

END OF SECTION 260126

SECTION 260500

COMMON WORK RESULTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The provisions and intent of the Contract, the General and Supplementary Conditions, and Division 1 Specification Sections, apply to the Work as if specified in this section.

1.2 DEFINITIONS:

- A. NEC means National Electrical Code.
- B. The term "code" as used herein shall mean all applicable National, State and local codes.

1.3 WORK INCLUDED:

- A. The Electrical work consists of furnishing, installing, testing and placing in satisfactory operation all equipment, materials, devices and appurtenances, necessary to provide a complete electrical system according to the intent of the Drawings and Specifications. In general this includes all labor, materials, equipment, tools, etc. to complete the electrical work.
- B. General requirements for materials and installation methods. Removal and legal disposal off site of electrical equipment no longer in use.
- C. Electrical work includes field installation and wiring of equipment supplied with HVAC equipment. Refer to Mechanical/Plumbing drawings, specification and include costs for this work in the bid.

1.4 INTENT OF DRAWINGS:

- A. The Electrical Drawings are intended to serve as working Drawings for general layout. Equipment, switches, panels, disconnects and raceway locations are partially diagrammatic and do not necessarily indicate actual routings or all appurtenances required for a complete installation.
- B. Minor changes in the locations of raceways, outlets and the like, from those shown on the Drawings, shall be made without extra charge if so directed before installation or required due to structural elements.
- C. Contractor is required to take all working dimensions from field measurements. Do not scale electrical Drawings.

1.5 MANUFACTURERS' RECOMMENDATIONS:

- A. Make all installations in strict accordance with manufacturers' published recommendations and details. All equipment, materials and installation methods recommended by manufacturers' shall be considered as part of this contract.

1.6 SUPERVISION AND COORDINATION:

- A. Contact Electrical Inspection, obtain and pay for permit(s) before starting work.
- B. Contact local serving utility and make arrangements for their services before starting work.
- C. Contractor shall have a responsible person in charge at the site any time work is in progress or when necessary for coordination with other trades.

1.7 CODES AND REGULATIONS:

- A. All work shall conform to current applicable National, State and local Codes; these shall be regarded as the minimum standard of quality for material and workmanship. Contractor shall provide all Labor and Material required for compliance with Code Requirements or Code Interpretations, although not specifically detailed on the Drawings or in the Specifications. Contractor shall become familiar with all the following codes prior to bidding.
- | | |
|------|---------------------------------------------|
| ASTM | American Society for Testing and Materials |
| NBFU | National Board of Fire Underwriters |
| NEC | National Electrical Code |
| WAC | Washington State Administrative Code |
| NESC | National Electrical Safety Code |
| NEMA | National Electric Manufacturers Association |
| NETA | National Electrical Testing Association |
| NFPA | National Fire Protection Association |
| UL | Underwriters Laboratories, Inc. |
| ICEA | Insulated Cable Engineers Associations |
| CBM | Certified Ballast Manufacturers |
| IBC | International Building Code |
| ETL | Electrical Testing Laboratories |
- B. Nothing in these Drawings and Specifications shall be construed as permitting work not conforming with governing codes.
- C. The Contractor shall not be relieved from complying with any requirements of these contract documents which may exceed, but not conflict with requirements of the governing codes.
- D. Contractor shall include in bid all costs to have a Department of Labor & Industries approved firm to evaluate the installation safety, and compliance with code as required per WAC 296-40-100 for any equipment specified or furnished that is not UL labeled.
- E. For equipment furnished by others not UL labeled the contractor shall not connect the equipment to the electrical system until receiving written approval by the electrical authority having jurisdiction.

1.8 PERMITS AND FEES:

- A. Obtain and pay all fees for licenses, permits and inspections required by laws, ordinances and rules governing work specified herein. Arrange for inspection of work and provide inspectors with all necessary assistance.

1.9 WORKMANSHIP:

- A. All work shall be done by competent craftsmen skilled in the specific work to be done. Equipment shall be installed in a neat and workmanlike manner following the best practice of the trade.

1.10 ITEMIZED COST BREAKDOWN:

- A. Furnish an electrical schedule of values.

1.11 OPERATING INSTRUCTIONS:

- A. Fully instruct the Owner's designated representatives in the operation and maintenance of all components of the electrical system upon completion of the work and after all tests and final inspection(s) by the Authority(s) Having Jurisdiction.

1.12 AS-BUILT RECORD DRAWINGS:

- A. Provide field set and one (1) clean, neatly drafted (electronic PDF) set of record drawings to owner prior to project closeout.

1.13 ELECTRICAL EQUIPMENT OPERATION AND MAINTENANCE (O & M) MANUALS:

- A. Provide electronic PDF set of all equipment and test reports for the project to owner prior to project closeout.

PART 2 - PRODUCTS

2.1 GENERAL:

- A. All materials shall be new, free from defects, of the quality specified herein and on the Drawings. Materials shall be designed to ensure satisfactory operation and manufacturer's rated life in the prevailing environmental conditions where installed. Materials and equipment shall be listed by Underwriter's Laboratories or a Washington Administration Code (WAC) recognized testing laboratory for use under these conditions.
- B. Each type of material shall be of the same make and quality throughout the job. The materials furnished shall be the latest standard design products of manufacturers regularly engaged in their production.

2.2 TECHNICAL DATA:

- A. Technical information contained herein relies entirely on tests and ratings provided by manufacturers who are solely responsible for their accuracy. The Engineer using this information in no way implies having tested or otherwise verified the results of published manufacturer's information.

2.3 AS SPECIFIED EQUIPMENT:

- A. This specification generally lists only one make and model number for each item of equipment or material required for the project. This is not intended to be restrictive but is intended to indicate the standard of quality, design and features required.
- B. In addition, the listed product is the basis of the design regarding physical size, electrical power requirements and performance. The product so identified is designated "as specified."

2.4 COMPLETE SYSTEMS:

- A. All systems specified herein and shown on the Drawings shall be complete and operational in every detail. Mention of certain materials in bidding documents shall not be construed as releasing the Contractor from furnishing additional materials required by the manufacturer, installation methods, codes and performing all labor required to provide a complete and operable system.

2.5 SUBMITTALS:

- A. Submittal items: Submittals shall include, but not be limited to the following items:
 - Raceways
 - Wires
 - Grounding Equipment
 - Wiring Devices
 - Nameplates
 - Panelboards
 - Light Fixtures

PART 3 - EXECUTION

3.1 PROTECTION OF WORK:

- A. Protect all work, wire, materials and equipment installed under this Division against damage by other trades, weather conditions or any other causes. Equipment found damaged or in other than new condition will be rejected as defective.
- B. Equipment shall be kept covered or enclosed to exclude moisture, dust, dirt, cement, or paint and shall be free of all such contamination before acceptance. Enclosures and trims shall be in new condition, free of rust, scratches or other finish defects. Properly refinish in a manner acceptable to the Engineer if damaged.
- C. Keep conduit and raceways closed with suitable plugs or caps during construction to prevent entrance of dirt, moisture, concrete or foreign objects. Pull a properly sized mandrel through each conduit prior to installation of wire or pull string for empty conduits and within 24 hours of concrete placement (duct tape not acceptable). Raceways shall be clean and dry before installation of wire and at the time of acceptance.
- D. Make up and insulate wiring promptly after installation of conductors. Wire shall not be pulled-in until raceways are complete, all bushings are installed and raceway terminations are completed nor pulled into conduit embedded in concrete until after the concrete is placed and forms are removed.
- E. Empty conduits shall be provided with distance labeled pull tape, labeled at source and destination matching plans and filled with removable foam.

3.2 CUTTING AND PATCHING:

- A. Obtain permission from the Owner prior to cutting. Locate cuttings not to weaken structural components. Cut carefully and only the minimum amount necessary. Cut concrete with diamond core drills or saws except where space limitations prevent the use of such equipment.
- B. All construction materials damaged or cut into during installation must be repaired or replaced with materials of like kind and quality as original materials by skilled labor experienced in that particular building trade.

3.3 PAINTING:

- A. Equipment scratched or marred in shipment or installation shall be refinished to the satisfaction of the Engineer.

3.4 LABELING:

- A. Clearly and properly label the complete conduit only and electrical system, as specified herein, to indicate the loads served or the function of each item of equipment connected under this contract.

END OF SECTION 260500

SECTION 260519

LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The provisions and intent of the Contract, the General and Supplementary Conditions, and Division 1 Specification Sections, apply to the Work as if specified in this section

1.2 WORK INCLUDED:

- A. Provide all wire and terminations for a complete installation

PART 2 - PRODUCTS

2.1 PACKAGING:

- A. Conductors shall be delivered to the job site in approved original cartons, or on reels as recommended by the manufacturer, and shall bear the Underwriter's Label. Reels shall be provided with suitable protection to prevent fork-lift damage to conductors during shipment or storage prior to use.

2.2 CONDUCTORS - 600 VOLTS:

- A. Stranded Copper, insulated for 90 degree centigrade and 600 volts.
- B. Insulation type XHHW-2 for underground applications
- C. Insulation type THHN/THW for building applications.
- D. Insulation requirements may vary per the NEC where necessary to suit more stringent installation conditions.

2.3 CONNECTORS - 600 VOLTS:

- A. Branch circuit conductor splices:
Pre-insulated "twist-on" type or "crimped-on" type as approved (Scotch-lok, Ideal or equal).
- B. Terminator lugs of No. 12 wire and smaller:
Spade, insulated type to be tool applied.
- C. Terminator lugs for No. 10 wire or larger:
Two bolt (or approved positive restraint), tool applied compression type (Burndy or equal).

2.4 INSULATING MATERIALS:

- A. Insulating tape or heat shrink tubing shall have the equivalent rating of the applicable conductor insulation (Scotch 3M, RAYCHEM or equal).

2.5 PLASTIC CABLE TIES:

- A. Nylon, or equivalent, locking type (T&B or equal).

PART 3 - EXECUTION

3.1 GENERAL:

- A. Install all wiring in raceway.

3.2 CONDUCTOR TYPES, REFERENCED ON PLAN:

- A. Conductors shall be stranded copper.

3.3 CONDUCTOR COLORING CODE:

Conductor color coding shall be as follows:

- A. 208/120 volt system
 - A Phase - Black
 - B Phase - Red
 - C Phase - Blue
 - Neutral - White
 - Grounding - Green
- B. Conductors shall have colored insulation except wires larger than #8 may be black with colored tape identification at all terminations and splices.
- C. Additional colors may be used where such colors will help in identifying wires and different systems.

3.4 CONDUCTOR INSTALLATION:

- A. Raceways shall be complete, clean and free of burrs before pulling conductors.
- B. U.L. approved pulling compounds may be used with the residue cleaned from the conductors and raceway entrances after the pull is made.
- C. Contractor shall obtain the manufacturer's published recommendations for the handling, pulling and terminating of the cable. Contractor shall perform work in accord with manufacturer's recommendations.
- D. Pulleys or blocks shall be used for alignment of the conductors when pulling. Pulling shall be in accordance with manufacturer's specifications regarding pulling tensions, bending radius of the cable and compounds. No mechanical pulling means shall be used for wires No. 8 AWG and smaller. Cables shall be pulled by the conductor, not by the insulation or shielding.

3.5 MOISTURE PROTECTION:

- A. Cable ends shall be protected at all times from moisture. Provide approved heat-shrink end caps or equivalent for all unterminated cable ends.

3.6 TERMINATIONS - COPPER CONDUCTORS 600 VOLTS:

- A. Control and special systems wires shall be terminated with a crimped on lug when terminating at a screw connection.
- B. All screw and bolt type connectors shall be made up tight and retightened after an eight-hour period. Tighten all bolted connections with a ratcheting type torque wrench per manufacturer's standards.
- C. All tool applied crimped connectors shall be applied per manufacturer's recommendations and physically checked for tightness.

END OF SECTION 260519

SECTION 260533
RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The provisions and intent of the Contract, the General and Supplementary Conditions, and Division 1 Specification Sections, apply to the Work as if specified in this section

1.2 WORK INCLUDED:

- A. Provide all raceways for a complete electrical system. Include all fittings, hangers and appurtenances required for a complete installation.
- B. All conduit is anticipated to be run surface within and exterior to a Historical Building..

PART 2 - PRODUCTS

2.1 CONDUITS:

- A. Galvanized Rigid Steel (GRS).
- B. Electrical Metallic Tubing (EMT)
- C. Non-metallic, polyvinyl chloride (PVC), schedule 40.

2.2 FITTINGS:

- A. GRS fittings shall have threaded connections.
- B. EMT fittings shall have set screw or compression type.
- C. PVC Schedule 40 fittings shall be solvent welded type.

PART 3 - EXECUTION

3.1 GENERAL:

- A. Install raceways surface on building or concealed below grade. All building penetrations shall be core drilled or with circular hole saw and sealed weather tight meeting manufacturer's requirements and instructions. Sealing material shall be as recommended by or approved by manufacturer.
- B. Cut conduit ends square, ream smooth and extend maximum distance into all couplings and connectors.
- C. Provide and install manufactured end caps on all conduit ends during construction to prevent the entrance of water or dirt. Tape, as a cover, is unacceptable.
- D. Pull a properly sized mandrel through each conduit prior to installation of conductors or pull-lines to remove any materials trapped within the conduit run. Conduits embedded in concrete shall have a mandrel pulled within 24 hours of concrete pour.
- E. Conduits shall maintain a minimum 12" clearance from any high temperature surface.

- F. The conduit layout shall be carefully planned by the contractor to ensure neat and workmanlike installation. All below grade conduit runs with two or more conduits shall be provided with manufactured conduit saddles.
- G. Any work showing inadequate planning may be ordered removed by the Engineer and shall be replaced in a neat and proper manner at no additional cost to the owner.

3.2 CONDUIT SIZING:

- A. Conduits shall be sized per code for conductors with type THHN insulation, although thinner insulation types are permitted in some cases. Conduit size shall not be reduced if large size is specified on the drawing. Minimum conduit size shall be 3/4" trade diameter for above grade and 2" trade diameter for below grade.

3.3 GRS/EMT:

- A. Install GRS for all conduits where conduit is exposed on building exterior where subject to damage.
- B. Install EMT for all surface conduits interior or exterior to building.

3.4 FLEXIBLE CONDUIT:

- A. Provide liquid tight flexible metal conduit connection to all equipment.

3.5 PVC CONDUIT SCHEDULE 40:

- A. PVC conduit Schedule 40 may be used underground. Offsets and bends shall not exceed 22 degrees without engineers field review and approval.

3.6 CONTINUITY OF CONDUIT SYSTEM:

- A. Conduits shall be assembled continuous and secured to boxes, panels, etc., with appropriate fittings to maintain electric continuity.

3.7 PULL-LINES:

- A. Provide 150 pound plastic pull-lines, with numbered distance marks at one-foot increments in all conduit-only systems and spare conduits to facilitate future conductor installation. Provide labels on source and end point of all pull lines

END OF SECTION 260533

SECTION 262416

PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The provisions and intent of the Contract, the General and Supplementary Conditions, and Division 1 Specification Sections, apply to the Work as if specified in this section.

1.2 WORK INCLUDED

- A. Provide all panelboard equipment complete. All equipment shall be dead front type construction and shall bear the U.L. label. Load centers will not be acceptable.
- B. All panels provided for service entrance locations as defined by the NEC shall be provided with a UL label as Suitable for Use as Service Entrance Equipment (SUSE).

1.3 SHOP DRAWINGS

- A. Prepare and submit for review prior to manufacture. Include front view, dimensions, device sizes and layout, list of nameplates and all other information required to demonstrate conformance with contract documents.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Siemens
- B. General Electric
- C. Square D
- D. Cutler Hammer
- E. Approved Equal

2.2 PANELBOARD DESCRIPTION

- A. Voltage, arrangement, and capacity of bus and overcurrent protective devices shall be as shown on the drawings. Bus shall extend behind all spaces ready for future overcurrent protective devices.
- B. Buss bars shall be plated aluminum or copper with ampere density not-to-exceed 1200/1000 amperes per square inch. Bussing will generally be 3 phase, 4 wire, 100 percent neutral, braced to match the interrupting rating of the breakers.
- C. Provide multiple lugs where parallel or "feed-through" connections are shown on drawings.
- D. Provide separate neutral and ground buses at the bottom of each panelboard.

2.3 OVERCURRENT PROTECTIVE DEVICES

- A. Provide circuit breakers in all panelboards.
- B. The AIC rating of the panel shall be as specified on the drawings.

- C. Mount breakers in all panelboards so breaker handle operates in a horizontal plane. Provide common trip on all multiple pole breakers.
- D. All circuit breakers shall be solid state bolt-in type.
- E. Circuit Breakers rated 15A through 30A shall be U.L. rated for 60/75 degree centigrade wire. Breakers 35A and larger shall be rated for 75 degree centigrade.
- F. Circuit breakers intended for switching 120 volt loads shall be switching duty rated (SWD).
- G. Provide "Spare" overcurrent devices, where noted on the drawings, complete and ready for future circuit connections.
- H. Provide "Space" for future overcurrent devices, where noted on the drawings. Space shall include all bussing and device mounting hardware. Provide approved coverplates or overcurrent devices in all spaces. Open spaces in the panel are not permitted.

2.4 ENCLOSURE GENERAL CONSTRUCTION

- A. Provide cabinets of sufficient dimensions to allow future expansion and addition of overcurrent devices within the panelboards. All panelboards shall be provided with door-in-door construction. Provide increased enclosure width required for installation of conduits.
- B. Provide all panelboards Nema 1, door in door construction.
- C. All electrical distribution equipment locks shall be keyed identically.
- D. Fasten panelboard front with machine screws with oval counter-sunk heads, finish hardware quality, with escutcheons or approved trim clamps. Clamps accessible only when dead front door is open are acceptable.
- E. Surface mounted panelboards with fronts greater than 48 inches vertical dimension shall be hinged at right side in addition to hinged door over dead front. Provide three point latching mechanism with one T-handle operator.
- F. Provide matching trim of same height for adjacent panels or control devices in finished areas.
- G. Transient Voltage Surge Suppression (TVSS) equipment with circuit breaker shall be provided by the panelboard manufacturer and included integral or external with each panelboard.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

- A. Secure panelboards in place with top of cabinet at 6'-0", above finished grade. Top of cabinet and trim shall be level; trim and door shall fit neatly without gaps, openings or distortion.
- B. Top edges of adjacent panels shall be even.
- C. Securely anchor panelboards to structural framing with stainless approved fasteners and concealed bracing as required. Provide painted stainless steel channel support framing with concrete pad or anchor base where panelboard(s) are free standing. Submit support rack shop drawings for approval prior to fabrication.

3.2 CIRCUIT INDEX

- A. Each panelboard shall be provided with a typewritten index listing each circuit in the panel by number, with its proper designation. Listing shall match circuit breaker arrangements, typically with odd numbers on the left and even numbers on the right. Mount index with a transparent protective cover

inside the cabinet door.

- B. Contractor shall provide a typed duplicate index for each panel in the O & M manuals.

3.3 PANELBOARD NAMEPLATE

- A. Provide phenolic engraved nameplate for each panelboard. See Section 26 05 00

END OF SECTION 262416

REPORTS

- Limited Hazardous Materials Survey
- Hazardous Materials Work Specifications
- Anticipated Project Related Questions

Limited Hazardous Materials Survey Report

HVAC Replacement – Fire Stations 11 & 13

FS 11: 3802 East McKinley Ave, Tacoma WA 98404

FS 13: 3825 North 25th Street, Tacoma WA 98406

Prepared for:

City of Tacoma, Public Works Department
Facility Management Division, Capital Projects
747 Market Street, Room 744
Tacoma, WA 98402

September 16, 2022

PBS Project No. 41286.030



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APPENDICES

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PLM Bulk Sample Inventories
PLM Bulk Sample Laboratory Data Sheets
PLM Bulk Sample Chain of Custody Documentation

APPENDIX B: AA Lead Paint Chip Sampling Information

AA Lead Paint Chip Sample Inventories
AA Lead Paint Chip Laboratory Data Sheets
AA Lead Paint Chip Chain of Custody Documentation

APPENDIX C: Certifications

1 INTRODUCTION

1.1 Project Background

PBS Engineering and Environmental, Inc. (PBS) performed a limited hazardous materials survey of Fire Stations 11 and 13 in Tacoma Washington. The intent of this investigation is to ensure compliance with applicable regulatory requirements that a “good faith inspection” for asbestos-containing materials (ACMs) be performed prior to renovation/demolition activities.

All accessible areas associated with the planned work, were inspected for the presence of ACMs and lead-containing paint (LCP). PBS’s understanding of the work scope is based on construction drawings prepared by KMB Architecture dated May 31, 2022.

1.2 Building Descriptions

Fire Station 11

Fire Station 11 is a brick-and-mortar structure. Interior finishes within the building include the following: Flooring is comprised of bare concrete, sheet vinyl flooring, or carpet on wood. Walls and ceilings are plaster. Level 2 Hall and Dormitories have popcorn ceiling texture. The Lounge 201 had a suspended ceiling with acoustical ceiling tiles. Windows are wood framed. Heating is provided to the building via radiators supplied by a boiler unit.

Fire Station 13

Fire Station 13 is a brick-and-mortar structure. Interior finishes within the building include the following: Flooring is comprised of bare concrete, sheet vinyl flooring, or carpet on vinyl floor tiles on wood. Walls and ceilings area plaster or gypsum wallboard. Windows are wood framed. Heating is provided to the building via radiators supplied by a boiler unit.

1.3 Survey Process

All accessible areas included in the project scope were inspected by Asbestos Hazard Emergency Response Act (AHERA) Certified Building Inspector Claire Tsai (Cert. No. IR-21-7316B, Exp. 12/10/2022) on August 3, 2022. PBS endeavored to inspect all accessible areas of the scope of work. Inaccessible areas consist of those requiring selective demolition, fall protection, or confined space entry protocols in order to gain access.

When observed, suspect materials were sampled. All samples were assigned a unique identification number and transmitted for analysis to Seattle Asbestos Test (NVLAP #200768-0) in Lynwood, Washington under chain-of-custody protocols. Samples were analyzed according to EPA Method 600R-93/116 using Polarized Light Microscopy (PLM), which has a reliable limit of quantification of 1% asbestos by volume. Information regarding the type and location of sampled materials can be found on the attached PLM Sample Inventory.

Suspect ACMs may exist in inaccessible areas. PBS endeavored to determine the presence and estimate the condition of suspect materials in all inaccessible areas included in the scope of work. While PBS has endeavored to identify the ACM that may be found in concealed locations, additional unidentified ACM may exist.

2 FINDINGS

2.1 Asbestos-Containing Materials (ACMs)

Federal and state regulations define an Asbestos-Containing Material as any material that contains greater than 1% of asbestos.

The following materials were sampled and found to contain **greater than 1% asbestos**:

Fire Station 11:

- **Powdery material patch** – Basement 001 base of boiler (Approximately 3 SF)
- **Mortar** – Building exterior and Chimney (Approximately 3 SF anticipated to be impacted)

Fire Station 13:

- **Grey brittle material patch** – Basement 001 base of boiler (Approximately 3 SF)
- **Residual hard mudded fitting insulation** below vinyl covers– Mechanical 001 boiler plumbing (Approximately 50 ea)
- **12" grey vinyl floor tile and associated black mastic** under carpet– Recreation room 201 (Approximately 840 sf)

The following materials were found to contain **less than 1% asbestos**:

Fire Station 13

- Plaster – Levels 1 and 2 walls and ceilings
- Joint compound and gypsum wallboard assemblies – Throughout (composite analysis of wallboard system was determined to contain less than 1% asbestos)

The following materials were sampled and found **not** to contain detectable asbestos:

Fire Station 11:

- Popcorn ceiling texture – Level 2 hall and Dormitories
- Plaster – Levels 1 and 2 walls and ceilings
- Boiler insulation – Basement 001
- Cementitious blocks – Basement 001 base of boiler
- Cementitious material – Basement 001 base of boiler
- White on grey coating – Basement 001 base of boiler on blocks
- White skim coat – Basement chimney
- Beige pebble sheet vinyl flooring two layers and associated yellow mastic and white leveling compound – Dining 204
- Yellow carpet mastic – Level 2 dormitories
- 2 x 4 lay-in ceiling-tile with fissure pinhole pattern – Lounge 202
- Silver paint – All radiators
- White window putty – north elevation windows
- Tan window caulk – north elevation windows
- White interior window caulk – north elevation windows
- Tan caulk – West elevation louver attic level

Fire Station 13:

- Plaster – Levels 1 and 2 walls and ceilings
- Boiler insulation – Mechanical 001
- Powdery material – Mechanical 001 Base of boiler
- White caulk – Mechanical 001 boiler vent
- Blue floor coating – Level 1
- Blue pebble sheet vinyl flooring and associated mastic – Bath 205 and Kitchen
- Silver paint – All radiators
- Brick and Mortar – Building exterior
- White caulk – Attic plywood panel fill
- Interior window putty – East windows
- Exterior window putty – East windows
- Exterior window caulk – East windows

Refer to Appendix A for a complete listing of representative bulk sampling and associated laboratory analysis.

2.2 Lead-Containing Components

Representative paint coatings were sampled for lead content at each location. The samples were assigned unique identification numbers and transmitted to NVL Laboratories, Inc. (AIHA IH #101861) under chain-of-custody protocols for analysis using Flame Atomic Absorption.

Lead **was detected** in the following samples:

Fire station 11:

- Beige paint on plaster ceiling – Lounge central area (0.43% lead)
- Yellow paint on wood beam – Basement (2.2% lead)
- White paint on wood window frame – North elevation (4.3% lead)
- Beige paint on wood window frame – Level 1 north wall (0.080% lead)
- Silver paint on metal radiator – Lounge south radiator (1.2% lead)

Fire station 13:

- Brown paint on wood window frame – Level 1 east wall (0.042% lead)
- Green paint on wood wall – Mechanical 001 (0.52% lead)
- Silver paint on metal radiator – Recreation room 201 (0.74% lead)

Refer to Appendix B for a complete list of sample locations and laboratory analysis for lead paint.

3 RECOMMENDATIONS

3.1 ACMs

PBS recommends that all exposed and concealed ACMs be removed prior to demolition activities. A qualified Washington State licensed asbestos abatement contractor should be employed to remove all such ACMs according to applicable local, state, and federal regulations.

Asbestos-containing joint compound associated with non-asbestos gypsum wallboard (GWB) assemblies were found to contain 2% asbestos. All sanding and sawing of joint compound must be performed by certified asbestos workers and supervisors. Gypsum wallboard assemblies (i.e wallboard and joint compound) were

found to contain less than 1% asbestos. Gypsum wallboard assembly demolition requires personnel impacting the material to adhere to regulatory requirements outlined in WAC 296-62-17712(2) and training as outlined in WAC 296-62-07722(5) and WAC 296-62-0728. Refer to WISHA Regional Directive 23.30 for additional information.

The possibility exist that suspect ACMs may be present in concealed locations including equipment, wall and ceiling cavities. These may include, but are not limited to waterproofing membrane, vermiculite, internal gaskets, caulking and sealants of HVAC equipment and construction adhesives, wall mastics and buried asbestos cement pipe. In the event that suspect ACMs that are not included in this survey are discovered during construction, contractors should avoid disturbance of the suspect ACM and inform the owner promptly for confirmation testing. All untested materials should be presumed asbestos-containing or tested for asbestos content prior to impact.

While not observed, additional suspect-ACMs may be present in concealed spaces, which are discussed above. Caution should be exercised during demolition to prevent impact of suspect-ACMs. All suspect ACMs should be presumed asbestos-containing until properly sampled and analyzed.

3.2 Lead-Containing Components

Representative painted coatings were found to contain lead by laboratory analysis. Impact of painted surfaces with detectable concentrations of lead requires construction activities to be performed according to Washington State Department of Labor and Industries (L&I) regulations for Lead in Construction Washington Administrative Code (WAC) 296-62-155. Workers impacting LCP should be provided the proper personal protective equipment and use proper work methods to limit occupational and environmental exposure to lead until an initial exposure assessment has been conducted. Additionally, all impacts to lead-based paint shall be in accordance with 40 CFR Part 745.

Painted coatings may exist in inaccessible areas of the work area or in secondary coatings. Any previously unidentified painted coatings should be considered lead containing until sampled and proven otherwise.

Report prepared by:

 Digitally signed
by Claire Tsai

Claire Tsai
AHERA Building Inspector
Cert. # IR-21-7316B, expiration 12/10/2022

Report reviewed by:

 Digitally
signed by
Ryan Hunter

Ryan Hunter
Project Manager

APPENDIX A

PLM Bulk Sampling Information

PLM Bulk Sample Inventory

PLM Bulk Sample Laboratory Data Sheets

PLM Bulk Sample Chain-of-Custody Documentation

**HVAC Replacement Fire Station 11
City of Tacoma**

**PBS Engineering + Environmental
PBS Project # 41286.030**

PLM ASBESTOS SAMPLE INVENTORY

<u>PBS Sample #</u>	<u>Material Type</u>	<u>Sample Location</u>	<u>Lab Description</u>	<u>Lab Result</u>	<u>Lab</u>
41286.030-11-01	Popcorn ceiling texture	Hall 210	Layer 1: White soft lumpy material with paint	NAD	SAT
41286.030-11-02	Popcorn ceiling texture	Dormitory 202 south area	Layer 1: White soft lumpy material with paint	NAD	SAT
41286.030-11-03	Popcorn ceiling texture	Dormitory 202 north area	Layer 1: White soft lumpy material with paint	NAD	SAT
41286.030-11-04	Popcorn ceiling texture	Dormitory 203 north area	Layer 1: White soft lumpy material with paint	NAD	SAT
41286.030-11-05	Popcorn ceiling texture	Dormitory 203 south east area	Layer 1: White soft lumpy material with paint	NAD	SAT
41286.030-11-06	Plaster wall	Level 1 west wall	Layer 1: Sandy brittle material with paint	NAD	SAT
41286.030-11-07	Plaster wall	Hall 201 north wall	Layer 1: Sandy brittle material with paint	NAD	SAT
41286.030-11-08	Plaster ceiling	Dinning 204 southeast area	Layer 1: Sandy brittle material with paint	NAD	SAT
41286.030-11-09	Plaster wall	Dormitory 202 southwest area	Layer 1: Sandy brittle material with paint	NAD	SAT
41286.030-11-10	Plaster wall	Level 1 north wall	Layer 1: Sandy brittle material with paint	NAD	SAT
41286.030-11-11	Plaster wall	Level 1 south wall	Layer 1: Sandy brittle material with paint	NAD	SAT
41286.030-11-12	Plaster ceiling	Lounge 201 north central area	Layer 1: Sandy brittle material with paint	NAD	SAT
41286.030-11-13	Boiler insulation	Basement 001	Layer 1: White elastic material with woven fibers Layer 2: Yellow fibrous material	NAD NAD	SAT
41286.030-11-14	Boiler insulation	Basement 001	Layer 1: White elastic material with woven fibers Layer 2: Yellow fibrous material	NAD NAD	SAT
41286.030-11-15	Boiler insulation	Basement 001	Layer 1: White elastic material with woven fibers Layer 2: Yellow fibrous material	NAD NAD	SAT
41286.030-11-16	Powdery material	Basement 001 base of boiler	Layer 1: Off white powdery material	5% Chrysotile	SAT

**HVAC Replacement Fire Station 11
City of Tacoma**

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PBS Project # 41286.030**

PLM ASBESTOS SAMPLE INVENTORY

<u>PBS Sample #</u>	<u>Material Type</u>	<u>Sample Location</u>	<u>Lab Description</u>	<u>Lab Result</u>	<u>Lab</u>
41286.030-11-17	Cementitious material	Basement 001 base of boiler	Layer 1: Gray brittle material	NAD	SAT
41286.030-11-18	White skim coat	Basement 001 Chimney	Layer 1: White powdery material with paint	NAD	SAT
41286.030-11-19	White skim coat	Basement 001 Chimney	Layer 1: White powdery material with paint	NAD	SAT
41286.030-11-20	White skim coat	Basement 001 Chimney	Layer 1: White powdery material with paint	NAD	SAT
41286.030-11-21	Mortar	Basement 001 Chimney	Layer 1: Gray sandy material	2% Chrysotile Point Count 0.75%	SAT
41286.030-11-22	Mortar	Attic west brick wall	Layer 1: Gray sandy material	2% Chrysotile Point Count 1.25%	SAT
41286.030-11-23	Beige pebble sheet vinyl flooring Backing Yellow mastic Sheet vinyl flooring white leveling compound	Dining 204 near radiator	Layer 1: Beige sheet vinyl Layer 2: Gray fibrous material with mastic Layer 3: Tan sheet vinyl Layer 4: Gray fibrous material with mastic and leveling compound	NAD NAD NAD NAD	SAT
41286.030-11-24	Yellow mastic on wood	Dormitory 202 north east area	Layer 1: Yellow mastic	NAD	SAT
41286.030-11-25	2 x 4 Lay-in-ceiling-tile fissure pinhole	Lounge 202 central area	Layer 1: Gray fibrous material with paint	NAD	SAT
41286.030-11-26	Silver paint	Level 1 north wall metal radiator	Layer 1: Silver paint	NAD	SAT
41286.030-11-27	White window putty	North elevation west window	Layer 1: Off white brittle material	NAD	SAT
41286.030-11-28	White window putty	North elevation middle window	Layer 1: Off white brittle material	NAD	SAT
41286.030-11-29	Tan window caulk	North elevation west window	Layer 1: Tan elastic material	NAD	SAT
41286.030-11-30	White interior window caulk	Level 1 north wall	Layer 1: White elastic material with brittle material	NAD	SAT

**HVAC Replacement Fire Station 11
City of Tacoma**

**PBS Engineering + Environmental
PBS Project # 41286.030**

PLM ASBESTOS SAMPLE INVENTORY

<u>PBS Sample #</u>	<u>Material Type</u>	<u>Sample Location</u>	<u>Lab Description</u>	<u>Lab Result</u>	<u>Lab</u>
41286.030-11-31	Tan caulk	West elevation louver	Layer 1: Beige soft/elastic material with paint	NAD	SAT
41286.030-11-32	Cementitious blocks	Base of boiler	Layer 1: Grey cementitious material with paint	NAD	SAT
41286.030-11-33	White on grey coating	Base of boiler on blocks	Layer 1: Grey brittle material with paint	NAD	SAT

**HVAC Replacement Fire Station 13
City of Tacoma**

**PBS Engineering + Environmental
PBS Project # 41286.030**

PLM ASBESTOS SAMPLE INVENTORY

<u>PBS Sample #</u>	<u>Material Type</u>	<u>Sample Location</u>	<u>Lab Description</u>	<u>Lab Result</u>	<u>Lab</u>
41286.030-13-01	Plaster wall	Level 1 west wall near radiators	Layer 1: Grey sandy brittle material with paint	NAD	SAT
41286.030-13-02	Plaster wall	Level 1 east wall	Layer 1: Grey sandy brittle material with paint	NAD	SAT
41286.030-13-03	Plaster wall	Level 1 102 west wall	Layer 1: Grey sandy brittle material with paint	<1% Chrysotile via Point Count Analysis	SAT
41286.030-13-04	Plaster ceiling	Hall 207	Layer 1: Grey sandy brittle material with paint	NAD	SAT
41286.030-13-05	Plaster wall	Area north of office 203 west wall near radiator	Layer 1: Grey sandy brittle material with paint	<1% Chrysotile via Point Count Analysis	SAT
41286.030-13-06	Plaster wall	Recreation room 201 east wall	Layer 1: Grey sandy brittle material with paint	NAD	SAT
41286.030-13-07	Plaster ceiling	Recreation room 201 southwest area	Layer 1: Grey sandy brittle material with paint	NAD	SAT
41286.030-13-08	Joint compound Gypsum wallboard	Exercise 202 west area ceiling	Layer 1: White powdery material with paint Layer 2: White chalky material with paper	2% Chrysotile NAD <1% Composite	SAT
41286.030-13-09	Joint compound Gypsum wallboard	Office 203 north area ceiling	Layer 1: White powdery material with paint Layer 2: White chalky material with paper	2% Chrysotile NAD <1% Composite	SAT
41286.030-13-10	Boiler insulation	Mechanical 001	Layer 1: White elastic material with fibrous material Layer 2: Yellow fibrous material with foil and adhesive	NAD NAD	SAT
41286.030-13-11	Boiler insulation	Mechanical 001	Layer 1: White elastic material with fibrous material Layer 2: Yellow fibrous material with foil and adhesive	NAD NAD	SAT

HVAC Replacement Fire Station 13
City of Tacoma
PLM ASBESTOS SAMPLE INVENTORY

PBS Engineering + Environmental
PBS Project # 41286.030

<u>PBS Sample #</u>	<u>Material Type</u>	<u>Sample Location</u>	<u>Lab Description</u>	<u>Lab Result</u>	<u>Lab</u>
41286.030-13-12	Boiler insulation	Mechanical 001	Layer 1: White elastic material with fibrous material	NAD	SAT
			Layer 2: Yellow fibrous material with foil and adhesive	NAD	
41286.030-13-13	Powdery material	Mechanical 001 base of boiler	Layer 1: Gray brittle/powdery material with fibers	NAD	SAT
41286.030-13-14	Brittle material	Mechanical 001 base of boiler	Layer 1: Gray brittle material	2% Chrysotile	SAT
41286.030-13-15	White caulking	Mechanical 001 boiler vent	Layer 1: White elastic material	NAD	SAT
41286.030-13-16	Residual material under pipe wrap	Mechanical 001 pipe from boiler	Layer 1: Off-white/tan loose elastic material	3% Chrysotile	SAT
41286.030-13-17	Blue floor coating	Level 1 near central radiators on wood	Layer 1: Blue elastic material with paint	NAD	SAT
41286.030-13-18	12" grey vinyl floor tile Black mastic	Recreation room 201 under carpet near north radiator	Layer 1: Gray tile Layer 2: Black mastic with fibrous material	3% Chrysotile 2% Chrysotile	SAT
41286.030-13-19	12" grey vinyl floor tile Black mastic	Recreation room 201 under carpet near east radiator	Layer 1: Gray tile Layer 2: Black mastic with fibrous material	3% Chrysotile 2% Chrysotile	SAT
41286.030-13-20	Blue pebble sheet vinyl flooring grey mastic	Bath 205 near radiator	Layer 1: Blue sheet vinyl Layer 2: Gray fibrous material with mastic	NAD NAD	SAT
41286.030-13-21	Silver paint	Level 1 central radiators	Layer 1: Silver paint	NAD	SAT
41286.030-13-22	Brick and mortar	Attic north wall	Layer 1: Red brittle material with sandy brittle material	NAD	SAT
41286.030-13-23	White caulk	Attic south wall plywood panel fill	Layer 1: White elastic material	NAD	SAT

**HVAC Replacement Fire Station 13
City of Tacoma**

**PBS Engineering + Environmental
PBS Project # 41286.030**

PLM ASBESTOS SAMPLE INVENTORY

<u>PBS Sample #</u>	<u>Material Type</u>	<u>Sample Location</u>	<u>Lab Description</u>	<u>Lab Result</u>	<u>Lab</u>
41286.030-13-24	Hard white interior window putty	East wall north window	Layer 1: Gray brittle material with paint	NAD	SAT
41286.030-13-25	Soft window putty on hard window putty	East elevation middle window	Layer 1: Gray elastic material with paint	NAD	SAT
41286.030-13-26	Soft grey window caulk on red mortar	East elevation north window	Layer 1: Gray elastic material with paint	NAD	SAT

SEATTLE ASBESTOS TEST, LLC

Lynnwood Laboratory: 19701 Scriber Lake Road, Suite 103, Lynnwood, WA 98036, Tel: 425.673.9850, Fax: 425.673.9810, NVLAP Lab Code: 200768-0

www.seattleasbestostest.com, admin@seattleasbestostest.com

Project Manager: Ryan Hunter, Claire Tsai	Date Analyzed: 8/6/2022
Client: PBS Engineering and Environmental, Seattle	Client Job#: 41286.030
Address: 214 E Galer Street, Suite 300, Seattle, WA 98102	Project Location: HVAC Replacement-Fire Station 11
Tel: 206.233.9639	Laboratory batch#: 202210712
Date Report Issued: 8/6/2022	Samples Received: 30

Enclosed please find the test results for the bulk samples submitted to our laboratory for asbestos analysis. Analysis was performed using polarized light microscopy (PLM) in accordance with Test Method US EPA - 40 CFR Appendix E of Part 763, Interim Method of Determination of Asbestos in Bulk Insulation Samples and Test Method US EPA/600/R-93/116.

Percentages for this report are done by visual estimate and relate to the suggested acceptable error ranges by the method. Since variation in data increases as the quantity of asbestos decreases toward the limit of detection, the EPA recommends point counting for samples containing between <1% and 10% asbestos (NESHAP, 40 CFR Part 61). Statistically, point counting is a more accurate method. If you feel a point count might be beneficial, please feel free to call and request one.

The test results refer only to the samples or items submitted and tested. The accuracy with which these samples represent the actual materials is totally dependent on the acuity of the person who took the samples. This report must not be used by the client to claim product certification, approval, or endorsement by Seattle Asbestos Test, LLC, NVLAP, NIST, or any agency of the Federal government. The test report or calibration certificate shall not be reproduced except in full, without written approval of the laboratory. If the sample is inhomogeneous the sub-samples of the components are analyzed separately as layers. This report in its entirety consists of this cover letter, the customer sampling COC or data sheet, and the analytical report which is page numbered.

This report is highly confidential and will not be released without your consent. Samples are archived for 30 days after the analysis, and disposed of as hazardous waste thereafter.

Thank you for using our service and let us know if we can further assist you.

Sincerely



Steve (Fanyao) Zhang
Approved Signatory

SEATTLE ASBESTOS TEST

Lynnwood Laboratory: 19701 Scriber Lake Road, Suite 103, Lynnwood, WA 98036, Tel: 425.673.9850, Fax: 425.673.9810, NVLAP Lab Code: 200768-0

Disclaimer: This report must not be used by the client to claim product certification, approval, or endorsement by Seattle Asbestos Test, LLC, NVLAP, NIST, or any agency of the Federal government.

ANALYTICAL LABORATORY REPORT

[PLM] EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method of the Determination of Asbestos in Bulk Insulation Samples;
EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

[PLM]

Attn.: Ryan Hunter, Claire Tsai

Client: PBS Engineering and Environmental, Seattle

Address: 214 E Galer Street, Suite 300, Seattle, WA 98102

Job#: 41286.030

Batch#: 202210712

Date Received: 8/4/2022

Samples Rec'd: 30

Date Analyzed: 8/6/2022

Samples Analyzed: 30

Project Loc.: HVAC Replacement-Fire Station
11

SZhang

Analyzed by: Steve Zhang

Approved Signatory: Steve (Fanyao) Zhang, President

Lab ID	Client Sample ID	Layer	Description	%	Asbestos Fibers	Non-fibrous Components	%	Non-asbestos Fibers
1	41286.30-11-01	1	White soft lumpy material with paint		None detected	Synthetic foam, Filler, Binder, Paint	3	Cellulose
2	41286.30-11-02	1	White soft lumpy material with paint		None detected	Synthetic foam, Filler, Binder, Paint	3	Cellulose
3	41286.30-11-03	1	White soft lumpy material with paint		None detected	Synthetic foam, Filler, Binder, Paint	2	Cellulose
4	41286.30-11-04	1	White soft lumpy material with paint		None detected	Synthetic foam, Filler, Binder, Paint	3	Cellulose
5	41286.30-11-05	1	White soft lumpy material with paint		None detected	Synthetic foam, Filler, Binder, Paint	3	Cellulose
6	41286.30-11-06	1	Sandy brittle material with paint		None detected	Sands, paint, filler	2	Cellulose
7	41286.30-11-07	1	Sandy brittle material with paint		None detected	Sands, paint, filler	2	Cellulose
8	41286.30-11-08	1	Sandy brittle material with paint		None detected	Sands, paint, filler	2	Cellulose
9	41286.30-11-09	1	Sandy brittle material with paint		None detected	Sands, paint, filler	2	Cellulose
10	41286.30-11-10	1	Sandy brittle material with paint		None detected	Sands, paint, filler	3	Cellulose
11	41286.30-11-11	1	Sandy brittle material with paint		None detected	Sands, paint, filler	2	Cellulose
12	41286.30-11-12	1	Sandy brittle material with paint		None detected	Sands, paint, filler	2	Cellulose
13	41286.30-11-13	1	White elastic material with woven fibers		None detected	Filler, binder	15	Cellulose
		2	Yellow fibrous material		None detected	Glass beads, filler	87	Glass fibers
14	41286.30-11-14	1	White elastic material with woven fibers		None detected	Filler, binder	12	Cellulose
		2	Yellow fibrous material		None detected	Glass beads, filler	76	Glass fibers
15	41286.30-11-15	1	White elastic material with woven fibers		None detected	Filler, binder	15	Cellulose
		2	Yellow fibrous material		None detected	Glass beads, filler	88	Glass fibers
16	41286.30-11-16	1	Off white powdery material	5	Chrysotile	Paint, filler	2	Cellulose
17	41286.30-11-17	1	Gray brittle material		None detected	Filler, binder	2	Cellulose
18	41286.30-11-18	1	White powdery material with paint		None detected	Paint, paint, filler	2	Cellulose
19	41286.30-11-19	1	White powdery material with paint		None detected	Paint, paint, filler	2	Cellulose

SEATTLE ASBESTOS TEST

Lynnwood Laboratory: 19701 Scriber Lake Road, Suite 103, Lynnwood, WA 98036, Tel: 425.673.9850, Fax: 425.673.9810, NVLAP Lab Code: 200768-0

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ANALYTICAL LABORATORY REPORT

[PLM] EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method of the Determination of Asbestos in Bulk Insulation Samples;
EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

[PLM]

Attn.: Ryan Hunter, Claire Tsai

Client: PBS Engineering and Environmental, Seattle

Address: 214 E Galer Street, Suite 300, Seattle, WA 98102

Job#: 41286.030

Batch#: 202210712

Date Received: 8/4/2022

Samples Rec'd: 30

Date Analyzed: 8/6/2022

Samples Analyzed: 30

Project Loc.: HVAC Replacement-Fire Station
11

SZhang

Analyzed by: Steve Zhang

Approved Signatory: Steve (Fanyao) Zhang, President

Lab ID	Client Sample ID	Layer	Description	%	Asbestos Fibers	Non-fibrous Components	%	Non-asbestos Fibers
20	41286.30-11-20	1	White powdery material with paint		None detected	Paint, paint, filler	2	Cellulose
21	41286.30-11-21	1	Gray sandy material	2	Chrysotile	Sands, filler	2	Cellulose
22	41286.30-11-22	1	Gray sandy material	2	Chrysotile	Sands, filler	2	Cellulose
23	41286.30-11-23	1	Beige sheet vinyl		None detected	Vinyl/binder		None detected
		2	Gray fibrous material with mastic		None detected	Binder/filler, Mastic/binder	55	Cellulose
		3	Tan sheet vinyl		None detected	Vinyl/binder		None detected
		4	Gray fibrous material with mastic and leveling compoune		None detected	Binder/filler, Mastic/binder	25	Cellulose
24	41286.30-11-24	1	Yellow mastic		None detected	Mastic, binder	2	Cellulose
25	41286.30-11-25	1	Gray fibrous material with paint		None detected	Paint, Filler, Perlite	65	Cellulose
26	41286.30-11-26	1	Silver paint		None detected	Paint, filler		None detected
27	41286.30-11-27	1	Off white brittle material		None detected	Filler, binder	2	Cellulose
28	41286.30-11-28	1	Off white brittle material		None detected	Filler, binder		None detected
29	41286.30-11-29	1	Tan elastic material		None detected	Filler, binder	2	Cellulose
30	41286.30-11-30	1	White elastic material with brittle material		None detected	Filler, paint	2	Cellulose



LABORATORY CHAIN OF CUSTODY

Project: HVAC Replacement – Fire Station 11

Project #: 41286.030 Page 1 of 2

Analysis requested: PLM

Date: 8/3/2022

Relinq'd by/Signature: Claire Tsai

Date/Time: 8/3/2022

Received by/Signature: [Signature]

Date/Time: 8/4/22

Email ALL INVOICES to: seattleap@pbsusa.com

E-mail results to:

- ☐ Willem Mager
☐ Gregg Middaugh
☐ Mark Hiley
☐ Tim Ogden
☒ Ryan Hunter
☐ Prudy Stoudt-McRae
☐ Janet Murphy

- ☐ Allison Welch
☐ Toan Nguyen
☐ Peter Stensland
☒ Claire Tsai
☐ Holly Tuttle
☐ Mike Smith
☐ Ferman Fletcher

- ☐ Cameron Budnick
☐ Mae Reilly
☐ Nick San
☐ Kameron DeMonnin
☐ _____

TURN AROUND TIME:

- ☐ 1 Hour
☐ 2 Hours
☐ 4 Hours

- ☐ 24 Hours
☒ 48 Hours

- ☐ 3-5 Days
☐ Other _____

SAMPLE DATA FORM

Sample #	Material	Location	Lab
41286.030-11-01	Popcorn ceiling texture	Hall 210	SAT
41286.030-11-02	Popcorn ceiling texture	Dormitory 202 south area	
41286.030-11-03	Popcorn ceiling texture	Dormitory 202 north area	
41286.030-11-04	Popcorn ceiling texture	Dormitory 203 north area	
41286.030-11-05	Popcorn ceiling texture	Dormitory 203 south east area	
41286.030-11-06	Plaster wall	Level 1 west wall	
41286.030-11-07	Plaster wall	Hall 201 north wall	
41286.030-11-08	Plaster ceiling	Dinning 204 southeast area	
41286.030-11-09	Plaster wall	Dormitory 202 southwest area	
41286.030-11-10	Plaster wall	Level 1 north wall	
41286.030-11-11	Plaster wall	Level 1 south wall	
41286.030-11-12	Plaster ceiling	Lounge 201 north central area	
41286.030-11-13	Boiler insulation	Basement 001	
41286.030-11-14	Boiler insulation	Basement 001	
41286.030-11-15	Boiler insulation	Basement 001	
41286.030-11-16	Powdery material	Basement 001 base of boiler	
41286.030-11-17	Cementitious material	Basement 001 base of boiler	

Project: HVAC Replacement – Fire Station 11

Project #: 41286.030 Page 2 of 2

SAMPLE DATA FORM			
Sample #	Material	Location	Lab
41286.030-11-18	White skim coat	Basement 001 Chimney	
41286.030-11-19	White skim coat	Basement 001 Chimney	
41286.030-11-20	White skim coat	Basement 001 Chimney	
41286.030-11-21	Mortar	Basement 001 Chimney	
41286.030-11-22	Mortar	Attic west brick wall	
41286.030-11-23	Beige pebble sheet vinyl flooring yellow mastic sheet vinyl flooring white leveling compound	Dining 204 near radiator	
41286.030-11-24	Yellow mastic on wood	Dormitory 202 north east area	
41286.030-11-25	2 x 4 Lay-in-ceiling-tile fissure pinhole	Lounge 202 central area	
41286.030-11-26	Silver paint	Level 1 north wall metal radiator	
41286.030-11-27	White window putty	North elevation west window	
41286.030-11-28	White window putty	North elevation middle window	
41286.030-11-29	Tan window caulk	North elevation west window	
41286.030-11-30	White interior window caulk	Level 1 north wall	

SEATTLE ASBESTOS TEST, LLC

Lynnwood Laboratory: 19701 Scriber Lake Road, Suite 103, Lynnwood, WA 98036, Tel: 425.673.9850, Fax: 425.673.9810, NVLAP Lab Code: 200768-0

www.seattleasbestostest.com, admin@seattleasbestostest.com

Project Manager: Ryan Hunter	Date Analyzed: 8/23/2022
Client: PBS Engineering and Environmental, Seattle	Client Job#: 41286.03
Address: 214 E Galer Street, Suite 300, Seattle, WA 98102	Project Location: HVAC Replacement - Fire Station 11
Tel: 206.233.9639	Laboratory batch#: 202210875
Date Report Issued: 8/23/2022	Samples Received: 3

Enclosed please find the test results for the bulk samples submitted to our laboratory for asbestos analysis. Analysis was performed using polarized light microscopy (PLM) in accordance with Test Method US EPA - 40 CFR Appendix E of Part 763, Interim Method of Determination of Asbestos in Bulk Insulation Samples and Test Method US EPA/600/R-93/116.

Percentages for this report are done by visual estimate and relate to the suggested acceptable error ranges by the method. Since variation in data increases as the quantity of asbestos decreases toward the limit of detection, the EPA recommends point counting for samples containing between <1% and 10% asbestos (NESHAP, 40 CFR Part 61). Statistically, point counting is a more accurate method. If you feel a point count might be beneficial, please feel free to call and request one.

The test results refer only to the samples or items submitted and tested. The accuracy with which these samples represent the actual materials is totally dependent on the acuity of the person who took the samples. This report must not be used by the client to claim product certification, approval, or endorsement by Seattle Asbestos Test, LLC, NVLAP, NIST, or any agency of the Federal government. The test report or calibration certificate shall not be reproduced except in full, without written approval of the laboratory. If the sample is inhomogeneous the sub-samples of the components are analyzed separately as layers. This report in its entirety consists of this cover letter, the customer sampling COC or data sheet, and the analytical report which is page numbered.

This report is highly confidential and will not be released without your consent. Samples are archived for 30 days after the analysis, and disposed of as hazardous waste thereafter.

Thank you for using our service and let us know if we can further assist you.

Sincerely



Steve (Fanyao) Zhang
Approved Signatory

SEATTLE ASBESTOS TEST

Lynnwood Laboratory: 19701 Scriber Lake Road, Suite 103, Lynnwood, WA 98036, Tel: 425.673.9850, Fax: 425.673.9810, NVLAP Lab Code: 200768-0

Disclaimer: This report must not be used by the client to claim product certification, approval, or endorsement by Seattle Asbestos Test, LLC, NVLAP, NIST, or any agency of the Federal government.

ANALYTICAL LABORATORY REPORT

[PLM] EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method of the Determination of Asbestos in Bulk Insulation Samples;
EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

[PLM]

Attn.: Ryan Hunter

Client: PBS Engineering and
Environmental, Seattle

Address: 214 E Galer Street, Suite 300, Seattle, WA 98102

Job#: 41286.03

Batch#: 202210875

Date Received: 8/23/2022

Samples Rec'd: 3

Date Analyzed: 8/23/2022

Samples Analyzed: 3

Project Loc.: HVAC Replacement - Fire Station
11

Analyzed by: Cici Xu

Approved Signatory: Steve (Fanyao) Zhang, President

Steve Zhang

Lab ID	Client Sample ID	Layer	Description	%	Asbestos Fibers	Non-fibrous Components	%	Non-asbestos Fibers
1	41286.030-11-31	1	Beige soft/elastic material with paint		None detected	Binder, Filler, Paint	4	Cellulose
2	41286.030-11-32	1	Gray cementitious material with paint		None detected	Cement/binder, Paint	5	Cellulose
3	41286.030-11-33	1	Gray brittle material with paint		None detected	Filler, Binder, Paint	2	Cellulose

SEATTLE ASBESTOS TEST				NVLAP Accreditation Lab Codes: 200768			
19701 Scriber Lake Road, Suite 103, Lynnwood, WA 98036, Tel:425.673.9850, Fax:425.673.9810							
4500 9th Ave., NE, Suite 300, Seattle, WA 98105							
Website:www.seattleasbestostest.com, Email:admin@seattleasbestostest.com							
PLM by Point Count (400 points)							
Attention: Ryan Hunter, Claire Tsai				Client Job #: 41286.030			
Client: PBS Engineering and Environmental, Seattle				Laboratory Batch #: 202210780			
Address: 214 E Galer Street, Suite 300, Seattle, WA 98102				Date Received: 8/11/2022			
				Samples Received: 2			
				Date Analyzed: 8/15/2022			
Project: HVAC Replacement-Fire Station 11							
<u>Sample Requested for Point Count</u>				41286.30-11- 21			
<u>Previous Analytical Information</u>							
Previously Analyzed by:				Steve Zhang			
Previous Batch #:				202210712			
Previous Lab ID:				21			
Previous Description:				Gray sandy material			
Layer to be Point Counted:				1			
Asbestos Type Found:				Chrysotile			
Asbestos Percentage Found:				2			
<u>Point Count Analytical Procedures</u>				New Lab ID: 1			
	Asbestos Points	Non-Asbestos Points	Total Points Counted				
Slide 1	1	49	50				
Slide 2	2	48	50				
Slide 3		50	50				
Slide 4		50	50				
Slide 5		50	50				
Slide 6		50	50				
Slide 7		50	50				
Slide 8		50	50				
Total	3	397	400				
<u>Point Count Summary Results</u>							
Type of Asbestos:				Chrysotile			
Percentage of Asbestos:				0.75%			
Analyzed By:				Reviewed by: Steve Zhang, President			

SEATTLE ASBESTOS TEST				NVLAP Accreditation Lab Codes: 200768			
19701 Scriber Lake Road, Suite 103, Lynnwood, WA 98036, Tel:425.673.9850, Fax:425.673.9810							
4500 9th Ave., NE, Suite 300, Seattle, WA 98105							
Website:www.seattleasbestostest.com, Email:admin@seattleasbestostest.com							
PLM by Point Count (400 points)							
Attention: Ryan Hunter, Claire Tsai						Client Job #:	41286.030
Client: PBS Engineering and Environmental, Seattle						Laboratory Batch #:	202210780
Address: 214 E Galer Street, Suite 300, Seattle, WA 98102						Date Received:	8/11/2022
						Samples Received:	2
						Date Analyzed:	8/15/2022
Project: HVAC Replacement-Fire Station 11							
<u>Sample Requested for Point Count</u>				41286.30-11- 22			
<u>Previous Analytical Information</u>							
Previously Analyzed by:				Steve Zhang			
Previous Batch #:				202210712			
Previous Lab ID:				22			
Previous Description:				Gray sandy material			
Layer to be Point Counted:				1			
Asbestos Type Found:				Chrysotile			
Asbestos Percentage Found:				2			
<u>Point Count Analytical Procedures</u>				New Lab ID: 2			
	Asbestos Points	Non-Asbestos Points	Total Points Counted				
Slide 1		50	50				
Slide 2	1	49	50				
Slide 3	1	49	50				
Slide 4	1	49	50				
Slide 5	1	49	50				
Slide 6		50	50				
Slide 7	1	49	50				
Slide 8		50	50				
Total	5	395	400				
<u>Point Count Summary Results</u>							
Type of Asbestos:				Chrysotile			
Percentage of Asbestos:				1.25%			
Analyzed By:				Reviewed by: Steve Zhang, President			

SEATTLE ASBESTOS TEST, LLC

Lynnwood Laboratory: 19701 Scriber Lake Road, Suite 103, Lynnwood, WA 98036, Tel: 425.673.9850, Fax: 425.673.9810, NVLAP Lab Code: 200768-0

www.seattleasbestostest.com, admin@seattleasbestostest.com

Project Manager: Ryan Hunter, Claire Tsai	Date Analyzed: 8/5/2022
Client: PBS Engineering and Environmental, Seattle	Client Job#: 41286.030
Address: 214 E Galer Street, Suite 300, Seattle, WA 98102	Project Location: HVAC Replacement-Fire Station 13
Tel: 206.233.9639	Laboratory batch#: 202210713
Date Report Issued: 8/5/2022	Samples Received: 26

Enclosed please find the test results for the bulk samples submitted to our laboratory for asbestos analysis. Analysis was performed using polarized light microscopy (PLM) in accordance with Test Method US EPA - 40 CFR Appendix E of Part 763, Interim Method of Determination of Asbestos in Bulk Insulation Samples and Test Method US EPA/600/R-93/116.

Percentages for this report are done by visual estimate and relate to the suggested acceptable error ranges by the method. Since variation in data increases as the quantity of asbestos decreases toward the limit of detection, the EPA recommends point counting for samples containing between <1% and 10% asbestos (NESHAP, 40 CFR Part 61). Statistically, point counting is a more accurate method. If you feel a point count might be beneficial, please feel free to call and request one.

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This report is highly confidential and will not be released without your consent. Samples are archived for 30 days after the analysis, and disposed of as hazardous waste thereafter.

Thank you for using our service and let us know if we can further assist you.

Sincerely



Steve (Fanyao) Zhang
Approved Signatory

SEATTLE ASBESTOS TEST

Lynnwood Laboratory: 19701 Scriber Lake Road, Suite 103, Lynnwood, WA 98036, Tel: 425.673.9850, Fax: 425.673.9810, NVLAP Lab Code: 200768-0

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ANALYTICAL LABORATORY REPORT

[PLM] EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method of the Determination of Asbestos in Bulk Insulation Samples;
EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

[PLM]

Attn.: Ryan Hunter, Claire Tsai

Client: PBS Engineering and Environmental, Seattle

Address: 214 E Galer Street, Suite 300, Seattle, WA 98102

Job#: 41286.030

Batch#: 202210713

Date Received: 8/4/2022

Samples Rec'd: 26

Date Analyzed: 8/5/2022

Samples Analyzed: 26

Project Loc.: HVAC Replacement-Fire Station
13

SZhang

Analyzed by: Steve Zhang

Approved Signatory: Steve (Fanyao) Zhang, President

Lab ID	Client Sample ID	Layer	Description	%	Asbestos Fibers	Non-fibrous Components	%	Non-asbestos Fibers
1	41286.030-13-01	1	Gray sandy brittle material with paint		None detected	Sands, paint, filler	2	Cellulose
2	41286.030-13-02	1	Gray sandy brittle material with paint		None detected	Sands, paint, filler	2	Cellulose
3	41286.030-13-03	1	Gray sandy brittle material with paint	2	Chrysotile	Sands, paint, filler	2	Cellulose
4	41286.030-13-04	1	Gray sandy brittle material with paint		None detected	Sands, paint, filler	2	Cellulose
5	41286.030-13-05	1	Gray sandy brittle material with paint	2	Chrysotile	Sands, paint, filler	2	Cellulose
6	41286.030-13-06	1	Gray sandy brittle material with paint		None detected	Sands, paint, filler	2	Cellulose
7	41286.030-13-07	1	Gray sandy brittle material with paint		None detected	Sands, paint, filler	2	Cellulose
8	41286.030-13-08 Composite <1%	1	White powdery material with paint	2	Chrysotile	Binder/filler, Paint	5	Cellulose
		2	White chalky material with paper		None detected	Binder/filler, Gypsum/binder	25	Cellulose
9	41286.030-13-09 Composite <1%	1	White powdery material with paint	2	Chrysotile	Binder/filler, Paint	5	Cellulose
		2	White chalky material with paper		None detected	Binder/filler, Gypsum/binder	25	Cellulose
10	41286.030-13-10	1	White elastic material with fibrous material		None detected	Filler, binder	5	Cellulose
		2	Yellow fibrous material with foil and adhesive		None detected	Binder/filler, Mastic/binder	87	Glass fibers
11	41286.030-13-11	1	White elastic material with fibrous material		None detected	Filler, binder	5	Cellulose
		2	Yellow fibrous material with foil and adhesive		None detected	Binder/filler, Mastic/binder	87	Glass fibers
12	41286.030-13-12	1	White elastic material with fibrous material		None detected	Filler, binder	5	Cellulose
		2	Yellow fibrous material with foil and adhesive		None detected	Binder/filler, Mastic/binder	87	Glass fibers
13	41286.030-13-13	1	Gray brittle/powdery material with fibers		None detected	Filler, binder	6	Glass fibers
14	41286.030-13-14	1	Gray brittle material	2	Chrysotile	Filler, binder		None detected
15	41286.030-13-15	1	White elastic material		None detected	Filler, binder	3	Cellulose
16	41286.030-13-16	1	Off-white/tan loose elastic material	3	Chrysotile	Binder, filler		None detected

SEATTLE ASBESTOS TEST

Lynnwood Laboratory: 19701 Scriber Lake Road, Suite 103, Lynnwood, WA 98036, Tel: 425.673.9850, Fax: 425.673.9810, NVLAP Lab Code: 200768-0

Disclaimer: This report must not be used by the client to claim product certification, approval, or endorsement by Seattle Asbestos Test, LLC, NVLAP, NIST, or any agency of the Federal government.

ANALYTICAL LABORATORY REPORT

[PLM] EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method of the Determination of Asbestos in Bulk Insulation Samples;
EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

[PLM]

Attn.: Ryan Hunter, Claire Tsai

Client: PBS Engineering and Environmental, Seattle

Address: 214 E Galer Street, Suite 300, Seattle, WA 98102

Job#: 41286.030

Batch#: 202210713

Date Received: 8/4/2022

Samples Rec'd: 26

Date Analyzed: 8/5/2022

Samples Analyzed: 26

Project Loc.: HVAC Replacement-Fire Station
13

SZhang

Analyzed by: Steve Zhang

Approved Signatory: Steve (Fanyao) Zhang, President

Lab ID	Client Sample ID	Layer	Description	%	Asbestos Fibers	Non-fibrous Components	%	Non-asbestos Fibers
17	41286.030-13-17	17	Blue elastic material with paint		None detected	Paint, filler	2	Cellulose
18	41286.030-13-18	1	Gray tile	3	Chrysotile	Vinyl/binder, Mineral grains	2	Cellulose
		2	Black mastic with fibrous material	2	Chrysotile	Mastic/binder	4	Cellulose
19	41286.030-13-19	1	Gray tile	3	Chrysotile	Vinyl/binder, Mineral grains	3	Cellulose
		2	Black mastic with fibrous material	2	Chrysotile	Mastic/binder	4	Cellulose
20	41286.030-13-20	1	Blue sheet vinyl		None detected	Vinyl/binder		None detected
		2	Gray fibrous material with mastic		None detected	Binder/filler, Mastic/binder	55	Cellulose
21	41286.030-13-21	1	Silver paint		None detected	Paint, filler		None detected
22	41286.030-13-22	1	Red brittle material with sandy brittle material		None detected	Sands, filler		None detected
23	41286.030-13-23	1	White elastic material		None detected	Filler, binder		None detected
24	41286.030-13-24	1	Gray brittle material with paint		None detected	Binder, filler	2	Cellulose
25	41286.030-13-25	1	Gray elastic material with paint		None detected	Paint, filler	2	Cellulose
26	41286.030-13-26	1	Gray elastic material with paint		None detected	Paint, filler		None detected



LABORATORY CHAIN OF CUSTODY

Project: HVAC Replacement – Fire Station 13

Project #: 41286.030 Page 1 of 2

Analysis requested: PLM

Date: 8/3/2022

Relinquished by/Signature: Claire Tsai

Date/Time: 8/3/2022

Received by/Signature: [Signature]

Date/Time: 8/4/22 5pm

Email ALL INVOICES to: seattleap@pbsusa.com

E-mail results to:

- ☐ Willem Mager
- ☐ Gregg Middaugh
- ☐ Mark Hiley
- ☐ Tim Ogden
- ☒ Ryan Hunter
- ☐ Prudy Stoudt-McRae
- ☐ Janet Murphy

- ☐ Allison Welch
- ☐ Toan Nguyen
- ☐ Peter Stensland
- ☒ Claire Tsai
- ☐ Holly Tuttle
- ☐ Mike Smith
- ☐ Ferman Fletcher

- ☐ Cameron Budnick
- ☐ Mae Reilly
- ☐ Nick San
- ☐ Kameron DeMonnin
- ☐ _____

TURN AROUND TIME:

- ☐ 1 Hour
- ☐ 2 Hours
- ☐ 4 Hours

- ☐ 24 Hours
- ☒ 48 Hours

- ☐ 3-5 Days
- ☐ Other _____

***Composite if >1%

SAMPLE DATA FORM

Sample #	Material	Location	Lab
41286.030-13-01	Plaster wall	Level 1 west wall near radiators	SAT
41286.030-13-02	Plaster wall	Level 1 east wall	
41286.030-13-03	Plaster wall ✓ 2	Level 1 102 west wall	
41286.030-13-04	Plaster ceiling	Hall 207	
41286.030-13-05	Plaster wall ✓ 2	Area north of office 203 west wall near radiator	
41286.030-13-06	Plaster wall	Recreation room 201 east wall	
41286.030-13-07	Plaster ceiling	Recreation room 201 southwest area	
41286.030-13-08	Gypsum wallboard/joint compound*** ✓	Exercise 202 west area ceiling	
41286.030-13-09	Gypsum wallboard/joint compound*** ✓	Office 203 north area ceiling	
41286.030-13-10	Boiler insulation } ph	Mechanical 001	
41286.030-13-11	Boiler insulation } cf	Mechanical 001	
41286.030-13-12	Boiler insulation }	Mechanical 001	
41286.030-13-13	Powdery material	Mechanical 001 base of boiler	
41286.030-13-14	Brittle material 2	Mechanical 001 base of boiler	
41286.030-13-15	White caulking	Mechanical 001 boiler vent	
41286.030-13-16	Residual material under pipe wrap 3	Mechanical 001 pipe from boiler	
41286.030-13-17	Blue floor coating	Level 1 near central radiators on wood	



LABORATORY CHAIN OF CUSTODY

Project: HVAC Replacement – Fire Station 13

Project #: 41286.030 Page 2 of 2

SAMPLE DATA FORM

Sample #	Material	Location	Lab
41286.030-13-18	12" grey vinyl floor tile black mastic <i>3/2</i>	Recreation room 201 under carpet near north radiator	
41286.030-13-19	12" grey vinyl floor tile black mastic <i>3/2</i>	Recreation room 201 under carpet near east radiator	
41286.030-13-20	Blue pebble sheet vinyl flooring grey mastic	Bath 205 near radiator	
41286.030-13-21	Silver paint	Level 1 central radiators	
41286.030-13-22	Brick and mortar	Attic north wall	
41286.030-13-23	White caulk	Attic south wall plywood panel fill	
41286.030-13-24	Hard white interior window putty	East wall north window	
41286.030-13-25	Soft window putty on hard window putty <i>AB</i>	East elevation middle window	
41286.030-13-26	Soft grey window caulk on red mortar <i>NO</i>	East elevation north window	

SEATTLE ASBESTOS TEST				NVLAP Accreditation Lab Codes: 200768			
19701 Scriber Lake Road, Suite 103, Lynnwood, WA 98036, Tel:425.673.9850, Fax:425.673.9810							
4500 9th Ave., NE, Suite 300, Seattle, WA 98105							
Website:www.seattleasbestostest.com, Email:admin@seattleasbestostest.com							
PLM by Point Count (400 points)							
						Client Job #:	41286.030
Attention: Ryan Hunter, Claire Tsai						Laboratory Batch #:	202210796
Client: PBS Engineering and Environmental, Seattle						Date Received:	8/12/2022
Address: 214 E Galer Street, Suite 300, Seattle, WA 98102						Samples Received:	2
						Date Analyzed:	8/15/2022
Project: HVAC Replacement-Fire Station 13							
<u>Sample Requested for Point Count</u>				41286.030-13-03			
<u>Previous Analytical Information</u>							
Previously Analyzed by:				Steve Zhang			
Previous Batch #:				202210713			
Previous Lab ID:				3			
Previous Description:				Gray sandy brittle material with paint			
Layer to be Point Counted:				1			
Asbestos Type Found:				Chrysotile			
Asbestos Percentage Found:				2			
<u>Point Count Analytical Procedures</u>				New Lab ID: 1			
		Asbestos Points		Non-Asbestos Points		Total Points Counted	
	Slide 1			50		50	
	Slide 2	1		49		50	
	Slide 3	2		48		50	
	Slide 4			50		50	
	Slide 5			50		50	
	Slide 6			50		50	
	Slide 7			50		50	
	Slide 8			50		50	
	Total	3		397		400	
<u>Point Count Summary Results</u>							
Type of Asbestos:				Chrysotile			
Percentage of Asbestos:				0.75%			
Analyzed By:				Reviewed by: Steve Zhang, President			

SEATTLE ASBESTOS TEST				NVLAP Accreditation Lab Codes: 200768			
19701 Scriber Lake Road, Suite 103, Lynnwood, WA 98036, Tel:425.673.9850, Fax:425.673.9810							
4500 9th Ave., NE, Suite 300, Seattle, WA 98105							
Website:www.seattleasbestostest.com, Email:admin@seattleasbestostest.com							
PLM by Point Count (400 points)							
						Client Job #:	41286.030
Attention: Ryan Hunter, Claire Tsai						Laboratory Batch #:	202210796
Client: PBS Engineering and Environmental, Seattle						Date Received:	8/12/2022
Address: 214 E Galer Street, Suite 300, Seattle, WA 98102						Samples Received:	2
						Date Analyzed:	8/15/2022
Project: HVAC Replacement-Fire Station 13							
<u>Sample Requested for Point Count</u>				41286.030-13-05			
<u>Previous Analytical Information</u>							
Previously Analyzed by:				Steve Zhang			
Previous Batch #:				202210713			
Previous Lab ID:				5			
Previous Description:				Gray sandy brittle material with paint			
Layer to be Point Counted:				1			
Asbestos Type Found:				Chrysotile			
Asbestos Percentage Found:				2			
<u>Point Count Analytical Procedures</u>				New Lab ID: 2			
		Asbestos Points		Non-Asbestos Points		Total Points Counted	
Slide 1		1		49		50	
Slide 2		1		49		50	
Slide 3				50		50	
Slide 4		1		49		50	
Slide 5				50		50	
Slide 6				50		50	
Slide 7				50		50	
Slide 8				50		50	
Total		3		397		400	
<u>Point Count Summary Results</u>							
Type of Asbestos:				Chrysotile			
Percentage of Asbestos:				0.75%			
Analyzed By:				Reviewed by: Steve Zhang, President			

APPENDIX B

AA Lead Paint Chip Sampling Information

AA Lead Paint Chip Sample Inventory

AA Lead Paint Chip Laboratory Data Sheets

AA Lead Paint Chip Chain-of-Custody Documentation

**HVAC Replacement Fire Station 11
City of Tacoma**

**PBS Engineering + Environmental
PBS Project # 41286.030**

AA LEAD PAINT CHIP SAMPLE INVENTORY

<u>PBS Sample #</u>	<u>Paint Color / Component or Substrate</u>	<u>Sample Location</u>	<u>Results (mg/kg)</u>	<u>Results (%)</u>	<u>Lab</u>
41286.030-11-Pb01	Beige/ plaster/ ceiling	Lounge central area	4,300	0.43	NVL
41286.030-11-Pb02	Yellow/ wood/ beam	Basement north area	22,000	2.2	NVL
41286.030-11-Pb03	White/ wood/ window frame	North elevation middle window	43,000	4.3	NVL
41286.030-11-Pb04	Beige/ wood/ window frame	Level 1 north wall	800	0.080	NVL
41286.030-11-Pb05	Silver/ metal/ radiator	Lounge south radiator	12,000	1.2	NVL

AA LEAD PAINT CHIP SAMPLE INVENTORY

<u>PBS Sample #</u>	<u>Paint Color / Component or Substrate</u>	<u>Sample Location</u>	<u>Results (mg/kg)</u>	<u>Results (%)</u>	<u>Lab</u>
41286.030-13-Pb01	White/ Gypsum wallboard/ wall	Exercise room 202 lockers	<55	<0.0055	NVL
41286.030-13-Pb02	Brown/ wood/ window frame	Level 1 east wall	420	0.042	NVL
41286.030-13-Pb03	Green/ wood/ wall	Mechanical 001 east wall	5,200	0.52	NVL
41286.030-13-Pb04	Silver/ metal/ radiator	Recreation room 201 east wall	7,400	0.74	NVL

August 4, 2022

Claire Tsai

PBS Environmental - Seattle

214 E Galer St. Suite. 300

Seattle, WA 98102



NVL Batch # 2214127.00

RE: Total Metal Analysis
Method: EPA 7000B Lead by FAA <paint>
Item Code: FAA-02

Client Project: 41286.030

Location: HVAC Replacement- Fire Station 11

Dear Ms. Tsai,

NVL Labs received 5 sample(s) for the said project on 8/4/2022. Preparation of these samples was conducted following protocol outlined in EPA 3051/7000B , unless stated otherwise. Analysis of these samples was performed using analytical instruments in accordance with EPA 7000B Lead by FAA <paint>. The results are usually expressed in mg/Kg and percentage (%). Test results are not blank corrected.

For recent regulation updates pertaining to current regulatory levels or permissible exposure levels, please call your local regulatory agencies for more detail.

At NVL Labs all analyses are performed under strict guidelines of the Quality Assurance Program. This report is considered highly confidential and will not be released without your approval. Samples are archived after two weeks from the analysis date. Please feel free to contact us at 206-547-0100, in case you have any questions or concerns.

Sincerely,

A handwritten signature in black ink, appearing to read "Shalini Patel".

Shalini Patel, Manager Metals Lab

Enc.: Sample results



Phone: 206 547.0100 | Fax: 206 634.1936 | Toll Free: 1.888.NVL.LABS (685.5227)
4708 Aurora Avenue North | Seattle, WA 98103-6516

Analysis Report

Total Lead (Pb)



Client: PBS Environmental - Seattle
Address: 214 E Galer St. Suite. 300
Seattle, WA 98102

Batch #: 2214127.00

Matrix: Paint
Method: EPA 3051/7000B
Client Project #: 41286.030
Date Received: 8/4/2022
Samples Received: 5
Samples Analyzed: 5

Attention: Ms. Claire Tsai

Project Location: HVAC Replacement- Fire Station 11

Lab ID	Client Sample #	Sample Weight (g)	RL in mg/Kg	Results in mg/Kg	Results in percent
22388173	41286.030-11-Pb01	0.1877	53	4300	0.43
22388174	41286.030-11-Pb02	0.2055	49	22000	2.2
22388175	41286.030-11-Pb03	0.1876	53	43000	4.3
22388176	41286.030-11-Pb04	0.1808	55	800	0.080
22388177	41286.030-11-Pb05	0.2018	50	12000	1.2


Sampled by: Client

Analyzed by: Yasuyuki Hida

Reviewed by: Shalini Patel

Date Analyzed: 08/04/2022

Date Issued: 08/04/2022


Shalini Patel, Manager Metals Lab

mg/ Kg =Milligrams per kilogram

Percent = Milligrams per kilogram / 10000

Note : Method QC results are acceptable unless stated otherwise.

Unless otherwise indicated, the condition of all samples was acceptable at time of receipt.

RL = Reporting Limit

'<' = Below the reporting Limit

Bench Run No: 2022-0804-01

FAA-02

LEAD LABORATORY SERVICES



Company PBS Environmental - Seattle
Address 214 E Galer St. Suite. 300
 Seattle, WA 98102
Project Manager Ms. Claire Tsai
Phone (206) 233-9639
NVL Batch Number 2214127.00
TAT 2 Days **AH** No
Rush TAT
Due Date 8/8/2022 **Time** 11:15 AM
Email claire.tsai@pbsusa.com
Fax (866) 727-0140

Project Name/Number: 41286.030 **Project Location:** HVAC Replacement- Fire Station 11

Subcategory Flame AA (FAA)

Item Code FAA-02 EPA 7000B Lead by FAA <paint>

Total Number of Samples 5

Rush Samples

	Lab ID	Sample ID	Description	A/R
1	22388173	41286.030-11-Pb01		A
2	22388174	41286.030-11-Pb02		A
3	22388175	41286.030-11-Pb03		A
4	22388176	41286.030-11-Pb04		A
5	22388177	41286.030-11-Pb05		A

	Print Name	Signature	Company	Date	Time
Sampled by	Client				
Relinquished by	Courier				

Office Use Only	Print Name	Signature	Company	Date	Time
Received by	Rachelle Miller		NVL	8/4/22	1115
Analyzed by	Yasuyuki Hida		NVL	8/4/22	
Results Called by					
<input type="checkbox"/> Faxed <input type="checkbox"/> Emailed					

Special Instructions:

Date: 8/4/2022
 Time: 11:13 AM
 Entered By: Rachelle Miller

Project: HVAC Replacement – Fire Station 11Project #: 41286.030 Page 1 of 1Analysis requested: FAA Lead in paintDate: 8/3/2022Relinq'd by/Signature: Claire TsaiDate/Time: 8/3/2022Received by/Signature: Rachelle MillerDate/Time: 8/4/22 1115 carrierEmail ALL INVOICES to: seattleap@pbsusa.com

E-mail results to:

- ☐ Willem Mager
☐ Gregg Middaugh
☐ Mark Hiley
☐ Tim Ogden
☒ Ryan Hunter
☐ Prudy Stoudt-McRae
☐ Janet Murphy

- ☐ Allison Welch
☐ Toan Nguyen
☐ Peter Stensland
☒ Claire Tsai
☐ Holly Tuttle
☐ Mike Smith
☐ Ferman Fletcher

- ☐ Cameron Budnick
☐ Mae Reilly
☐ Nick San
☐ Kameron DeMonnin
☐ _____

TURN AROUND TIME:

- ☐ 1 Hour
☐ 2 Hours
☐ 4 Hours

- ☐ 24 Hours
☒ 48 Hours

- ☐ 3-5 Days
☐ Other _____

SAMPLE DATA FORM

Sample #	Material	Location	Lab
41286.030-11-Pb01	Beige/ plaster/ ceiling	Lounge central area	NVL
41286.030-11-Pb02	Yellow/ wood/ beam	Basement north area	
41286.030-11-Pb03	White/ wood/ window frame	North elevation middle window	
41286.030-11-Pb04	Beige/ wood/ window frame	Level 1 north wall	
41286.030-11-Pb05	Silver/ metal/ radiator	Lounge south radiator	

August 4, 2022

Claire Tsai

PBS Environmental - Seattle

214 E Galer St. Suite. 300

Seattle, WA 98102



NVL Batch # 2214128.00

RE: Total Metal Analysis
Method: EPA 7000B Lead by FAA <paint>
Item Code: FAA-02

Client Project: 41286.030

Location: HVAC Replacement- Fire Station 13

Dear Ms. Tsai,

NVL Labs received 4 sample(s) for the said project on 8/4/2022. Preparation of these samples was conducted following protocol outlined in EPA 3051/7000B , unless stated otherwise. Analysis of these samples was performed using analytical instruments in accordance with EPA 7000B Lead by FAA <paint>. The results are usually expressed in mg/Kg and percentage (%). Test results are not blank corrected.

For recent regulation updates pertaining to current regulatory levels or permissible exposure levels, please call your local regulatory agencies for more detail.

At NVL Labs all analyses are performed under strict guidelines of the Quality Assurance Program. This report is considered highly confidential and will not be released without your approval. Samples are archived after two weeks from the analysis date. Please feel free to contact us at 206-547-0100, in case you have any questions or concerns.

Sincerely,

A handwritten signature in black ink, appearing to read 'Shalini Patel'.

Shalini Patel, Manager Metals Lab

Enc.: Sample results



Phone: 206 547.0100 | Fax: 206 634.1936 | Toll Free: 1.888.NVL.LABS (685.5227)
4708 Aurora Avenue North | Seattle, WA 98103-6516

Analysis Report

Total Lead (Pb)



Client: PBS Environmental - Seattle
Address: 214 E Galer St. Suite. 300
Seattle, WA 98102

Batch #: 2214128.00

Matrix: Paint
Method: EPA 3051/7000B
Client Project #: 41286.030
Date Received: 8/4/2022
Samples Received: 4
Samples Analyzed: 4

Attention: Ms. Claire Tsai

Project Location: HVAC Replacement- Fire Station 13

Lab ID	Client Sample #	Sample Weight (g)	RL in mg/Kg	Results in mg/Kg	Results in percent
22388178	41286.030-13-Pb01	0.1803	55	< 55	<0.0055
22388179	41286.030-13-Pb02	0.1882	53	420	0.042
22388180	41286.030-13-Pb03	0.1892	53	5200	0.52
22388181	41286.030-13-Pb04	0.2007	50	7400	0.74

Sampled by: Client

Analyzed by: Yasuyuki Hida

Reviewed by: Shalini Patel

Date Analyzed: 08/04/2022

Date Issued: 08/04/2022


Shalini Patel, Manager Metals Lab

mg/ Kg =Milligrams per kilogram

Percent = Milligrams per kilogram / 10000

Note : Method QC results are acceptable unless stated otherwise.

Unless otherwise indicated, the condition of all samples was acceptable at time of receipt.

RL = Reporting Limit

'<' = Below the reporting Limit

Bench Run No: 2022-0804-01

FAA-02

LEAD LABORATORY SERVICES



Company PBS Environmental - Seattle
Address 214 E Galer St. Suite. 300
 Seattle, WA 98102
Project Manager Ms. Claire Tsai
Phone (206) 233-9639
NVL Batch Number 2214128.00
TAT 2 Days **AH** No
Rush TAT
Due Date 8/8/2022 **Time** 11:15 AM
Email claire.tsai@pbsusa.com
Fax (866) 727-0140

Project Name/Number: 41286.030 **Project Location:** HVAC Replacement- Fire Station 13

Subcategory Flame AA (FAA)

Item Code FAA-02 EPA 7000B Lead by FAA <paint>

Total Number of Samples 4

Rush Samples

	Lab ID	Sample ID	Description	A/R
1	22388178	41286.030-13-Pb01		A
2	22388179	41286.030-13-Pb02		A
3	22388180	41286.030-13-Pb03		A
4	22388181	41286.030-13-Pb04		A

	Print Name	Signature	Company	Date	Time
Sampled by	Client				
Relinquished by	Courier				

Office Use Only	Print Name	Signature	Company	Date	Time
Received by	Rachelle Miller		NVL	8/4/22	1115
Analyzed by	Yasuyuki Hida		NVL	8/4/22	
Results Called by					
<input type="checkbox"/> Faxed <input type="checkbox"/> Emailed					

Special Instructions:

Date: 8/4/2022

Time: 11:17 AM

Entered By: Rachelle Miller



APPENDIX C

Certifications

THIS IS TO CERTIFY THAT

CLAIRE TSAI

HAS SUCCESSFULLY COMPLETED THE TRAINING COURSE

for

ASBESTOS INSPECTOR REFRESHER

In accordance with TSCA Title II, Part 763, Subpart E, Appendix C of 40 CFR

Course Date: 12/10/2021

Course Location: Online,

Certificate: IR-21-7316B



CCB #SRA0615 4-Hr Training

4-Hour AHERA Inspector Refresher Training; AHERA is the Asbestos Hazard Emergency Response Act enacting Title II of Toxic Substance Control Act (TSCA)

Expiration Date: 12/10/2022

For verification of the authenticity of this certificate contact:
PBS Engineering and Environmental Inc.
4412 S Corbett Avenue
Portland, Oregon 97239
503.248.1939

A handwritten signature in black ink, which appears to read "Andy Fridley", is written over a horizontal line.

Andy Fridley, Instructor

THIS IS TO CERTIFY THAT

RYAN HUNTER

HAS SUCCESSFULLY COMPLETED THE TRAINING COURSE

for

ONLINE AHERA ASBESTOS INSPECTOR REFRESHER

In accordance with TSCA Title II, Part 763, Subpart E, Appendix C of 40 CFR

Course Date: 02/10/2022

Course Location: Online

Certificate: IRO-22-7254B



CCB #SRA0615 4-Hr Training

4-Hour Online AHERA Inspector Refresher Training; AHERA is the Asbestos Hazard Emergency Response Act enacting Title II of Toxic Substance Control Act (TSCA)

Expiration Date: 02/10/2023

For verification of the authenticity of this certificate contact:
PBS Engineering and Environmental Inc.
4412 S Corbett Avenue
Portland, Oregon 97239
503.248.1939

A handwritten signature in black ink, reading "Andy Fridley", is written over a horizontal line.

Andy Fridley, Instructor

SECTION 011110

SUMMARY OF HAZARDOUS MATERIALS WORK

PART 1 - GENERAL

1.1 SUMMARY

- A. Hazardous Materials or materials needing special handling or disposal, that may be potentially impacted by the project or that could be encountered during construction, have been identified below. These materials include asbestos-containing materials (ACM) and lead-containing paint (LCP).
- B. General Contractor is required to coordinate schedule and extent of hazardous materials work with the appropriate sub-contractors. General Contractor is required by applicable regulations to provide supervisory authority over asbestos-related operations.
- C. Work performed under this specification section is governed by related specification sections, including, but not limited to, the following:
 - 1. Division 2: Existing Conditions, Section 02 82 13, Asbestos Abatement
 - 2. Division 2: Existing Conditions, Section 02 83 13, Lead-Related Activities

1.2 ASBESTOS-CONTAINING MATERIALS

- A. Removal of asbestos-containing materials as identified by these Specifications is the responsibility of the Contractor. The Contractor shall be responsible for compliance monitoring and removal and disposal of these items. Refer to paragraph 1.4 for information regarding ACMs to be removed as part of the Work.
- B. Presence of Asbestos: The Owner has surveyed accessible portions of Fire Station 11 & 13 included in the Work with the objective of identifying the presence of asbestos-containing materials. The Contractor shall refer to the Limited Hazardous Materials Survey Report attached to these Specifications, which lists suspect-ACMs sampled at Fire Station 11 & 13, and analysis for asbestos content. The Contractor shall ensure that a copy of this summary is made available to and retained on the project site by all subcontractors.
- C. The Contractor shall be aware that suspect-ACMs may exist in inaccessible locations and areas of Fire Station 11 & 13 not included in the Work. The Contractor shall proceed with caution during all phases of the Work. Should any suspect-ACMs not indicated in the Limited Hazardous Materials Survey Report be encountered, the Contractor shall immediately notify Owner and Environmental Consultant.
- D. The Contractor is advised that should additional ACMs not included in the Limited Hazardous Materials Survey Report be encountered, the Owner may elect to include such materials in the Work at a mutually agreed upon price. Work impacting such materials is not to occur prior to the Contractor receiving explicit written authorization from the Owner, and any Work performed without such approval is performed at the Contractor's own risk and expense.
- E. The disturbance or impact of ACMs may cause asbestos fibers to be released into the building's atmosphere, thereby creating a potential health hazard to building occupants. Contractor is to apprise all workers, supervisory personnel, subcontractors and consultants who will be at the jobsite of the seriousness of this potential hazard and of proper Work procedures that must be followed, in the event of a release.

- F. Damage of Asbestos by the Contractor: Damage to asbestos-containing materials to remain caused by the Contractor shall be repaired to the satisfaction of the Owner by the Contractor using certified asbestos workers, at the expense of the Contractor.
- G. Contractor is to provide temporary protection of asbestos-containing materials to remain in areas of work with limited clearance and access. Contractor is to familiarize with site conditions and areas of limited clearance and access and anticipate associated impacts on production rates and schedule.
- H. Where in the performance of the Work, workers, supervisory personnel, subcontractors, or consultants may encounter, disturb, or otherwise function in the immediate vicinity of any identified ACMs, Contractor shall take appropriate continuous measures, as necessary, to protect all building occupants from the potential hazard of exposure to airborne asbestos. Such measures shall include the procedures and methods described herein, and compliance with applicable local, state and federal regulations.

1.3 LEAD-CONTAINING PAINT

- A. Lead-containing Paint: The Owner has conducted a lead-containing paint survey of the areas of Fire Station 11 & 13 to be impacted by the Work. Survey samples and results are included in the attached Limited Hazardous Materials Survey Reports.
- B. Consider all painted coatings similar to those identified as lead-containing, and any un-tested painted coatings, to contain lead in similar concentration, including factory coatings and coatings on structural steel (e.g. "red lead"). Work impacting lead-containing paint is to be performed in accordance with Specification Section 028313, Lead-Related Activities. Refer to other sections as necessary for information on activities that will impact lead-containing paint.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. Verify Asbestos Abatement scope of Work with the Owner and Environmental Consultant prior to the execution of the work. Provide all services outlined below for all work under the Base Bid, any Alternates and any Unit Prices in accordance with all applicable federal, state and local regulations, and the requirements of Section 028213.
- B. Contractor shall furnish all labor, materials, equipment, services and insurance (specifically covering the handling and transportation of Asbestos-Containing Materials) that is specified, shown, or reasonably implied for the removal and/or impact of asbestos-containing materials at Fire Station 11 & 13 as indicated on the H-series drawing sheets according to all applicable local, state and federal regulations as necessary to facilitate the Work. Work impacting asbestos within this contract is the responsibility of the Contractor and shall be performed in accordance with all applicable local, state and federal regulations and the Contract Documents.
- C. The Contractor shall comply with all applicable local, state and federal regulations, laws and ordinances concerning removal, remodeling, cutting, handling, storage, disposal, monitoring and protection against exposure or environmental pollution related to lead and regulated metals. Work related to lead-containing paint, lead-containing components and regulated metals within this contract is the responsibility of the Contractor and shall be performed in accordance with all applicable local, state and federal regulations and the Contract Documents including but not limited to Section 028313.
 - 1. Based on paint chip testing data. It is anticipated that disposal of the waste streams generated by the Work will not require disposal according to WAC 173-303, Dangerous Waste Regulations, as it pertains to lead.

1.5 EXISTING CONDITIONS

- A. The Environmental Consultant and Owner make no representation, warranty or guarantee the conditions indicated by the test reports or inspection summary are representative of those conditions existing throughout the area, or that unforeseen developments may not occur, or that materials other than, or in proportions different from those indicated, may not exist.
- B. Contractor is advised that the locations of all ACMs may not be clearly known, and that care should be taken to prevent impact of ACMs located in concealed and inaccessible locations.
- C. Contractor is advised to familiarize with access and space restrictions in areas affected by the Work and to account for such limitations in schedule and production expectations.

1.6 WORK NOT COVERED BY CONTRACT DOCUMENTS

- A. Pre-abatement, Area and Post-abatement air monitoring will be performed for the Owner by the Environmental Consultant. Contractor shall only perform air monitoring that is required by these Specifications and all applicable regulations related to employee exposure.

1.7 SEGRAGATION OF WORK AREAS

- A. Various operations required by the Contract Documents require segregation of Work Areas from the surrounding occupied and/or unoccupied areas, including restriction of access to only properly trained and protected personnel. Contractor is required to coordinate such access restrictions as necessary to facilitate the Work.

1.8 OWNER RULES

- A. Contractor shall abide by all facility rules and regulations

1.9 CLEAN UP

- A. Ensure that all areas are visibly clean at completion of Work. Refer to other Sections for information on cleaning requirements.

PART 2 – PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION 011110

SECTION 028213
ASBESTOS ABATEMENT

PART 1 - GENERAL

1.1 SCOPE

- A. This section covers the removal and disposal of asbestos-containing materials and all activities impacting asbestos-containing materials and materials containing less than 1% asbestos in the project areas included in the Work as defined by these Contract Documents. See Section 01 11 10, Summary of Hazardous Materials Work.
- B. Provide all labor, materials, equipment, services, permits, and insurance required to complete asbestos-related procedures as indicated in the Contract Documents.
- C. Field-identify the location and quantity of all asbestos-containing materials to be impacted as indicated in Section 01 11 10.
- D. The Contractor shall refer to the Limited Hazardous Materials Survey Report, which lists all suspect materials sampled and analyzed for asbestos content. The Contractor shall ensure that a copy of this information is made available to and retained on the project site by all subcontractors.

1.2 RELATED WORK

- A. Work performed under this specification section shall be governed by all related specification sections, including, but not limited to, the following:
 - 1. Section 01 11 10, Summary of Hazardous Materials Work.

1.3 DEFINITIONS

- A. Wherever the terms occur in this contract document, they will have the meanings, which follow:
 - 1. Abatement: Procedures to control fiber release from asbestos-containing building materials. Includes encapsulation, enclosure, removal, repair, and related activities.
 - 2. Adequately wet: Sufficiently mixed, saturated, or coated with water or an aqueous solution to prevent emissions.
 - 3. AHERA: Asbestos Hazard Emergency Response Act, CFR Part 763.
 - 4. Amended Water: Water containing a surfactant additive.
 - 5. Asbestos: Asbestiform varieties of actinolite. Amosite, (Cummingtonite – grunerite, tremolite, chrysotile, crocidolite, and anthophyllite).
 - 6. Asbestos-containing Material (ACM): Any material containing more than one percent (1%) asbestos as defined under NESHAPS CFR 40, Part 61, and OSHA 29 CFR Part 1926.1101, or at least one percent (1%) asbestos as defined under Puget Sound Clean Air Agency (PSCAA) – Asbestos Control Standards.
 - 7. Asbestos-containing Waste Material: Asbestos-containing materials, materials used to control the work area during the asbestos project, debris, containers, bags, protective clothing, and HEPA filters.
 - 8. Authorized Visitor: The Owner or designated representative, or a representative of any regulatory or other agency having jurisdiction over the project, and having require training, medical, fit test, etc.
 - 9. Certified Asbestos Worker: Person certified by WAC Chapter 296-65-010.
 - 10. Certified Asbestos Supervisor: Person certified by WAC Chapter 296-65-012, whose duties include at least: establishing negative pressure, mini-enclosure, glove bag, or other engineering controls ensure integrity of those controls, supervise employee monitoring,

- protective equipment, training, hygiene, and decontamination procedures.
11. Class I Asbestos Work: Activities involving the removal of TSI, surfacing ACMs, and presumed asbestos-containing materials as defined by WISHA and OSHA.
 12. Class II Asbestos Work: Activities involving the removal of ACMs that are not thermal system insulation or surfacing material as defined by WISHA and OSHA.
 13. Critical Barrier: Barrier constructed of two layers of six-mil plastic sheeting and sealed at the edges with duct tape and, as appropriate, spray adhesive. Critical barriers constructed in exterior areas shall utilize reinforced plastic sheeting.
 14. Curtained Doorway: A device to allow ingress or egress from one room to another while permitting minimal air movement between the rooms, typically constructed by placing three overlapping sheets of plastic over an existing or temporarily framed doorway, securing each along the top of the doorway in a pleated fashion and securing one vertical side of each sheet on alternating sides of consecutive sheets. Two curtained doorways spaced a minimum of three feet apart form an air lock.
 15. Decontamination Area: Enclosed area adjacent and connected to regulated area and consisting of equipment room, shower area, and clean room, which is used to decontaminate workers, materials, and equipment.
 16. Disposal: Procedures necessary to transport and deposit the asbestos-contaminated material in an approved waste disposal site in compliance with EPA and other applicable regulations.
 17. Disposal Site: EPA approved landfill for asbestos-containing waste.
 18. EPA: U.S. Environmental Protection Agency.
 19. Environmental Consultant: Environmental consultant specializing in asbestos abatement and retained by the Owner.
 20. Fiber: A particulate form five micrometers or longer, with a length to diameter ratio of at least 3:1.
 21. Fibers/cc: Fibers per cubic centimeter of air.
 22. Fixed Object: Fixtures that are attached to the building or are too heavy or bulky to remove from the work area.
 23. HEPA Filter: A High Efficiency Particulate Air (absolute) filter capable of trapping and retaining 99.97% of asbestos fibers greater than 0.3 microns in length.
 24. HEPA Vacuum Equipment: High Efficiency Particulate Air (absolute) filtered vacuuming equipment with a filter system capable of collecting and retaining asbestos fibers. Filters of 99.97% efficiency for retaining fibers of 0.3 microns in length or larger shall be installed for filtering discharge air.
 25. HVAC System: Heating, Ventilation, and Air Conditioning System.
 26. Independent Testing Laboratory: A laboratory financially independent from and hired by the Owner or Contractor which is either AIHA-accredited for asbestos with demonstrated proficiency via the AIHA PAT program or has analysts proficient in the AIHA AAR program for air sample analysis.
 27. Industrial Hygienist: An employee of the Independent Testing Laboratory who is experienced and trained in asbestos sampling and analysis as specified.
 28. Isolated Work Area: A totally contained area of the facility where Class I abatement activities are performed as defined by WAC 296-62-077.
 29. L&I: State of Washington Department of Labor and Industries.
 30. Non-Isolated, Regulated Area: Work area where Class II asbestos abatement work is performed as defined by WAC 296-62-077.
 31. NVLAP: National Voluntary Laboratory Assurance Program.
 32. Owner: Employees or representatives designated the State of Washington or Rainier School.
 33. PSCAA: Puget Sound Clean Air Agency
 34. PACM: Presumed asbestos-containing materials.
 35. PAT: Proficiency Analytical Testing program performed for NIOSH method 7400.
 36. PCM: Phase Contrast Microscopy analytic method applied to air samples to determine airborne fiber concentrations, NIOSH method 7400.

37. PLM: Phase Light Microscopy analytic method applied to bulk material samples to determine asbestos content, EPA method 40 CFR 763, Subpart F. Appendix, A.
38. Public Area: Any area outside the isolated work area. When work area isolation measures are removed, the work area becomes a public area.
39. Regulated Area: Area which only certified asbestos workers and other persons authorized by Regulation I of the Washington Industrial Health Act have access, where asbestos materials to be removed exist, or where airborne fiber concentrations are expected to exceed 0.01 f/cc.
40. Removal: All operations where ACM and/ or PACM are taken out or stripped from structures or substrates. Including demolition activities.
41. SDS: Safety Data Sheet supplied by manufacturer provides information on a product listed in OSHA 29 CFR 1910.1200(g)(2).
42. Smoke tube method: A method of qualitatively testing the direction of air flow and seals in plastic sheeting walls and glove bags, using titanium tetrachloride (or equivalent) smoke tubes.
43. Surfactant: A chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.
44. Transport: Hauling of asbestos-containing waste from a work site to a disposal site and deposit of the waste by a firm in compliance with the EPA, Washington State, and PSCAA.
45. Waste Shipment Records: Form similar to that shown in EPA NESHAP 40 CFR 61.150(d)(1), or an EPA approved state or local form.
46. Worksite Entry Logbook: A logbook kept in the clean room, which must be signed by everyone entering or leaving the work area.

1.4 DOCUMENTS INCORPORATED BY REFERENCE

- A. The current issue of each document shall govern. Where conflict among requirements or with these Specifications exists, the most stringent requirements shall apply.
 1. U.S. Environmental Protection Agency National Emissions Standards for Hazardous Air Pollutants (NESHAPS). (Code of Federal Regulations Title 40, Part 61, Subparts A and B).
 2. U.S. Environmental Protection Agency Office of Toxic Substances Guidance Documents, Guidance for Controlling Friable Asbestos-Containing Materials in Buildings, EPA Report Number 560/5-85-024 ("Purple Book").
 3. U.S. Department of Labor Occupational Safety and Health Administration (OSHA).
 4. Title 29 Code of Federal Regulations Section 1910.1001—General Industry Standard for Asbestos.
 5. Title 29 Code of Federal Regulations Section 1910.134—General Industry Standard for Respiration Protection.
 6. Title 29 Code of Federal Regulations Section 1910 et al.—Occupational Exposure to Asbestos; Final Rule.
 7. Title 29 Code of Federal Regulations 1926.1101—Construction Standard for asbestos.
 8. Title 29 Code of Federal Regulations Section 1910.2—Access to Employee Exposure and Medical Records.
 9. Title 29 Code of Federal Regulations Section 1910.1200—Hazard Communication.
 10. Environmental Protection Agency 40 CFR Part 763, AHERA, Asbestos-Containing Materials in Schools, Final Rule and Notice.
 11. National Institute for Occupational Safety and Health (NIOSH), 30 CFR, Part II, Respirators.
 12. American National Standards Institute (ANSI) NY; ANSI Standard Z 88.2-1980 American National Standards Practice for Respiratory Protection, latest edition.
 13. CERCLA, Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S.C. 9601 et. seq.)
 14. RCRA, Resource Conservation and Recovery Act.
 15. Washington State General Occupational Health Standards, Washington Administrative Code (WAC) Chapter 296-62-077 Asbestos, Tremolite, Anthophyllite, and Actinolite; Chapter 296-65 Asbestos Removal & Encapsulation; Chapter 296-155 Safety Standards for Construction

Work.

16. Puget Sound Clean Air Agency (PSCAA)—Asbestos Control Standards.
17. Washington Industrial Safety and Health Act (WISHA).
18. International Building Code (I.B.C.), latest edition, and regulations as applicable.
19. Electrical work shall be performed in accordance with the National Electrical Code.
20. All local ordinances, regulations, or rules pertaining to asbestos, including its storage, transportation, and disposal.

1.5 SUBMITTALS AND NOTICES

- A. The Contactor shall adhere to safety procedures as required by the following:
- B. Additional requirements for submittals are also described in other sections of these specifications. The requirements in this section pertain to asbestos-containing materials and removal.
- C. Contractors shall submit to the Environmental Consultant the following information prior to beginning work on the project:
 1. Work Plan: Include a detailed plan of the procedures proposed for use om complying with the requirements, including the following:
 - a. A description of all special equipment, techniques, and methods to be used on the Project, including description of work area layout(s) citing entries/exits, HEPA exhausts, decontamination units, waste loadouts, etc.
 - b. A detailed project schedule, including proposed clearance monitoring schedule and progression of abatement through the work areas.
 - c. Specific information relating to handling, transport, and disposal of asbestos-containing waste. Identify any disposal site at which any waste material generated during the project will be disposed and furnish evidence of all necessary government approvals to dispose of the waste.
 2. Laboratory Qualification Information: Submit information pertaining to the proposed Air Monitoring Program for this project. Air monitoring shall include employee exposure monitoring. This information shall include the name(s) of the on-site Industrial Hygiene Technician working under the foreman's supervision, types of equipment, sampling schedule, sampling procedures, calibration record keeping, name and address of proposed Independent Testing Laboratory, and evidence of analyst's NIOSH 582 course completion and AIHA PAT program participation.
 3. Notifications and Policies: Submit copy of all required notifications and permits obtained by the contractor (Washington State Department of Labor and Industries, and PSCAA) and copies of all types of specified bonds and insurance. Submit upon receipt any approved amendments to notifications or re-notifications for multi-phase activities. See Paragraph 1.11 – Permits and Notifications for additional requirements.
 4. Asbestos Supervisor: Submit the name, Asbestos Supervisor Certification, Certificate of Worker Acknowledgment and resume of experience of the assigned on-site foreman. At a minimum, the foreman shall have successfully completed a supervisor-training course in compliance with WAC Chapter 296-65-007. References and work on similar projects will also be reviewed. The Owner and the Environmental Consultant reserve the right to reject the foreman from the work at any time during the project. The Contractor shall then submit another on-site foreman for approval as described above.
- D. Periodic Job Submittals
 1. Personal Air Monitoring: Submit copies of all personal air monitoring data sheets, chain-of-custody and analytical results to the Owner and Environmental Consultant on a daily basis prior to the start of the next work shift following sample collection.
 2. Daily Logs: Submit daily logs to the Owner and Environmental Consultant daily prior to the start of the next work shift. Daily logs shall indicate the date, time, identity, company, or agency represented, and reason for entry of all persons entering the work area, and the

type, amount and location(s) of all ACMs removed.

- E. At the request of the Environmental Consultant or other representative of the Owner, immediately provide documentation of training or medical monitoring of employees as required by applicable regulations. Such documentation will be maintained on the project site as required by applicable regulations. Failure to comply with such request will result in immediate suspension of employees from work as defined by the Contract Documents.
- F. Post-Job Submittals shall be delivered to the Environmental Consultant within 15-days of completion of work and shall include the following:
 - 1. Certification: Provide written certification from the Abatement Contractor's Project Manager or Supervisor that Contractor has fully inspected the work area and completed work in strict accordance with the Specifications.
 - 2. Air Monitoring: Submit documentation of all employees' personal air monitoring results relative to OSHA and WISHA respiratory protection level compliance. Include copies of all air monitoring data sheets, chain-of-custody documentation and analysis reports for sampling conducted at the site.
 - 3. Project Record Documents: Provide project records including documentation of all contract changes, and copies of worksite entry logbooks, safety logs, sign-in sheets, and supervisor's daily field reports.
 - 4. Disposal Manifests: Submit legible, fully executed copies of all asbestos waste disposal transportation and disposal manifests including signed receipts from the landfill, and chain-of-custody.

1.6 PERSONNEL PROTECTION

- A. Training
 - 1. All personnel accomplishing removal of asbestos-containing material shall have received the minimum training as required by L&I for the work to be performed. At a minimum, the supervisor shall be the bearer of a current "Certified Asbestos Supervisor Certificate" issued by L&I. Prior to commencement of work, Contractor shall ensure all workers have been trained as specified in WAC Chapter 296-65.
 - 2. The Contractor shall provide and post decontamination, respirator, and work procedures for abatement crew.
 - 3. The Contractor shall ensure that all employees have been trained as to emergency evacuation procedures specific to each work area.
- B. Personnel Protective Equipment for Asbestos Removal
 - 1. Provide protective clothing and equipment per WAC 296-62 and Section 2.1.

1.7 AIR MONITORING BY CONTRACTOR

- A. Laboratory Analysis: An Independent Testing Laboratory shall be retained by the Contractor for PCM sample analysis. All analysis shall be performed by an analyst experienced and trained in asbestos sampling and analysis. At a minimum, documentation of prior asbestos sampling and analysis experience, plus satisfactory completion of the NIOSH 582 course or equivalent will be required. Air sample collection may be performed by an Industrial Hygienist or the Contractor's foreman at the Contractor's option. The Contractor shall perform sampling and analysis of air samples for asbestos in compliance with WAC Chapter 296-62-07735, Appendix A-WISHA reference method.
- B. Sample Documentation: Documentation shall be kept for each filter sample procured as to worker sampled, social security number, activity, work area location, date and time taken, volume of air drawn through filter, pump identification number, and calibration. Documentation shall indicate in what areas tests were taken and shall clearly indicate the specified maximum allowable fiber levels for each area tested. Submit chain-of-custody records along with all samples.

- C. Analysis Procedures: The samples shall be collected on 25 mm filters and analyzed within 12 hours using membrane filter method at 400-500x magnification with phase contrast illumination—NIOSH Analytical Method No. 7400—for laboratory and field analysis. The analyst shall sign and submit permanent records of all samples and analyzed directly to the Environmental Consultant. The Independent Testing Laboratory shall seal the unused portion of all filters in airtight containers so that individual samples can be re-analyzed at a later date if necessary. The containers shall be clearly labeled with Project Name and Sample Number and shall become property of the Owner at work completion at the Owner's request.
- D. Controls: The Contractor's testing laboratory shall submit sample analysis results, chain-of-custody and equipment calibration records to the Environmental Consultant prior to the start of the next work shift following collection.
- E. Contractor's Sampling During Abatement.
 - 1. Sample Collection: Air monitoring shall be performed to determine worker exposure during the period of asbestos abatement in each work area. Begin sampling when asbestos removal commences. Samples are to be taken where Class I or II work is being conducted during each 8-hour work shift until abatement is complete.
 - 2. Most Contaminated Worker: The Contractor shall determine which worker(s) in each work area is probably experiencing the most severe exposure. This is the "Most Contaminated Worker(s)". 8-hour TWA and 30-minute excursion samples shall be collected on this worker(s). This worker shall wear a personal sampling pump and the sample shall be drawn from the breathing zone of this worker.
 - 3. The number of air samples collected shall be in accordance with the Contractor's approved work plan; however, a minimum of one sample per work area must be collected daily.
- F. Quality Assurance: See Section 1.14, Quality Assurance, for additional requirements related to air monitoring.

1.8 AIR MONITORING BY OWNER

- A. Industrial Hygienist: The Environmental Consultant will collect and analyze asbestos air samples prior to abatement, inside the work area, outside the work area, at HEPA exhaust and after visual inspection at the Owner's discretion and expense. See Section 1.14, Quality Assurance, for additional requirements related to air monitoring
- B. Sampling and analysis of asbestos samples shall be performed in compliance with WAC Chapter 296-62-07735, Appendix A—WISHA reference method.
- C. The Owner reserves the right to monitor Contractor's performance via air samples on abatement workers in addition to the Contractor's air monitoring.
- D. Any post-abatement air monitoring being conducted by the Owner that is made necessary by air sample data above prescribed post-abatement limits shall be performed by the Environmental Consultant at the Contractor's expense.

1.9 OWNER OCCUPANCY

- A. The area if abatement shall be occupied only by properly trained and protected personnel during the abatement activities. Construct the abatement control areas and perform the work so as not to interfere with the Owner's sire and facility operations.

1.10 WORKING HOURS

- A. Submit proposed work schedule to Owner for approval in conjunction with "Pre-Work Submittals" required by this Section. The Owner reserves the right to restrict and curtail any operations which

are considered, at the Owner's sole determination, to generate such noise or activities as to interfere with facility operations. Any revisions to the approved work schedule shall be submitted in writing to the Owner a minimum of 48 hours prior to the desired change.

1.11 PERMITS AND NOTIFICATIONS

- A. The Contractor is responsible for obtaining and maintaining all permits and notifications as required for the completion of the work by L&I, the U.S. EPA, PSCAA and any other permitting agency involved with the completion of the work included herein.
- B. Puget Sound Clean Air Agency (PSCAA)
 - 1. At least ten (10) days before undertaking an Asbestos Project, the Contractor shall submit to the Owner a copy of the Notice of Intent to Remove Asbestos that the Contractor has filed with PSCAA. Prior to the start of any abatement work, the Contractor shall post the Notice of Intent to Perform an Asbestos Project with PSCAA's case number and signature of reviewing officer to prove that the Notification has been processed by PSCAA.

1.12 LIABILITY

- A. The Contractor is an independent contractor and not an employee of the Owner, Architect or Environmental Consultant. The Owner, Architect and the Environmental Consultant shall have no liability to the Contractor or any third persons for Contractor's failure to faithfully perform and follow the provisions of these Specifications and the requirements of the governing agencies. Notwithstanding the failure of the Owner, Architect, or the Environmental Consultant to discover a violation by the Contractor of any of the provisions of these Specifications, or to require the Contractor to fully perform and follow any of them, such failure shall not constitute a waiver of any of the requirements of these Specifications which shall remain fully binding upon the Contractor.

1.13 SUBCONTRACTORS

- A. Subcontractors employed by the Contractor shall be bound to all the work and safety standards specified. Subcontractor's personnel shall meet requirements as specified and shall be supervised by the Contractor during performance of this work.

1.14 QUALITY ASSURANCE

- A. Qualifications for Performance of Work
 - 1. Contractor shall have a record of successful experience in asbestos removal and related Work similar in scope and magnitude to this Project. Contractor shall have valid licenses and certifications to this Project. Contractor shall have valid licenses and certifications as a Contractor and an Asbestos Abatement Contractor in the State of Washington.
 - 2. Maintain on site a full-time Certified Asbestos Supervisor approved by the Owner per pre-job submittals.
 - 3. Provide one experienced Foreman for every five asbestos workers, or portion thereof, utilized on the Project.
- B. On Site Observation
 - 1. Pre-Removal: Environmental Consultant shall perform observations regarding demarcation of regulated area, installation of critical barriers, integrity of negative pressure enclosures, waste load-out facilities, and other conditions affecting abatement work. Contractor shall request pre-removal observations a minimum of two hours prior to desired removal commencing. No abatement work shall be performed prior to pre-removal observation by the Environmental Consultant.
 - 2. Observation: Environmental Consultant shall perform observations regarding integrity of isolation barriers, decontamination facilities, worker protection, Contractor's air monitoring

program, performance of abatement operations, and conformance to the Specification, EPA, OSHA, WISHA and PSCAA regulations.

3. Post Removal: Environmental Consultant shall perform visual inspections after the removal of asbestos-containing materials and cleaning of work area(s) is complete.
4. Following abatement and cleaning of work area(s), the abatement superintendent shall inspect the work area(s), complete and sign the "Post-Abatement Visual Inspection" form and notify the Environmental Consultant that the scheduled post-abatement inspection may commence.
5. Visual Inspections shall be performed according to ASTM Standard E 1368, Standard Practice for Visual Inspection of Asbestos Abatement Projects.
6. Upon completion of the post-abatement inspection, the Environmental Consultant shall indicate acceptance of the work area for compliance, as appropriate, by signing the "Post-Abatement Visual Inspection" form.
7. Should additional cleaning of the work area be required to meet the standards set forth in Paragraph B of this section, the Environmental Consultant shall indicate deficiencies on the "Post-Abatement Visual Inspection" form and notify the Contractor of such deficiencies.
8. The Contractor shall not proceed until post-removal visual inspection by the Environmental Consultant Stop Work: Environmental Consultant shall notify the Contractor in writing to stop abatement work if the Owner determines that work practices are in violation of regulations, these Specifications or that work is endangering workers or occupants of the building. The Contractor shall continue work when conditions and actions are corrected and when written authorization is received from the Environmental Consultant.
9. Schedule of Inspections: The Contractor shall schedule pre-removal and post-removal visual inspections with the Environmental Consultant a minimum of forty-eight (48) hours in advance of the desired inspection occurring.
10. Any delay in the completion of the Work caused by a lack of proper scheduling of inspections shall not be sufficient cause for any extension of time or extension of the project completion date.
11. Compensation for time spent by the Environmental Consultant on the Project resulting from pre-arranged meetings at which the Work has not progressed to the designated level of completion shall be the responsibility of the Abatement Contractor and will be deducted from future payments due the Abatement Contractor, by the Owner.

C. Air Monitoring

1. Notification: If, at any time during the work, analysis of an air sample taken by the Contractor, Owner, or Environmental Consultant, indicates a fiber concentration in excess of the applicable Maximum Allowable Fiber Concentration, the laboratory that analyzed the air sample shall immediately notify the Contractor's Superintendent and the Environmental Consultant. Provide protective clothing and equipment per WAC 296-62 and Section 2.1.

D. Maximum Allowable Fiber Concentrations:

1. Outside all Regulated Work Areas: 0.01 f/cc (fibers per cubic centimeter by PLM) or below pre-abatement.
2. Inside Isolated Regulated Work Area: 0.1 f/cc.
3. Inside Non-Isolated Regulated Work Area: 0.01 f/cc or below pre-abatement levels.
4. Post Abatement: 0.01 f/cc.

E. Procedures: Immediately upon being notified of fiber concentration in excess of the Maximum Allowable Fiber Concentration, the Contractor shall perform the following steps in the order presented, at no additional cost to the Owner:

1. Stop abatement work and identify source of high fiber counts.
2. Corrective Actions: Immediately correct containment breaches, pressure differential changes and potential cause of high fiber counts. The Environmental Consultant will determine the affected area considered to be contaminated and the proper cleaning to be performed by the Contractor at no additional cost to the Owner.
3. Clean the affected area. Cleaning will include wet methods and HEPA vacuuming.

4. Re-sample air until fiber counts are determined to be below the specified maximum levels.
5. Secure and repair containment barriers, repair or add equipment, modify work procedures, and make other changes to reduce fiber counts.
6. Resume work and air monitoring.

PART 2 – PRODUCTS

2.1 PROTECTIVE CLOTHING AND EQUIPMENT

- A. Provide approved clothing per WAC 296-62 for all workers and all official representatives of the Owner, State, or other governmental entity, and the Environmental Consultant who may inspect or visit the project. Work clothes shall consist of disposal full-body coveralls and head and foot covers ("Tyvek" or approved), boots, or sneakers. Eye, hearing, fall protection, gloves, and hard hats shall be available, as required by job site conditions.
- B. Respirators: At a minimum, , respiratory protection shall be approved by the National Institute for Occupational Safety and Health (NIOSH), United States Department of Labor, and U.S. Department of Health, Education and Welfare, Centers for Disease Control, in accordance with WAC Chapter 296-62-071. Respiratory protection shall provide workers with a maximum calculated fiber level inside the mask of 0.01 f/cc.
- C. Selection: As part of the Contractor's Respiratory Protection Program, all workers shall be provided with a selection of brands and sizes of respirators to choose from. At a minimum, all workers shall be quantitatively or qualitatively fit-tested at the time of respirator selection per WAC Chapter 296-62-07715.
- D. Contractor shall supply replacement filter cartridges as required. Cartridges, which have become wet or clogged, shall be replaced immediately.
- E. Contractor shall provide personal protective equipment and supplies to the Environmental Consultant and authorized visitors for use on the site.
- F. Air-purifying Equipment: Air-purifying equipment shall consist of High-efficiency Particulate Air (HEPA) filtration systems. No air movement system or air equipment shall discharge asbestos fibers outside the work area. Each unit shall be capable of variable volume from a minimum of 500 CFM to at least 1700 CFM under load and shall have at least 2 stages of prefiltration ahead of the HEPA final filter. Each unit shall be equipped with an elapsed time indicator (hour meter), static pressure gauge with low flow alarm, and be overload protected. At the Contractor's option, each unit shall be equipped with heat and smoke sensors, which will visually and audibly warn workers and shut unit fan down within 30 seconds. The units shall be: Micro-Trap Portable Air Filtration System manufactured by Asbestos Control Technology, Inc. or approved equal.
- G. Water-purifying Equipment: Capable of removing all fibers longer than 5 microns or as required by local regulations from water used in abatement work and decontamination showers. Control Resource Systems, Inc. "AQUA-HOG" or approved equal.
- H. Vacuum Equipment: All vacuum equipment utilized in the work area shall be High-Efficiency Particulate Air (HEPA) equipment, and suitable for wet/dry usage.
- I. Scaffolding: Scaffolding, as required to accomplish the specified work, shall meet all applicable safety regulations including WAC Chapter 296-155-475 to 48536. Special scaffolding shall have drawings and calculations stamped and signed by a civil or structural engineer registered in the state of Washington.
- J. Transportation Equipment: Transportation equipment, as required, shall be suitable for loading, temporary storage, transit, and unloading of contaminated waste without exposure to persons or property. Equipment shall have a hard bottom and sides. If equipment is rented, notify rental

agency in advance, in writing, of intended use of equipment.

- K. Electrical: Electrical tools, equipment, and lighting shall meet all applicable codes and regulations, including WAC Chapter 296-155-426 to 462. Ground fault protection as required by OSHA, shall be in effect at all times. Contractor shall take all additional precautions and measures necessary to ensure a safe working environment during wet removal.
- L. Glove Bags: Bags shall be clean poly bags, seamless at the bottom, with pre-printed asbestos warning labels, 6-mil PVC with attached TYVEK arms and latex gloves. Bags shall be "Profo'Bag" manufactured by Asbestos Control Technology, Inc., or "Asbest'O'Saf/SAC" by Control Resource Systems, Inc., or approved equal.
- M. Remote Filter Housing: Stainless steel housing with pre-filters and HEPA filters sealed to cabinet flanges by Century Equipment "Advance Guard II" or approved equal.
- N. Other Tools and Equipment: Provide other suitable tools for the removal, enclosure, encapsulation, patching, and disposal activities including but not limited to hand-held scrapers, wire brushes, sponges, and rounded-edge shovels.
- O. Lighting: Provide adequate lighting for safe execution of work and for Environmental Consultant to perform visual inspections of work areas.
- P. Pre-manufactured Remote Decontamination Facility: Remote decontamination facilities shall be in compliance with all applicable state, federal, and local codes and regulations and function in accordance with these specifications.

2.2 MATERIALS

- A. Plastic Sheet: Plastic sheet will be flame-retardant polyethylene material, minimum thickness of 6-mil, sized in lengths and widths to minimize the frequency of joints. Exterior applications require reinforced plastic sheeting.
- B. Plastic Bags: Plastic bags shall be 6-mil polyethylene printed with warning labels with waterproof print and permanent adhesive in accordance with WAC Chapter 296-62-07721, OSHA, DOT, and EPA regulations. Permanently mark the label with the date the material was collected for disposal, the name of the waste generator, the name and affiliation of the certified asbestos supervisor, and the location at which the waste was generated.
- C. Tape: Tape shall be capable of sealing joints of adjacent sheets of plastic and for attachment of plastic sheet to finished or unfinished surfaces of dissimilar materials and capable of adhering under dry and wet conditions, including use of amended water. Minimum of 2" wide tape must be used. Do not use polyethylene tape.
- D. Disposal Containers: Disposal containers shall be suitable to receive and retain any asbestos-containing or contaminated materials until disposal at an approved site. The containers shall be labeled with waterproof print and permanent adhesive in accordance with WAC Chapter 296-62-07721, OSHA, DOT, and EPA regulations. Permanently mark the label with the date the material was collected for disposal, the name of the waste generator, the name and affiliation of the certified asbestos supervisor, and the location at which the waste was generated. Containers must be both airtight and watertight, and have hardtop, bottom, and sides.
- E. Warning Labels: Warning labels on plastic bags and disposal containers shall include the following information.

**DANGER
MAY CONTAIN ASBESTOS FIBERS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS**

**DO NOT BREATHE DUST
AVOID CREATING DUST**

- F. Warning Signs: Warning signs shall be provided and displayed at each regulated area in accordance with WAC Chapter 296-62-07721. Warning signs shall include the following information:

**DANGER
MAY CONTAIN ASBESTOS FIBERS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
DO NOT BREATHE DUST
AVOID CREATING DUST**

- G. Amended Water: Clean potable water containing a surfactant additive. The surfactant additive shall be 50% polyoxyethylene ether and 50% polyethylene ester, or equivalent, and shall be mixed with water at a concentration of one-ounce surfactant to 5 gallons of water, or as recommended by the manufacturer in the case of an equivalent.
- H. Encapsulants (Sealants): Encapsulants shall be of the bridging or penetrating variety and shall be listed as "satisfactory" by the EPA. Penetrating Encapsulant: No. 207 Special Sealer #33775-27A as manufactured by Makus-Cincinnati, Inc.; "Asbestos 30B-2" as manufactured by Asbesco Corp.; "Cable Coating 22-P" as manufactured by American Coatings Corp. or approved. Bridging Encapsulant: Decadex Firecheck manufacture's standard color "Magnolia" as manufactured by Pentagon Plastics, Inc.; "Cable Coating 2-B", manufacturer's standard color gray, as manufactured by American Coatings Corp.; or approved equal.
- I. Other Materials: Provide materials such as lumber, nails, and hardware, which may be required to construct and dismantle the decontamination area and barrier isolating the work area.
- J. Spray Glue: Spray glue shall be a heavy-duty adhesive in aerosol can, "CDC Spray Glue" as manufactured by AMREP, Inc., or approved equal.

PART 3 – EXECUTION

3.1 NON-ISOLATED WORK AREA PREPARATION

- A. Performance: Contractor shall perform the following procedures in the order in which they are presented for work in non-isolated work areas according to the approved work plan. Any alternative control measures considered for Class II asbestos abatement work involving the removal of ACM that is not TSI, surfacing or sheet flooring materials shall be approved by the Environmental Consultant and performed in accordance with WAC 296-62 and 29 CFR 1926.1101.
1. Coordinate with Prime Contractor to ensure isolation of HVAC equipment. Coordinate with Prime Contractor regarding all electrical, safety, and other service connections, requirements, and equipment. Contractor is responsible to detect operation of systems intended to be shut down during abatement.
 2. Install critical barriers at all roof-level openings, doors, windows, and other openings into the building.
 3. Have emergency cleanup equipment and supplies, including HEPA vacuum, amended water, disposal bags, buckets, towels, and sponges, on hand prior to start of abatement work.
- B. Compliance: No asbestos abatement work shall occur unless the work area has been found acceptable for Specification compliance by the Environmental Consultant. Notifications to perform asbestos abatement and the Hazardous Materials Survey Report (Good Faith Inspection) shall be posted at the work site.

3.2 REMOVAL OF ASBESTOS-CONTAINING MATERIALS IN NON-ISOLATED AREAS

- A. Contractor shall remove all asbestos-containing materials as defined in these Contract Documents. Contractor shall apply spray coat of amended water to asbestos materials to be removed. Keep material damp during entire removal process. Immediately place asbestos-containing materials in properly labeled asbestos waste bags following removal.
- B. Contractor shall maintain a safe and uncluttered work site including staging area, work area, and waste load-out area.
- C. Contractor shall promptly remove waste bags to the waste load-out area.

3.3 IMPACT OF MATERIALS CONTAINING LESS THAN 1% ASBESTOS

- A. WAC 296-62-07 identifies a regulated "asbestos-containing material" as "containing more than 1% asbestos" content by weight. The referenced code also contains rules regarding materials that contain less than 1% asbestos. These include the following:
- B. These materials are not regulated by EPA or local Clean Air Agencies. It is not considered a Class I, II, III or IV work. Requirements for handling <1% asbestos are found in WAC 296-62-07712 (2,4 and 5), WAC 296-62-07722(5) and WAC 296-62-07728.
- C. A Competent person must conduct a negative exposure assessment and periodic monitoring.
- D. When working with these materials' wet methods, HEPA vacuums and prompt cleanup must be performed.
- E. 2-hr Awareness training is required for all workers/trades disturbing this material.
- F. Items/activities that are not required for materials that contain less than 1% asbestos include; labeled disposal bags, asbestos worker certification, supervisor or contractor certifications, pre-demolition removal of the materials, and pre-removal notifications to regulatory agencies.
- G. Submittals: Provide information on the competent person, work plan, and proof of training for all workers potentially impacting materials that contain asbestos.

3.4 DISPOSAL

- A. Regulations: The Contractor shall determine current waste handling, transportation, and disposal regulations for the work site and for each waste disposal landfill. The Contractor must comply with these regulations and U.S. Department of Transportation, PSCAA – Asbestos Control Standards, and EPA requirements.
- B. Waste Load-Out
 - 1. Contractor shall coordinate activities to ensure that all asbestos-containing waste is properly containerized and removed from all work areas prior to the end of each work shift. Contractor shall prevent the accumulation of waste containers within the work areas and shall ensure that all waste containers are stored in lockable, properly sealed storage container(s) at the end of each work shift.
 - 2. Contractor shall perform waste-load out activities during pre-approved time periods via pre-approved routes through the building per Work Plan approved by Owner and Environmental Consultant.
- C. Submit waste manifests signed by the disposal facility to the Owner and Environmental Consultant.

END OF SECTION 028213

SECTION 028313
LEAD-RELATED ACTIVITIES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. General work items include, but are not limited to:
 - 1. Compliance: Activities requiring compliance with this Section include the manual demolition, cutting, sawing, and sanding of building components containing lead as defined in these Specifications and Drawings. See the Limited Hazardous Materials Survey Report for information regarding lead-containing paint in areas of the Work.
 - 2. Handling: Conduct activities involving lead-containing paint under Work of this Contract in accordance with this Section and current applicable state and federal regulations including WAC 296-62-07521: "Lead"; WAC 296-155-176: "Occupational Health and Environmental Control"; and 29 CFR 1926.62: "Lead Exposure in Construction – Interim Final Rule."
 - 3. Waste Disposal: The Contractor is responsible for determining current waste handling regulations according to applicable local, state, and federal regulations.
 - 4. Monitoring: Monitoring of airborne concentrations of lead in accordance with WAC 296-155-176 and this Section. The intent of this Section is to reduce and maintain employee exposure to lead and surrounding airborne concentrations at or below the permissible exposure limit.

1.2 RELATED SECTIONS

- A. Work performed under this specification section is governed by related specification sections, including, but not limited to, the following:
 - 1. Division 1: General Requirements; Section 01 11 10 Summary of Hazardous Materials Work.

1.3 SUBMITTALS

- A. Submit the following "Pre-Work Submittals" prior to start of work. The Work may not proceed until complete Pre-Work Submittal package has been reviewed by the Environmental Consultant.
 - 1. Lead Work Plan: Submit a site-specific lead plan based on the elements of the Contractors' Lead Compliance Program required by WAC Chapter 296-155 for activities impacting lead. The Work Plan shall be developed and implemented to provide engineering, work practice, and administrative controls to reduce and maintain employee exposure to lead at or below the permissible exposure limit. The plan will include at a minimum task-specific descriptions of activities; controls; personnel; procedures; methods of compliance; technology used to meet compliance; air monitoring plan; detailed schedule; work practice program; administrative controls and other relevant information. Implementation of work practices not described in the Lead Work Plan shall not be permitted until an amendment to the submittal is reviewed by Environmental Consultant and Owner.
 - 2. Worker Training Program: Submit written proof indicating that all employees impacting lead-containing materials have received training per 29 CFR 1926.62 and WAC Chapter 296-155. Proof shall include a signature from the Contractor's Principal indicating that all employees performing lead-related activities have completed such a program.
 - 3. Respirator Program: Submit written proof indicating respirator program is in compliance with all parts of OSHA Lead Regulations 29 CFR 1910.134 and 1926.62, and WAC Chapter 296-155.
- B. Final Submittals:
 - 1. Project Record Documents: Provide record of lead control activities including disposition of

- each type of lead-containing item removed from the site.
2. Air Monitoring: Submit copies of all air monitoring data (including sample data sheets), chain-of-custody documentation and calibration records related to the initial exposure assessment for lead.

1.4 AIR MONITORING

- A. Testing Laboratory: An Independent Testing Laboratory shall be retained by the Contractor for all lead air analysis. All exposure monitoring analysis shall be performed in accordance with 29 CFR Part 1926.62 and WAC Chapter 296-155. The laboratory must participate in the ELPAT Program and be a member of AIHA. Air sample collection may be performed by an Industrial Hygienist or the Contractor's trainer supervisor at the Contractor's option.
- B. Sample Documentation: Documentation shall be kept for each filter sample procured as to worker samples, social security number, activity, work area location, date and time taken, volume of air drawn through filter, pump identification number, and calibration. Documentation shall indicate in what areas tests were taken and shall clearly indicate the specified maximum allowable levels for each area tested. Report all data. Complete laboratory chain-of-custody records.
- C. Analysis Procedures: The samples shall be collected on 37 mm filters and analyzed within 24 hours using NIOSH Analytical Method No. 7105 or 7082. The containers shall be clearly labeled with project name and Sample Number and shall become property of the Owner at work completion and the Owner's request.
- D. Contractor's Sampling During Lead Related Activities:
 1. Initial Exposure: Exposure monitoring shall be performed by the Contractor during impact of representative lead-painted building components per WAC 296-155.
 2. Most Contaminated Worker: The Contractor shall determine which worker(s) in each work area is probably experiencing the most severe exposure. This is the "Most Contaminated Worker(s)". 8-hour TWA samples shall be collected on this worker(s). Worker shall wear a personal sampling pump and the sample shall be drawn from the breathing zone of the worker.
 3. Number of samples: The number of air samples collected shall be as defined in the approved Lead Compliance Program. Historical measurements per WAC 296-155 may be used to satisfy continuing exposure assessment requirements.
- E. Work Area Monitoring
 1. Monitoring: The Owner reserves the right to monitor the Contractor's performance via air, dust wipe, and TCLP samples during lead-related activities, in addition to the Contractor's exposure monitoring and testing. Sampling by the Owner will not be available for use as the Contractor's Initial Exposure Assessment.
- F. Quality Control
 1. Maximum allowable airborne concentrations: Contractor shall ensure that all times airborne concentrations of lead outside work areas are at or below the OSHA Action Level of 30 mg/L3.
 2. Immediately upon being notified of concentrations exceeding the specified maximum allowable levels, the Contractor shall perform the following steps in the order presented, at no additional cost to the Owner. Stop lead-related activities work, identify source of high lead concentrations, develop plan with Environmental Consultant and Owner to complete lead-related activities in a manner to prevent visible emissions and elevated lead levels.

1.5 SUBCONTRACTORS

- A. Subcontractors employed by the Contractor shall be bound to all the work and safety standards specified. Subcontractor's personnel shall meet requirements as specified and shall be supervised by the Contractor during performance of this work.

1.6 LIABILITY

- A. The Contractor is an independent contractor and not an employee of the Owner, Architect, or Environmental Consultant. The Owner and the Environmental Consultant shall have no liability to the Contractor or any third persons for Contractor's failure to faithfully perform and follow the provisions of these Specifications and the requirements of the governing agencies. Notwithstanding the failure of the Owner or the Environmental Consultant to discover a violation by the Contractor to fully perform and follow any of them, such failure shall not constitute a waiver of any of the requirements of these Specifications which shall remain fully binding upon the Contractor.

PART 2 – PRODUCTS

2.1 PROTECTIVE CLOTHING AND EQUIPMENT

- A. Personal Protective Equipment for Lead-related activities shall be provided per WAC 296-155.

PART 3 – EXECUTION

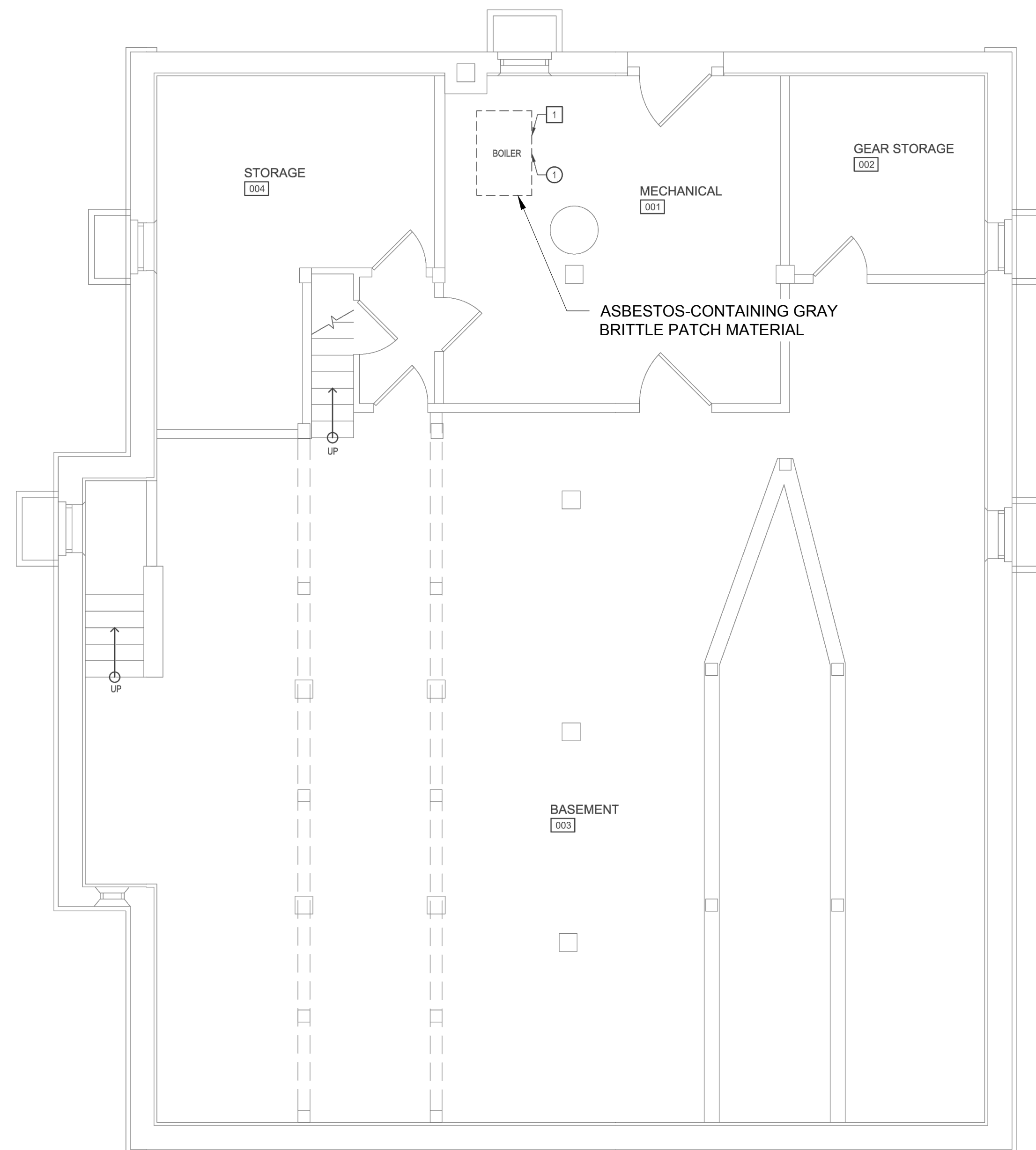
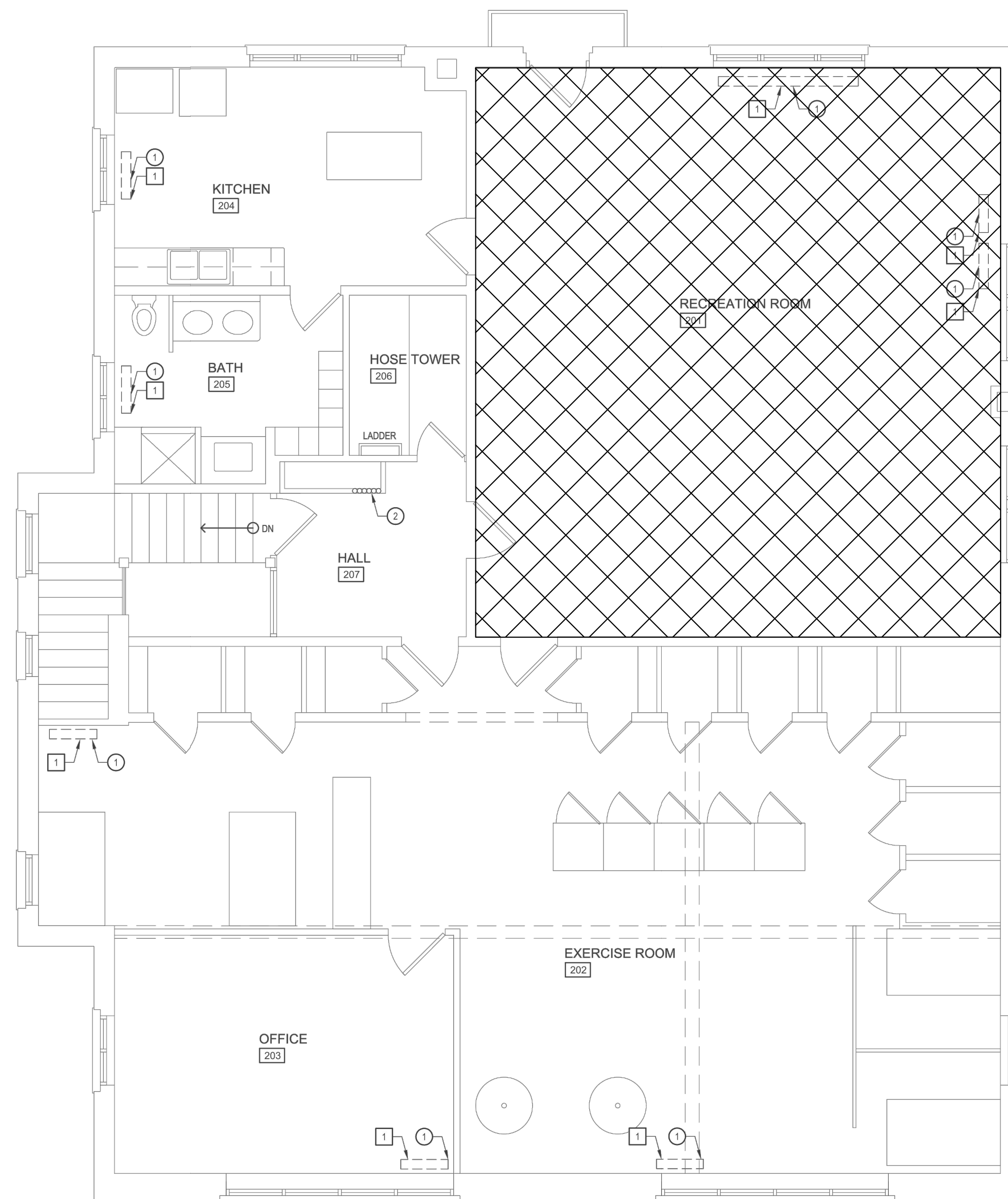
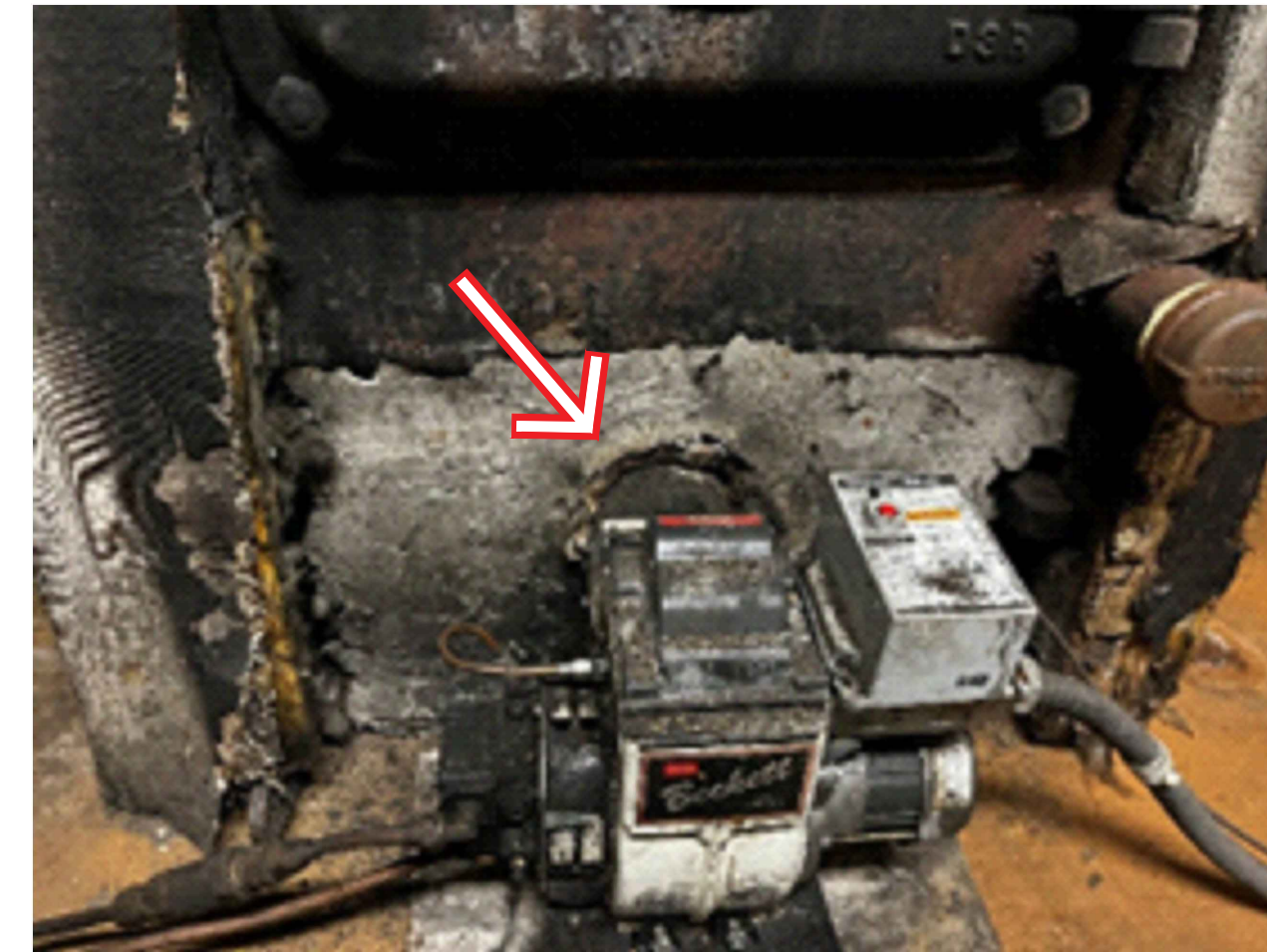
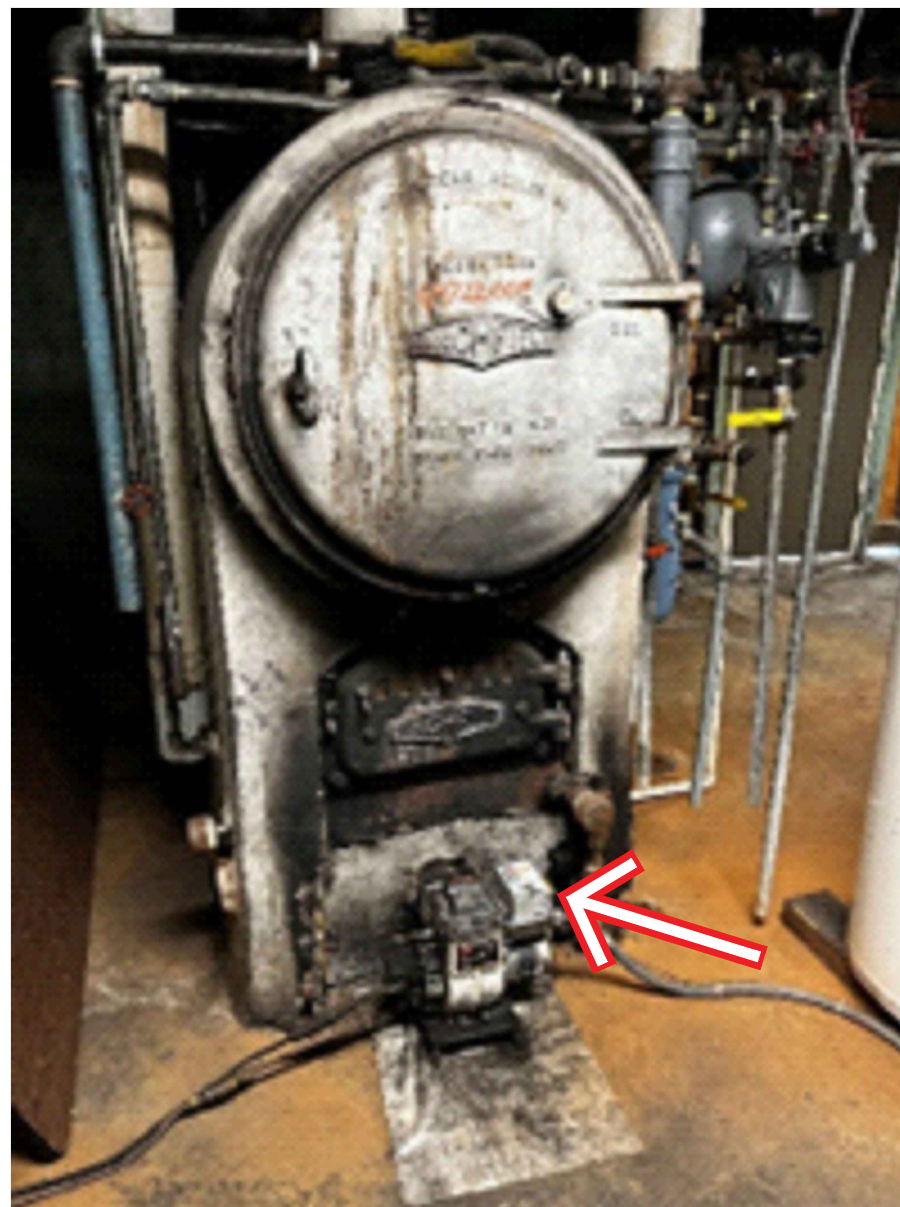
3.1 WORK PRACTICES

- A. Negative Exposure Assessment: The Contractor may waive the requirement if a negative pressure enclosure when using mechanical methods upon approval by the Environmental Consultant of data indicating negative exposure assessment has been completed per WAC 296-155 and Paragraph 1.4, Air Monitoring. The Contractor shall allow 48-hours for review of such data.
- B. Housekeeping: Maintain all surfaces as free as practicable of accumulations of lead and perform clean-up of work areas as necessary according to WAC 296-155-17617.
- C. Work Practices:
 - 1. Set-up Activities: Prior to impact of lead-containing components, Contractor shall cover the ground below the work area with 6-mil plastic sheeting or equivalent. The drop-sheeting shall extend outward a minimum of 6 feet from the location of lead-containing item(s) being impacted. Any tears that occur in the drop-sheeting shall be immediately repaired with duct tape or other acceptable seal.
 - 2. Perform work impacting lead-containing components in accordance with approved lead work plan. Use procedures and equipment required to limit occupational and environmental exposure to lead when lead-containing paint is impacted. The procedures employed by the Contractor shall not create the potential for contaminating surrounding areas or materials with lead-containing dust. Dust generation shall be minimized at all times.
 - 3. At completion of the above operations, HEPA vacuum drop-sheeting to remove any lead-containing particulate or debris.
- D. Debris Testing
 - 1. Debris Testing: A representative sample from debris. The method/location of disposal will be established by test results. See Paragraph 3.1-F for disposal requirements.
- E. Disposal Procedures
 - 1. Waste characterization will be performed, as necessary, by the Contractor on the anticipated general waste stream. Results of TCLP characterization samples are to be provided to the

Owner by the Contractor. Components coated with lead-containing paint may be included in the general waste stream upon receipt of favorable waste characterization data.

2. The Contractor shall be responsible for disposal of lead-containing debris according to applicable local, state, and federal regulations.

END OF SECTION 028313



- ## GENERAL NOTES

1. CONTRACTOR TO VERIFY ALL ITEMS SHOWN, LOCATIONS AND QUANTITIES OF ASBESTOS-CONTAINING MATERIALS (ACMS), AND DIMENSIONS PRIOR TO REMOVAL. ANY DEVIATIONS FROM THE SPECIFICATION THAT ARE DISCOVERED BY THE CONTRACTOR SHALL BE REPORTED TO THE OWNER'S REPRESENTATIVE PRIOR TO REMOVAL. THE DRAWINGS ARE FOR DIAGRAMMATIC PURPOSES ONLY. GENERAL LOCATIONS OF SOME HAZARDOUS MATERIALS ARE DEPICTED DIAGRAMMATICALLY ON THE DRAWINGS. THE REMAINING MATERIAL LOCATIONS ARE DESCRIBED TEXTUALLY ON THESE DRAWINGS. QUANTITIES OF HAZARDOUS MATERIALS LISTED ON THIS SHEET ARE CONSIDERED ACCURATE TO WITHIN +/- 10%. THE CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, EQUIPMENT AND PERMITS FOR THE REMOVAL AND DISPOSAL OF THE QUANTITIES OF HAZARDOUS MATERIALS PROVIDED PLUS AN ADDITIONAL 10%. THE CONTRACTOR WILL BE COMPENSATED FOR QUANTITIES WHICH ARE GREATER THAN 110% OF THE TOTAL AND THE OWNER WILL DEDUCT FROM THE CONTRACT SUM QUANTITIES THAT ARE 90% OR LESS OF THE TOTAL.
2. REMOVAL OF HAZARDOUS MATERIALS MAY COMPROMISE THE SECURITY OF THE SITE. THE CONTRACTOR IS FULLY RESPONSIBLE FOR MAINTAINING SITE SECURITY AND PUBLIC SAFETY THROUGHOUT THE PROJECT. SEE SPECIFICATIONS REGARDING SECURITY AND PUBLIC SAFETY.
3. ABATEMENT CONTRACTOR TO COORDINATE ALL ACTIVITIES WITH PRIME CONTRACTOR INCLUDING, BUT NOT LIMITED TO SCHEDULE, ACCESS, ELECTRICAL/UTILITY SHUTDOWNS, AND DEMOLITION. PERFORM SELECTIVE DEMOLITION AS NECESSARY TO ACCESS CONCEALED HAZARDOUS AND/OR ASBESTOS-CONTAINING MATERIALS TO BE REMOVED. ABATEMENT CONTRACTOR TO REPORT LOCATIONS AND QUANTITIES OF ALL HAZARDOUS MATERIALS TO BE DEMOLISHED TO THE OWNER'S REPRESENTATIVE PRIOR TO ABATEMENT/DEMOLITION.

- ## ASBESTOS-CONTAINING MATERIALS NOTES

1. THE CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, EQUIPMENT AND PERMITS FOR IMPACTING AND REMOVING ACMS AS DESCRIBED IN SPECIFICATION SECTION 01 11 10, SECTION 02 82 13 AND ALL APPLICABLE REGULATIONS AS NECESSARY TO ACCOMPLISH THE SCOPE OF WORK.
2. REMOVE APPROXIMATELY 3 SF OF ASBESTOS-CONTAINING GRAY BRITTLE MATERIAL PATCH FROM BASE OF BOILER. SEE REFERENCE PHOTOS.
3. REMOVE APPROXIMATELY 50 LF OF ASBESTOS-CONTAINING RESIDUAL HARD MUDDIED FITTING INSULATION BELOW VINYL COVERS FROM VARIOUS LOCATIONS. PERFORM SELECTIVE DEMOLITION AS NECESSARY TO ACCESS. 1 HMF = 1 LF. SEE MECHANICAL DEMO.
4. REMOVE AND DISPOSE OF ASBESTOS-CONTAINING VINYL FLOOR TILE AND ASBESTOS-CONTAINING MASTIC (BELOW ONE LAYER OF CARPET) ON WOOD SUBSTRATE AS INDICATED TO PERFORM WORK. SEE LEGEND.
5. THE FOLLOWING MATERIALS CONTAIN LESS THAN 1% ASBESTOS: GYPSUM WALLBOARD AND JOINT COMPOUND ASSEMBLIES AS A COMPOSITE, AND PLASTER. MATERIALS CONTAINING LESS THAN 1% ASBESTOS SHOULD BE HANDLED IN ACCORDANCE WITH SPECIFICATION SECTION 01 11 10, SECTION 02 82 13 AND ALL APPLICABLE REGULATIONS AS NECESSARY TO ACCOMPLISH THE SCOPE OF WORK. LOCATIONS NOT SHOWN.

**PBS Engineering and
Environmental Inc.**
4412 SW Corbett Avenue
Portland, OR 97239
503.248.1939
pbsusa.com



HAZARDOUS MATERIALS ABATEMENT PLAN

FIRE STATION 13 HVAC REPLACEMENT

3825 NORTH 25TH STREET, TACOMA, WASHINGTON

[illegible]

DRAWN BY

CHECKED:

DATE:

ECT NUMBER:

1286.030

HM2

SHEET 2 OF 2



City of Tacoma

Project Related Questions and Answers

Fire Station 11 & 13 HVAC Improvements (RE-BID) RFB Specification No. **PW23-0089F**

These are anticipated project related questions and answers. Respondents should consider this information when submitting their proposals.

Question 1: Does the City expect the work at both stations to be completed concurrently or sequentially?

Answer 1: The City will work with the selected bidder to determine the best course of action for completing this work.

Question 2: Does the City intend to occupy the buildings during construction?

Answer 2: Yes, the Fire Department will be fully functional and occupy the building during construction. The City will work with the selected bidder to coordinate such construction measures and schedule changes to accommodate the work in a timely manner. The selected bidder will have intermittent closures of sections of the building in which to conduct work, while leaving the remainder of the building unincumbered so that the Fire Department can continue its' work unhindered by construction operations

Question 3: Where are the staging areas located at Fire Station 11 and 13?

Answer 3: The Staging area at station 11 can be placed within the city's fenced-in parking area. The city is not responsible for site security, or stored items. Site security and storage is the selected bidder's responsibility.
The Staging area at station 13 is within the basement or in the side yard adjacent to the building. The city is not responsible for site security, or stored items. Site security and storage is the selected bidder's responsibility.

Question 4: Does all boiler piping contain Asbestos Contain Material (ACM)?

Answer 4: Please review the PBS report, specifications, and plans contained in the project manual.

Question 5: How do we accommodate HVAC equipment installation access in the attics of both Fire Stations 11 and 13?

Answer 5: This is a contractor means and methods issue to be resolved by the selected bidder at time of construction?

Question 6: Will the removal of all ACM flooring be required at Fire Station 13?

Answer 6: The City is expecting that abatement will be localized to the areas directly effected per the PBS report and specifications.



City of Tacoma

Project Related Questions and Answers

Question 7: Are substitutions allowed for Allerton controls?

Answer 7: No substitutions for Allerton controls will be accepted. Allerton controls are the current standard selected by Facilities Management. Please review the drawings contained within the bid set for further direction on this matter.

Question 8: What is the Tacoma Power lead time on this project?

Answer 8: Tacoma Power is not anticipating any issues in acquiring the transformers for this project at this time.

Question 9: Will the City Consider extending the 104 calendar days for construction to allow additional lead time for the completion of work?

Answer 10: If there are supply chain issues outside of the contractors control, the contractor may submit a change order request for an equitable time adjustment in accordance with the Project Manual.