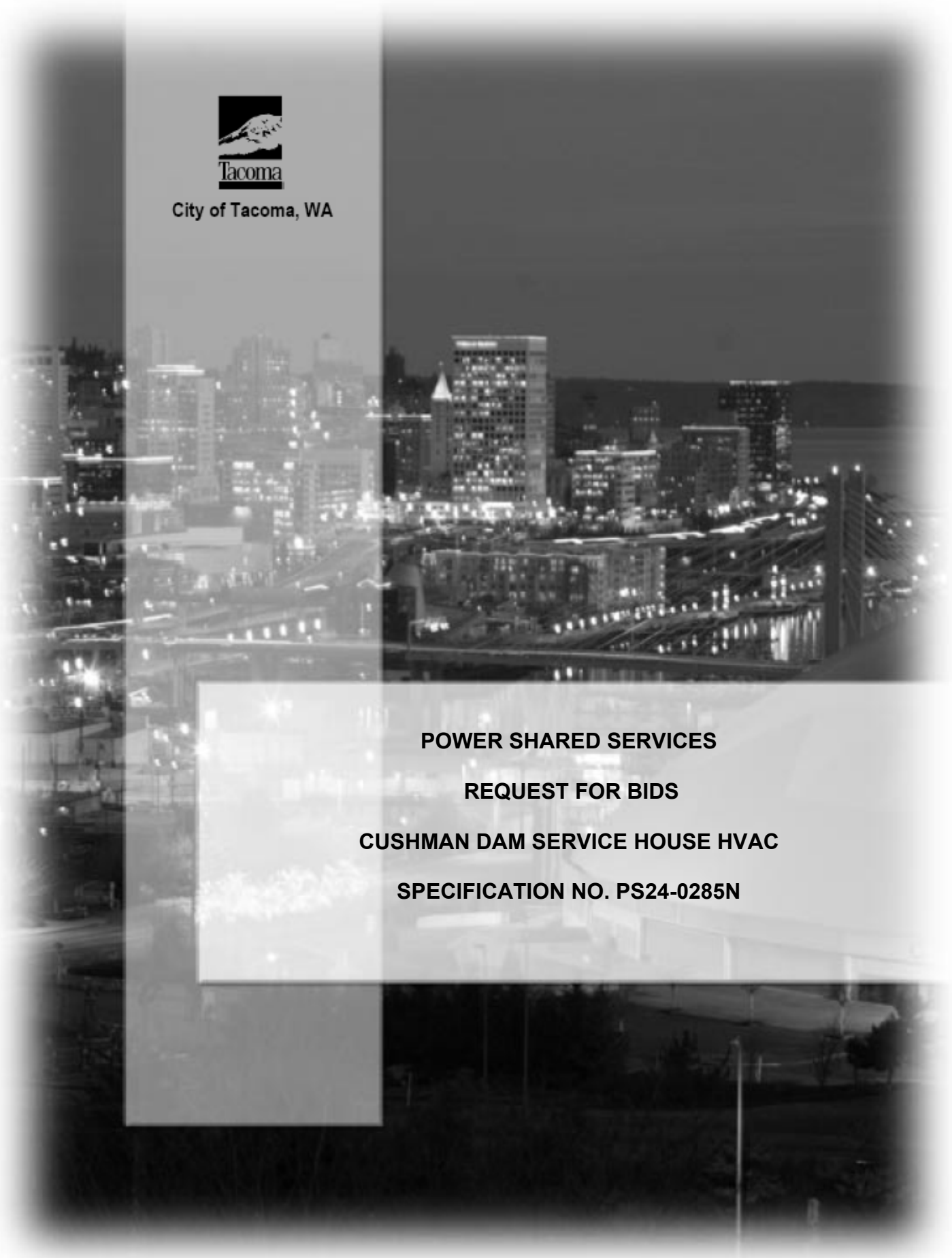

City of Tacoma, WA

POWER SHARED SERVICES

REQUEST FOR BIDS

CUSHMAN DAM SERVICE HOUSE HVAC

SPECIFICATION NO. PS24-0285N

City of Tacoma
Power Shared Services

REQUEST FOR BIDS PS24-0285N

Cushman Service House HVAC

Submittal Deadline: 11:00 a.m., Pacific Time, February 12, 2025

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

For electronic submittals, the City of Tacoma will designate the time of receipt recorded by our email server, as the official time of receipt. This clock will be used as the official time of receipt of all parts of electronic bid submittals. Include the specification number in the subject line of your email. Your submittal must be sent as an attachment, links to your electronic submittal will not be accepted.

For in person submittals, the City of Tacoma will designate the time of receipt recorded by the timestamp located at the lobby security desk, as the official time of receipt. Include the specification number on the outside of the envelope. Late submittals will be returned unopened and rejected as non-responsive.

Submittal Delivery: Submittals will be received as follows:

By Email:	**In Person:**
sendbid@cityoftacoma.org Maximum email size, including attachments: 35 MB. Multiple emails may be sent for each submittal. **Note:** Email may pass through multiple servers before arriving at its destination. Please allow sufficient time for email delivery of submittals. Timely electronic delivery is at the risk of the supplier.	Tacoma Public Utilities Administration Building North, Main Floor, Lobby Security Desk 3628 South 35th Street Tacoma, WA 98409 Monday – Friday 8:00 am to 4:30 pm

Solicitation Documents: An electronic copy of the complete solicitation documents may be viewed and obtained by accessing the City of Tacoma Purchasing website at www.TacomaPurchasing.org.

- Register for the Bid Holders List to receive notices of addenda, questions and answers and related updates.
- Click here to see a list of vendors registered for this solicitation.

Pre-Proposal Meeting: A pre-proposal meeting will be held at time and place named in spec.

Project Scope: The City of Tacoma (City) / Tacoma Public Utilities (TPU) is soliciting bids to establish one or more contracts with qualified vendors to fulfill the City's needs for the Cushman Service House HVAC project

Estimate: $236,400.00

Paid Sick Leave: The City of Tacoma requires all employers to provide paid sick leave in accordance with Washington State 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 Aaron Bratton by email to abratton@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.

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SUBMITTAL CHECK LIST

This checklist identifies items to be included with your submittal. Any submittal received without these required items may be deemed non-responsive and not be considered for award. Submittals must be received by the City of Tacoma Purchasing Division by the date and time specified in the Request for Bids page.

The following items make up your complete electronic submittal package (include all the items below):	
Signature Page (Appendix B) To be filled in and executed by a duly authorized officer or representative of the bidding entity. If the bidder is a subsidiary or doing business on behalf of another entity, so state, and provide the firm name under which business is hereby transacted.	
Price Proposal Form (Appendix B) The unit prices bid must be shown in the space provided. Check your computations for omissions and errors.	
Certification of Compliance with Wage Payment Statutes Bidder shall complete this form in its entirety to ensure compliance with state legislation (SHB 2017).	
State Responsibility and Reciprocal Bid Preference Information Bidder shall complete this form in its entirety to ensure compliance with state legislation (SHB 2010).	
After award, the following documents will be executed:	
City of Tacoma Contract (See sample in Appendix C) Must be executed by the successful bidder.	
Certificate of Insurance and related endorsements (Appendix D) Shall be submitted with all required endorsements	
Payment and Performance Bonds (See samples in Appendix C) Payment Bond and Performance Bond: Must be executed by the successful bidder and his/her surety company	
General Release (See sample in Appendix C)	

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 chapters 18.27 RCW,18.106 RCW, 70.87 RCW, 19.28 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:
        i. Industrial Insurance (workers' compensation) coverage for the bidder's employees working in Washington, as required in Title 51 RCW;
        ii. A Washington Employment Security Department number, as required in Title 50 RCW;
        iii. A Washington Department of Revenue state excise tax registration number, as required in Title 82 RCW;
        iv. An electrical contractor license, if required by Chapter 19.28 RCW;
        v. 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 Small Business Enterprise and Local Employment and Apprenticeship 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.

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.

1. MINIMUM REQUIREMENTS

List any minimum requirements for respondents. See Supplemental Requirements in Notice to Bidders above.

2. STANDARD TERMS AND CONDITIONS / GENERAL PROVISIONS

City of Tacoma Standard Terms and Conditions apply.

City of Tacoma General Provisions apply.Please see Appendix C.

3. INSURANCE REQUIREMENTS

Successful proposer will provide proof of and maintain the insurance coverage in the amounts and in the manner specified in the City of Tacoma Insurance Requirements contained in this solicitation. (See Appendix)

4. DESCRIPTION OF WORK

The City of Tacoma (City) / Tacoma Public Utilities (TPU) is soliciting bids to establish one or more contracts with qualified vendors to fulfill the City's needs for Cushman Dam Service House HVAC. Contract(s) will be awarded to the lowest responsive and responsible bidder(s) based on price, product quality and availability.

5. ANTICIPATED CONTRACT TERM

Term will be for 1 year with an optional 1 year extension. All work in spec and drawing package must be completed within 180 calendar days from notice to proceed.

6. CALENDAR OF EVENTS

This is a tentative schedule only and may be altered at the sole discretion of the City.

The anticipated schedule of events concerning this RFB is as follows:

Pre-Bid Meeting:	**1/28/2025**
Approved Equivalent Deadline:	**1/31/2025**
Question Deadline:	**2/5/2025**
City response to Questions:	**2/7/2025**
Submittal Due Date:	**2/12/2025**
Anticipated Award Date, on or about:	**2/19/2025**

7. INQUIRIES

7.1 Questions can be submitted to *Aaron Bratton*, Senior Buyer, via email to abratton@cityoftacoma.org. Subject line to read:

Spec PS24-0285N– Cushman Dam Service House HVAC – *VENDOR NAME*

7.2 Questions are due by 3 pm on the date included in the Calendar of Events section.

7.3 Questions marked confidential will not be answered or included.

7.4 The City reserves the discretion to group similar questions to provide a single answer or not to respond when the requested information is confidential.

7.5 The answers are not typically considered an addendum.

7.6 The City will not be responsible for unsuccessful submittal of questions.

7.7 Written answers to questions will be posted alongside these specifications at www.tacomapurchasing.org.

8. PRE-BID MEETING

An optional pre-bid meeting will be held at the date and time specified in the calendar of events, at 391 Standstill Drive, Hoodsport WA 98548. Please email Aaron Bratton, abratton@cityoftacoma.org to RSVP.

9. DISCLAIMER

The City is not liable for any costs incurred by the Respondent for the preparation of materials or a proposal submitted in response to this RFB, for conducting any presentations to the City, or any other activities related to responding to this RFB, or to any subsequent requirements of the contract negotiation process.

10. RESPONSIVENESS

Bid submittals must provide ninety (90) days for acceptance by City from the due date for receipt of submittals. All submittals will be reviewed by the City to determine compliance with the requirements and instructions specified in this RFB. The Respondent is specifically notified that failure to comply with any part of this RFB may result in rejection of the submittal as non-responsive. The City reserves the right, in its sole discretion, to waive irregularities deemed immaterial. The City also reserves the right to not award a contract or to issue subsequent RFB's

11. AWARD

Awardee shall be required to comply with 2 CFR part 25, and obtain a unique entity identifier and/or be registered in the federal System for Award Management as appropriate.

Award will be made to the lowest responsive, responsible bidder. All bidders shall provide unit or lump sum pricing for each line item. Each line item will be added up for a subtotal price. The subtotal price will be compared amongst each bidder, including any payment discount terms

offered twenty (20) days or more. The City may also take into consideration all other criteria for determining award, including evaluation factors set forth in Municipal Code Section 1.06.262.

All other elements or factors, whether or not specifically provided for in this specification, which would affect the final cost to and the benefits to be derived by the City will be considered in determining the award of the contract. The final award decision will be based on the best interests of the City.

The City reserves the right to let the contract to the lowest responsible bidder whose bid will be the most advantageous to the City, price and any other factors considered. In evaluating the proposals, the City may also consider any or all of the following:

1. Compliance with specification.
2. Proposal prices, listed separately if requested, as well as a lump sum total
3. Time of completion/delivery.
4. Warranty terms.
5. Bidder's responsibility based on, but not limited to:
    a) Ability, capacity, organization, technical qualifications and skill to perform the contract or provide the services required.
    b) References, judgment, experience, efficiency and stability.
    c) Whether the contract can be performed within the time specified.
    d) Quality of performance of previous contracts or services

12. PREVAILING WAGE INFORMATION

If this project requires prevailing wages under chapter 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 Mason County.

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

1. If the project is not awarded within six months of the submittal deadline, the award date is the effective date.
2. If the project is not awarded pursuant to a competitive solicitation, the date the contract is executed is the effective date.
3. 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.
3. For on-call contracts, retainage can be release annually. Please see the Intent-Affidavit Info for On-Call Contracts in Appendix D

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://secure.lni.wa.gov/ or by visiting their MY L&I account.

13. BID BONDS

The attached Bid Bond (Appendix C) must be executed by the person legally authorized to sign the bid and must be properly signed by representatives of the surety company unless the bid is accompanied by a certified check or cashier's check.

13.1 If a Bid Bond is used, the form furnished by the City must be followed; no variation from the language thereof will be accepted. The amount of the Bid Bond must be not less than five percent (5%) of the total amount bid; and, if shown in dollars and cents, the amount of said Bid Bond must be not less than the required five percent; or in lieu of dollars and cents, the bond may be completed by inserting therein, "five percent of the amount of the accompanying proposal". Bid Bonds will not be returned. Bid Bond should be submitted electronically with bid submittal. Hard copies should be postmarked no later than the submittal date.

13.2 If a certified or cashier's check is provided by the successful Respondent(s), the amount of their check will be refunded after award of the Contract, City's receipt of the signed Contract, and acceptance of the Performance Bond, if applicable. Unsuccessful Respondents providing certified checks will be refunded the amount of their check upon award of the Contract.

13.3 Failure to furnish a Bid deposit of a minimum of 5 percent shall make the bid nonresponsive and shall cause the bid to be rejected by the City.

A deposit of at least 5 percent of the total Bid shall accompany each Bid. This deposit may be cash, certified check, cashier's check, or a proposal bond (Surety bond). Any proposal bond shall be on the Contracting Agency's form and shall be signed by the Bidder and the Surety. A proposal bond shall not be conditioned in any way to modify the minimum 5 percent required.

The Surety shall: (1) be registered with the Washington State Insurance Commissioner, and (2) appear on the current Authorized Insurance List in the State of Washington published by the Office of the Insurance Commissioner.

The failure to furnish a Bid deposit of a minimum of 5 percent shall make the Bid nonresponsive and shall cause the Bid to be rejected by the Contracting Agency.

If submitting your bid electronically, A scanned version of the original bid bond or cashier's check shall accompany your electronic bid submittal. The original bid bond or cashier's check shall be sent to the Contracting Agency and received by the Contracting Agency within 7 calendar days of the bid opening or the bidder may be deemed non-responsive.

Original bid bonds or cashier's check will be delivered to:

City of Tacoma Procurement & Payables Division

Tacoma Public Utilities

3628 South 35th Street

Tacoma, WA 98409

If so stated in the Contract Provisions, cash will not be accepted for a bid deposit.

14. PAYMENT AND PERFORMANCE BOND

If a payment and performance bond is stated herein, the required bond including power of attorney, will be 100 percent of the Contract total and is subject to the following requirements.

14.1 The City's payment and performance bond forms must be used.

14.2 The payment and performance bonds must be executed by a surety company licensed to do business in the state of Washington.

14.3 The cost of a payment and performance bonds must be included in submittal prices. Bonds will not be paid as a separate line item.

14.4 For a supply-type contract, a certified cashier's check or cash may be substituted for the bonds; however, this cash or check must remain with the City through the guarantee period and any interest on said amount shall accrue to the City.

The same bonds can remain in place over the life of the contract and annual status inquiries can be directed to Sr. Buyer via email to abratton@cityoftacoma.org. Subject line to read:

Spec PS24-0285N– Cushman Dam Service House HVAC – VENDOR NAME

15. DELIVERY

15.1 Delivery shall be to 391 Standstill Drive, Hoodsport WA 98548.
Each vendor will be required to submit a delivery timeline they can commit to. Purchase order delivery dates will reflect this timeline. In the event a purchase order deliver date is not met, the City reserves the right to purchase these products elsewhere if they are in a time constraint. If constant late deliveries occur, the City may terminate the contract.

15.2 Hours of operation shall be Monday through Friday, 9:00 a.m. to 3:30 p.m., excluding legal holidays, as referred to in the Standard Terms and Conditions or as otherwise approved by the City.

16. WARRANTY – If Applicable

Labor: Minimum three (3) year warranty.

Parts: Manufacturer's warranty or minimum one-year warranty whichever is greater.

Contractor shall arrive on-site at the project site within 24 hours of notification for all warranty repairs during normal work hours of 8:00 a.m. to 5:00 p.m. Monday through Friday. Repairs shall include free pick-up and delivery.

Contractor agrees to allow City to make minor warranty repairs where that is most cost effective and, if requested, contractor will credit City for cost of parts, but not labor.

Vendor will warrant goods according to the manufacturer's warranty guidelines. The start of the warranty commences once the goods are delivered and accepted by the City.

17. INSPECTION – If Applicable

All goods are subject to final inspection and acceptance by the City. If any inspection fails, the vendor shall be required to make arrangements to exchange the goods at their own expense and replace it in a timely manner acceptable to the City.

Material failing to meet the requirements of this contract will be held at Vendor's risk and may be returned to Vendor. If so returned, the cost of transportation, unpacking, inspection, repackaging, reshipping, or other like expenses are the responsibility of the Vendor.

18. COMPLIANCE WITH SPECIFICATIONS

All products shall be new and unused. Any product that does not comply with any part of these technical specifications shall be rejected and the vendor shall, at its own expense, including shipping, replace the item.

19. MATERIALS AND WORKMANSHIP

The successful bidder shall be required to furnish all materials necessary to perform contractual requirements. Materials and workmanship for this contract shall conform to all codes, regulations and requirements for such specifications contained herein and the normal uses for which intended. Material shall be manufactured in accordance with the best commercial practices and standards for this type of goods. All literature and products must be packaged and labeled to sell in the United States.

20. ENVIRONMENTALLY PREFERABLE PROCUREMENT

In accordance with the City's Sustainable Procurement Policy and Climate Action Plan, it is the policy of the City of Tacoma to encourage the use of products or services that help to minimize the environmental and human health impacts of City Operations. Respondents are encouraged to incorporate environmentally preferable products or services that have a lesser or reduced effect on human health and the environment when compared with competing products or services that serve the same purpose. This comparison may consider raw materials acquisition, products, manufacturing, packaging, distribution reuse, operation, maintenance or disposal of the product or service.

The City of Tacoma encourages the use of sustainability practices and desires any awarded contractor(s) to assist in efforts to address such factors when feasible for:

- Durability, reusability, or refillable
- Pollutant releases, especially persistent bioaccumulative toxins (PBTs), low volatile organic compounds (VOCs), and air quality and stormwater impacts
- Toxicity of products used
- Greenhouse gas emissions, including transportation of products and services, and embodied carbon
- Recycled content
- Energy and water resource efficiency

21. LEAP REQUIREMENTS

This project has no LEAP requirements, however, the City of Tacoma is committed to equality in employment for WA-State approved Apprentices, City of Tacoma residents, residents of local economically distressed areas, youth, veterans, minorities, and women. Please contact the LEAP Office for assistance in locating qualified employees. Visit the LEAP website for more information.

22. EQUITY IN CONTRACTING

:

This project has no EIC requirements, however, the City of Tacoma is committed to encouraging firms certified through the Washington State Office of Minority and Women's Business Enterprise to participate in City contracting opportunities. See **TMC 1.07 Equity in Contracting Policy** at the City's Equity in Contracting Program website.

APPENDIX A - Specifications and Drawings

Specifications

Drawings

DEPARTMENT OF PUBLIC UTILITIES
CUSHMAN DAM SERVICE HOUSE HVAC
SPECIFICATION NO. PS24-0285N

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DIVISION 26 – ELECTRICAL

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 01 10 00 – SUMMARY OF WORK

PART 1 - GENERAL

1.01 RELATED WORK DESCRIBED ELSEWHERE

The provisions and intent of the Contract, including the Procurement and Contracting Requirements and General Requirements, apply to this work as if specified in this section. Work related to this section is described throughout these specifications.

1.02 PROJECT DESCRIPTION

A. This project involves the construction, installation, testing, and commissioning of a modern, high-efficiency Heating, Ventilation, and Air Conditioning (HVAC) system in the existing Cushman Dam Service House building. This project is designed to enhance indoor air quality, improve energy efficiency, and provide reliable climate control throughout the building. The construction phase will focus on executing the design plans provided by the consultant team, ensuring that the system meets performance standards and complies with local building codes.

B. This project includes installing all electrical components as outlined in the design plans provided by the consultant team, including installation of all necessary supporting electrical infrastructure required to power the new system and ensure seamless integration with the building's existing electrical framework.

C. This project includes the protection of all existing equipment and components within the building as needed to maintain normal business operations.

1.03 PROJECT LOCATION

A. Work associated with this proposal will be located at the Cushman Dam Service House located at the following address:

391 Standstill Drive
Hoodsport, WA 98548

1.04 SITE VISITS AND EXISTING INFORMATION

A. Prior to submitting their Bid Proposal the Contractor will be responsible for examining the site and compared the existing conditions with the specifications and contract drawings, and be satisfied as to the facilities and difficulties associated with the execution of the defined work before the delivery of their Bid proposal.

B. No allowance will be subsequently made by the City on behalf of the Contractor by reason of any error or neglect on the Contractors part, for such uncertainties as aforesaid.

C. Tacoma Power shall make no adjustment to the price or provide any compensation to the Contractor for impacts relating to the Contractor's failure to consider the potential impacts of not only the site conditions observed, but changes in the observed conditions that could have been foreseen by the Contractor.

D. By submitting the Bid proposal, the Contractor represents that they have inspected in detail the project site and has become familiar with all the physical and local conditions affecting the project and/or the project site.

E. Any information provided by the City to the Contractor, relating to existing conditions on, under, or to the project and/or site including, but not limited to information pertaining to hazardous material abatement and other conditions affecting the project site, represents only the opinion of the City as to the location, character, or quantity of such conditions and is provided only for the convenience of the Contractor.

F. The City assumes no responsibility whatsoever with respect to the sufficiency or accuracy of such information provided by the City and there is no guarantee, either expressed or implied, that the conditions indicated or otherwise found by the Contractor as a result of any examination or exploration are representative of those existing throughout the work and/or project site.

G. The Contractor shall draw their own conclusions from information provided by the City and make tests, review and analyses as the Contractor deems necessary to understand such conditions and to prepare their Bid proposal.

H. The Contractor shall carefully study and compare the contract documents with each other and shall immediately report to the City any errors, inconsistencies or omissions discovered. If the Contractor performs any construction activity knowing it involves a recognized error, inconsistency, or omission in the contract documents without such notice to the City, the Contractor shall assume the risk and responsibility for such performance and shall bear an appropriate amount of the attributable costs for correction.

I. The Contractor shall take field measurements and verify field conditions for each Bid Item and shall carefully compare such field measurements, conditions and other information known with the contract documents prior to procurement or materials or construction activities.

1.05 COMMENCEMENT

The Contractor will be required to complete the Bid Proposal contract documents and to provide surety and payment bonds within ten (10) calendar days after the award of the Contract. The Contractor shall start the work to be performed in the Contract no later than ten (10) calendar days after the notification to proceed date, or as agreed upon with the City. Notification to proceed may either be by issuance of the executed Contract, letter, or by agreement at the preconstruction conference.

1.06 SPECIFICATION FORMAT

A. This specification is written and formatted for use with Public Works specifications and is numbered to be consistent with other specifications, including Construction Specifications Institute (CSI) format, as modified by the City. It is not intended to indicate what work is to be accomplished by various subcontractors on the project. In all cases, the City's contract is with one (1) general contractor and it is the general contractor's responsibility to ensure all work required to provide a complete and operational facility is included in their bid.

B. When possible, the City has tried to reference work which should be included with various trades, but it is the contractor's responsibility to ensure all work is properly coordinated. The numbering system in the Special Provisions Section reflects standard provisions written by the City and assigned constant numbers. Thus, gaps will appear when specific sections are not used.

1.07 CONTRACT WORK TIMES

A. Contract work times shall be Monday through Friday, 6:30 a.m. to 6:00 p.m. The Cushman 1 Dam Service House will be used for on-going operations of the Utility for the duration of the contract.

B. Overnight and weekend work may be required for various tasks, including work deemed by the City's project manager or representative to be excessively odorous, noisy, dusty, or disruptive to the ongoing operations or staff of Tacoma Public Utilities.

C. Overnight and weekend work shall be coordinated with the City a minimum of 5 business days prior to start of work and shall be performed at no additional cost to the City or delay to the project schedule. Overnight work shall be from 5:30 p.m. to 5:30 a.m.

D. Contract workdays shall be Monday through Friday, excluding holidays, described in Section 2.13 of the General Provisions or as otherwise approved by the City.

E. If the Contractor elects to work on a Saturday, Sunday, holiday or longer than the designated contract work times, such work shall be considered overtime work.

F. For all overtime work, a City project manager or representative must be present. The Contractor shall reimburse the City for the full amount of the costs for City employees who must work any such overtime hours. It shall be the City's project manager or representative's decision as to when an inspector is required. For the purpose of estimation of reimbursement of City employee's overtime, the bidder shall budget $90.00 per hour.

G. If the City orders work to be performed on overtime, all City employees' overtime costs will be at no expense to the Contractor. The City will not require reimbursement for overtime hours worked by the City for inspection as detailed in the General Provisions if the conditions of this paragraph are met to the satisfaction of the project manager or representative.

1.08 QUALIFICATION OF CONTRACTORS

A. Only contractors or subcontractors with management, employees, and staff experienced in the type of work required by Contract, and require by these specifications, and with a record of successful completion of projects of similar scope, complexity, and overall cost will be allowed to work on this Contract.

B. The Contractor shall employ a competent superintendent who shall be present at the project site at all times during the entire progress of the work. The superintendent shall be on site even when only a subcontractor is working, unless otherwise approved by the City's project manager or representative. This requirement may be reduced or waived as agreed upon by the City in writing.

C. The superintendent shall have full authority to act on Contractor's behalf. It will be the superintendent's responsibility to have a set of plans and specifications on the project site during the progress of the work. The superintendent shall mark or record on the plans all changes made during construction. Such "as-built" plans shall be available to the project manager or representative at all times and shall be delivered to the project manager or representative with each payment request.

1.09 SPECIFICATIONS AND DRAWINGS

A. Drawings will be provided to the Contractor for the scope of the work proposed.

B. Contract documents include but are not limited to these specifications and construction drawings.

C. Contract Documents shall be onsite and maintained at all times through the course of construction. It is the Contractors responsibility for maintaining all As-Built redlines which will be submitted to the City's project manager or representative with each pay request. Payments will not be processed without complete current As-Built redline mark-ups being submitted.

D. An electronic file of "For Construction" Contract Documents will be furnished to the Contractor for this Contract. It shall be the contractor's responsibility to print and

provide sufficient sets of drawings for building purposes to construction personnel and Subcontractor.

1.10 WORK BY THE CITY

A. Work that is to be completed by the City will be shown on the construction drawings as 'NIC' (not in contract) or 'By City'. For these cases, the components referenced will be furnished and installed by City (unless specifically noted otherwise).

B. Work by City will be performed before or concurrently with the work in this Contract.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 01 14 00 – WORK RESTRICTIONS

PART 1 -GENERAL

1.01 RELATED WORK DESCRIBED ELSEWHERE

The provisions and intent of the Contract apply to this work as if specified in this section. Work-related to this section is described throughout these specifications.

1.02 SITE COORDINATION

A. Operation of Existing Facilities: The facilities or portions of facilities within the project limits must be continuously operated throughout the construction period. No interruption will be allowed, adversely affecting the service quality. If the Contractor obtains City provided permission in advance; portions of the existing facilities may be taken out of service for short periods.

B. Though the City will make every effort to limit disruptions to the work area, the City reserves the right to access the work area as needed to conduct critical operational tasks.

C. The Contractor will be responsible for coordinating with City staff as needed to ensure City-provided temporary power is installed and maintained to the building and other critical facilities components (e.g., communications equipment, security equipment) at all times throughout construction.

D. The contractor shall be responsible for coordinating and scheduling the work to be performed by the City to coincide with the contractor's work.

E. All construction activities shall be coordinated daily with the project manager or representative or their designated representative. Changes to the schedule that will impact dates shown as milestones on the schedule shall be coordinated with the project manager or representative daily.

F. The contractor shall become familiar with the ongoing operations and include all coordination required for the work. The contractor shall follow all requirements of the City and do all coordination as part of the required work.

G. The contractor shall coordinate scheduling, submittals, and all work specified herein to assure an efficient and orderly sequence of the installation of interdependent construction elements with provisions for accommodating items installed later.

1.03 USE OF PREMISES

A. City Occupancy: The project and/or its surrounding area will be occupied/used by the City for ongoing daily operations.

B. Use of Site: Limit use of premises to Work in areas indicated. Do not disturb portions of the site beyond areas in which the Work is indicated.

1. Unless otherwise indicated, keep roadways, building entryways, pathways, and sidewalks clear and available to the City and emergency vehicles at all times. Do not use these areas for parking or material storage.

    a. Schedule deliveries to minimize the use of roadways and minimize space and time requirements for storage of materials and equipment on-site.

    b. The project and/or its surrounding area will be occupied/used by the City for ongoing daily operations.

    c. Maintain barriers dividing the work area from the area in City use.

C. Contractor shall provide temporary facilities and make temporary modifications as necessary to keep the existing facilities in operation during the construction period.

D. All requests for use of areas not designated for use by the Contractor shall be made in writing to the project manager or representative for approval at least five (5) working days in advance of the need. The project manager or representative shall evaluate those areas for use prior to use and notify the Contractor in writing if the use of those areas is acceptable.

E. Work Hours:

1. Weekdays (Monday through Friday): 6:30 a.m. to 6:00 p.m.
2. Overnight (Monday through Friday): 5:30 p.m. to 5:30 a.m.
3. Weekends: see Section 01 10 00 – Summary of Work
4. Federal, State, and City Holidays: No work permitted.

1.04 NOISE CONTROL

A. Meet all requirements of RCW70A, WAC 173-58, and WAC 173-60-040. Maintain the construction noise level inside adjacent buildings from exceeding a dB(A) 60 curve (with windows closed).

B. Meet all requirements of the City of Tacoma Municipal Code.

C. Air Compressors: Equip air compressors with silencing packages. Electric-driven compressors are preferred.

1.05 STAGING AND STOCKPILE AREAS

A. Limit staging and stockpile areas to the areas as directed by the City's project manager or representative. The Contractor's use of these areas shall be limited to purposes directly related to the construction of the Contract. If additional staging and/or stockpile area may be required, notify the City in writing. No additional staging or stockpile area is permitted until the City provides written approval of the Contractor's proposal.

B. The Contractor may provide staging and storage areas off-site at the Contractor's discretion. Provide the City with locations for approval.

1.06 RESTORATION CLAUSE

A. Restore all areas disturbed by the construction process to their original or better conditions.

B. Unless otherwise designated, protect all existing site features to remain from potential Contractor damage. If unavoidable damage occurs, notify the City immediately, and the City will render a decision as to how the feature(s) will be replaced or the damage repaired at the Contractor's expense.

1.07 EQUIPMENT STANDARDS

A. All equipment furnished and/or installed under this Contract shall meet the safety requirements of all applicable Federal, State, or Local codes.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

DIVISION 01 – GENERAL REQUIREMENT

SECTION 01 20 00 – PRICE AND PAYMENT PROCEDURES

PART 1 - GENERAL

1.01 RELATED WORK DESCRIBED ELSEWHERE

A. The provisions and intent of the Contract, including the General Conditions, apply to this work as specified in this section. Work related to his section is described throughout these specifications.

B. Individual submittals are described throughout and are required in accordance with the pertinent sections of these specifications.

1.02 SCHEDULE OF VALUES

For this Contract the Contractor shall submit a schedule of values to be accepted by the City. At a minimum the schedule of values shall meet the following requirements:

A. An electronic form with the schedule of values shall be submitted and accepted by the City. Contractor's standard form or an electronic media printout will be considered. Forms filled out by hand will not be accepted.

B. Submit for City approval an electronic format of Schedule of Values, a minimum of 10 days prior to the first application for payment submittal. An approved schedule of values will be used by the City as a basis for progress payments.

C. Revise the schedule of values as required to list Change Order Proposals with each payment application.

1.03 PROGRESS PAYMENTS

A. If more than one payment is required, the pay estimates shall be submitted monthly. Pay estimates shall clearly identify the work performed for the given time period based on a percentage of work completed as outlined in the schedule of values.

B. Prior to submitting pay estimates to the City, the Contractor and Project Manager or representative shall review the work accomplished to determine the actual quantities including labor, materials and equipment charges to be billed. Following the Project Manager's review, the Contractor shall prepare and original pay estimate with complete supporting documentation attached and submit to the attention of the Contracts Adminstrator. The pay estimate may be mailed, hand delivered, or submitted electronically using a PDF file format.

Contract Administrator Tacoma Power
Power Shared Services/Facilties
3628 South 35th Street
Tacoma, Washington 98409

C. Non-payment for rejected or surplus products

Payment will not be made for any of the following:

1. Products wasted or disposed of in a manner that is not acceptable.
2. Products determined as unacceptable before or after placement.
3. Products not completely unloaded from the transporting vehicle.
4. Products placed beyond the lines and levels of the required work.
5. Products remaining on hand after completion of the work.

6. Loading, hauling, and disposing of rejected products.

1.04 MODIFICATION PROCEDURES

A. The City will advise the Contractor of minor changes in the work that will not involve an adjustment to the Contract Price, or Contract Time as authorized in the General Conditions of the Contract.

B. For changes where advanced pricing is needed, the City will issue a request for Change Order Proposal (COP) that includes a description of a proposed change, and may have supplementary or revised drawings and specifications, a change in Contract time for executing the change and the period of time during which the requested price will be considered valid. The Contractor will prepare and submit a fixed price quotation within 10 working days.

C. Contractor may propose a change by submitting in writing a request for change to the City. This request for change shall have, at a minimum, a statement describing the reason for the change and the effect on the Contract price and Contract time with documentation.

D. Computation of Contract Price: Will be as specified in the General Conditions.

1. For change order as requested by the City, the amount will be based on the Contractors's price quotation.
2. For changes requested by the Contractor, the amount will be based on the Contractor's request for change order as approved by the City.
3. For changed order by the City without quotation from the Contractor, the amount will be determined by the City based on the Contractor's substantiation of costs as specified for Time and Material work.

E. Substantiation of Costs: Provide full information required for evaluation and acceptance.

1. At a minimum the followings data shall be provided:
   a. Quantities of products, labor, and equipment
   b. Justification for any change in Contract Time.
   c. Credit for deletions from the Contract, documented similarly.
   d. Invoices and receipts for products, equipment, and subcontracts, documented similarly.

F. Execution of Change Orders: The City will issue Change Orders for signatures of parties as required per the General Conditions and Contract terms.

G. After execution of the Change Order the Contractor shall promptly revise the schedule of values and application of payment forms to record each authorized Change Order as a separate line item and adjust the Contract Price.

1.05 APPLICATION FOR FINAL PAYMENT

A. Prepared application for final payment as specified for progress payments, identifying the total adjusted Contract price, previous payments, and remaining sum due.

B. Application for final payment will not be considered until the following have been accomplished:

1. Closeout procedures specified in Section 01 70 00 – Execution and Closeout Requirements.
2. Contractor's Certification of Payment Debts Claims.
3. Contractor's Certificate of Release Liens.
4. Completion of punch list with City's approval.
5. Completion of all Change Orders.
6. Submittal of Affidavit of wages paid for Contractor and subcontractors.
7. Labor and Industry release
8. Sign-off of all required permits.

1.06 PAYMENT PRICING

A. Pricing for the various lump sum or unit prices required per the Contract, shall include all compensation to be received by the Contractor for furnishing all tools, equipment, supplies, and manufacturered articles, and for all labor, operations, and incidentals appurtenant to the items of work being described, as necessary to complete the various items of the work in accordance with the requirements of the Contract documents.

B. Pricing also includes all costs of compliance with the regulations of public agencies having jurisdiction, including safety and health requirement of the Occupational Safety and Health Administration of the U.S. Department of Labor.

C. There will be no separate payment for any item that is not specifically set forth on the schedule of values, and all costs therefore shall be included in the prices named in the schedule of values for the various appurtenant items of work.

D. All other work not specifically mentioned in the measurement and payment sections identified below shall be considered incidental to the work performed and merged into the various unit and lump sum prices, unless specifically requested by the City in the Contract. Payment for work under one item will not be paid for under another item.

E. The City reserves the right to make changes should unforeseen conditions necessitate such changes. Where work is on a unit price basis, the actual quantities occasioned by such changes shall govern the compensation.

1.07 MEASUREMENT FOR PAYMENT

A. Measurement for payment will be at the Lump Sum or Unit Price as stipulated in the Schedule of Values for the items listed below. Payment shall be considered full compensation for furnishing all labor, materials, tools, and equipment to complete the work specified.

1. MOBILIZATION/DEMOBILIZATION

a. Measurement for MOBILIZATION/DEMOBILIZATION shall be full compensation for all costs, including labor, miscellaneous equipment, and materials needed to mobilize to the project site prior to the start of work and demobilize from the project site at the completion of work. Incidental mobilization work includes setting up the project site, internal project meetings and submittals, and contract setup. Incidental demobilization work includes removing all equipment from the project site, site cleanup and restoration, and final project documentation, including but not limited to red-line drawings and O&M manuals.

b.

c. Payment for MOBILIZATION/DEMOBILIZATION will be paid out per lump sum (LS) for labor work and shall not exceed 10 percent of the base bid price. If multiple payments are required, 70 percent of the bid amount will be paid upon completion of the initial mobilization and the job site preparation. The remaining 30 percent will be paid upon completion of the site restoration and clean-up.

2. HVAC SYSTEM INSTALLATION

   a. Measurement for HVAC SYSTEM INSTALLATION shall be full compensation for all costs including labor, miscellaneous equipment, materials, and tools for labor hours associated with the delivery, installation, testing, and commissioning of HVAC and associated components as required to complete the work outlined in the attached drawings and specifications. Incidental to this bid item includes, but is not limited to, salvage or demolition and legal disposal of existing HVAC equipment as outlined in the attached drawings and specifications.

   b. Payment for the HVAC SYSTEM INSTALLATION will be made in a lump sum (LS) and shall include all costs associated with the supply, installation, testing, commissioning, associated components, and incidental costs as required to complete the work outlined in the attached drawings and specifications.

3. ELECTRICAL SYSTEM INSTALLATION

   a. Measurement for ELECTRICAL SYSTEM INSTALLATION shall be full compensation for all costs including labor, miscellaneous equipment, materials, and tools for labor hours associated with the delivery, installation, testing, and commissioning of the HVAC electrical system needed to operate the new HVAC system as outlined in the attached drawings and specifications. Incidental to this bid item shall include demolition and legal disposal of existing electrical components as outlined in the attached drawings and specifications.

   b. Payment for ELECTRICAL SYSTEM INSTALLATION will be made in a lump sum (LS) and shall include all costs associated with the supply, installation, testing, and associated incidental costs. Incidental to this bid item includes, but is not limited to, demolition and legal disposal of existing HVAC electrical components as outlined in the attached drawings and specifications.

4. FORCE ACCOUNT, PER LUMP SUM

   a. Payment for FORCE ACCOUNT, PER LUMP SUM, shall be made for change order items added to the contract, which shall be treated as a deduction from the remaining force account.

   b. LABOR AND MATERIALS AT COST PLUS will be paid in accordance with Section 1-09.6 of the latest edition of the Standard Specifications for Road, Bridge and Municipal Construction of the Washington State Department of Transportation as modified by Force Account Work in the Special Provisions or on negotiated lump sum or unit price change orders added to the contract.

DIVISION 01 – GENERAL REQUIREMENT

SECTION 01 20 00 – PRICE AND PAYMENT PROCEDURES

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 01 25 00 – SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.01 RELATED WORK DESCRIBED ELSEWHERE

The provisions and intent of the Contract, Including the Procurement and Contracting Requirements and General Requirements, apply to this work as if specified in this section. Work related to this section is described throughout these specifications.

1.02 QUALITY ASSURANCE

A. This Contract is based upon products and standards established in Contract Documents without consideration of proposed substitutions.

B. Products specified define standards of quality, type, function, dimension, appearance, and performance required.

C. The City will consider proposals for substitutions of materials, equipment, and methods only when such proposals are accompanied by full and complete technical data as required by the City to evaluate the proposed substitution.

D. Do not substitute materials, equipment, or methods unless such substitution has be specifically accepted and approved in writing for this work by the City.

1.03 TIME OF SUBSTITUTION REQUESTS

A. Make requests for substitutions during the bidding period. Written requests by bidders for substitutions may be considered if received by the City at least 14 days prior to the bid submittal deadline. The City may, in its sole discretion, defer the consideration of a proposed substitution until after the Contract award.

B. Request each substitution in accordance with the applicable provisions of Section 01 33 00 – Submittal Procedures. Describe the proposed substitution in its entirety including the name of the material or equipment, drawings, catalog cuts, performance or test data and all other information required for evaluation. Include a statement noting all changes required in adjoining, dependent, or interrelated work necessitated by the incorporation of the proposed substitution. The bidder/Contractor bears the burden of proof to show that the proposed substitution meets or exceeds the required function and is equal or superior to the specification.

C. Th City may require that samples be submitted or demonstration made prior to approval. The City's decision of approval or disapproval of a proposed substitution shall be final.

D. Approval of substitutions will be made by addenda. When, in the sole opinion of the City, the product is equivalent, in all respects to the product specified it will be approved subject to Contract requirements and the Contractor's assumption of all responsibility therefore.

E. After written approval, this submission shall become a part of the Contract, and may not be deviated from except upon written approval of the City.

F. Catalog data for equipment approved by the City does not in any case supersede the Contract Documents. The approval by the City shall not relieve the Contractor from responsibility for deviations from drawings or these specifications, unless the Contractor has, in writing call the City's attention to such deviations at the time of the submission, nor shall it relieve the Contractor from responsibility for errors of any sort in the items submitted. The Contractor shall check the work described by the catalog data with the Contract Documents for deviations and errors.

G. It shall be the responsibility of the Contractor to insure that items to be furnished fit the space available. Make necessary field measurements to ascertain space requirements, including those for connections and shall order such sizes and shapes of equipment that the final installation shall suit the true intent and meaning of the drawings and specifications.

H. When equipment requiring different arrangement of connections for those shown as approved is used, it shall be the responsibility of the Contractor to install the equipment to operate properly, and in harmony with the intent on the drawings and these specifications, and to make all changes in the work required by the different arrangement of connections together with any cost of redesign necessitated thereby, all at the Contractor's expense.

I. Where the phrase "or equivalent" or "or equal" occurs in the Contract Documents, do not assume that material, equipment, or methods will be approved as equal by the City unless the item has specifically been approved as a substitution for this Work by the City.

J. The decision of the City shall be final.

1.04 SUBSTITUTION PROCEDURES

A. Limit each request to one proposed substitution.

B. Submit substitution request on a required form complete with attachments necessary to full document proposed substitution.

C. Document each request with supporting data substantiating compliance of the proposed substitution with Contract Documents, including:

1. Manufacturer's name and address, product, trade name, model, or catalog number, performance and test data, and reference standards.
2. Itemized point-by-point comparison of proposed substitution with specified product, listing variations in quality, performance, and other pertinent characteristics.
3. Reference to article and paragraph numbers in the Specifications section.
4. Cost data comparing proposed substitution with specified product and amount of net change to Contract Sum.
5. Changes required in other Work.
6. Availability of maintenance service and source of replacement parts, as applicable.
7. Certified test data to show compliance with performance characteristics specified.
8. Samples, when applicable or requested, at no cost to the City.
9. Other information as necessary to assist the City's evaluations.

D. A request for substitution constitutes a representation that the Contractor has:

1. Investigated proposed product and determined that it is equal or superior in all respects to specified product.
2. Provided identical or better warranty as required for the specified product.
3. Coordinated installation and make changes to other Work that may be required.
4. Waived claims for additional costs or time extension, which may subsequently become apparent.

5. Certified that the proposed product will not affect or delay the Construction Progress Schedule.
6. Paid or agreed to pay for changes to design, including architectural or engineering design, detailing, and construction costs caused by the requested substitution.

E. Substitutions will not be considered when:

1. Indicated or implied on shop drawings or product data submittals without formal request submitted in accordance with this section.
2. Submittal for substitution request has not been reviewed and approved by the Contractor.
3. Acceptance will require substantial revision of Contract Documents or other items of the work as determined by the City.
4. Submittal for substitution request does not include point-by-point comparison of proposed substitution with the specified product.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 01 30 00 – ADMINSTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED WORK DESCRIBED ELSEWHERE

The provisions and intent of the Contract, including the Procurement and Contracting Requirements and General Requirements, apply to this work as specified in this section. Work related to this section is described throughout these specifications.

1.02 SUBMITTALS

A. Personnel list: For principal staff assignments, include areas of responsibility, addresses, and phone numbers. Include back-up personnel.

B. Coordination drawings.

C. Daily Reports: Submit at weekly intervals.

1.03 PRECONSTRUCTION MEETING

A. Notification:

Following the notification to proceed, the City will notify the Contractor of a time, date, and location for a Preconstruction meeting.

B. Location:

Pre-construction meeting will either be at the main Tacoma Public Utilities Administration Building, or virtual at the discretion of the City. For bidding purposes, assume that the preconstruction meeting will be at the following location:

Tacoma Public Utilities Administration Building
3628 South 35th Street
Tacoma, WA 98409

C. Attendance:

The following may be requested to attend the preconstruction meeting:

1. City Representatives:
    a. Project Manager
    b. Key internal staff stakeholders
    c. Consultants
2. Contractor's Representatives:
    a. Project Manager (Superintendent)
    b. Contract Administrator
    c. Major Subcontractors

D. Agenda:

1. Distribution of Contract Documents
2. Designation of project personnel
3. Procedures and processing of field decisions, submittals, substitutions, applications for payment, proposal request(s), change orders, record drawings, and contract closeout.
4. Scheduling
5. Work hours
6. Responsibility for temporary facilities and controls
7. Construction quality control procedures

8. Safety
9. Security
10. Site access, traffic control, parking availability

E. Meeting Minutes: Minutes of the pre-construction meeting will be sent to the contractor and all meeting attendees. Recipients of the pre-construction meeting minutes will be required to direct any comments or changes to these minutes to the project manager or representative within seven (7) days from the date of receipt. If no changes or comments are received within the seven (7) days, the meeting minutes will be kept by the project manager or representative and become part of the project file

1.04 BI-WEEKLY VIRTUAL COORDINATION MEETINGS

A. The city project manager or representative will schedule bi-weekly virtual coordination meetings via Zoom or Microsoft Teams.

B. Attendance:

1. City Representatives:

   a. Project Manager
   b. Key internal staff stakeholders
   c. Consultants

2. Contractor's Representatives:

   a. Project Manager (Superintendent)
   b. Major Subcontractors

C. Weekly Meeting Agenda:

1. Safety Report
2. Review minutes of previous meeting minutes
3. Review of Work Progress
4. Schedule review
5. Coordinate issues, field observations, problems, and decisions.
6. Identification of problems that impede, will impede, or present the potential for impeding planned progress. Identify corrective measures to regain projected schedule.
7. Review non-conforming work and the status of correction.
8. Review of submittals schedule and status of submittals.
9. Review delivery schedules.
10. Review Request for Information status
11. Review Contract Modification status, including any effect on coordination and progress schedule.
12. Maintenance of quality and work standards.
13. Other business related to the Work.

D. Minutes of the weekly site meeting will be sent to the contractor and all meeting attendees. Recipients of the weekly site meeting minutes will be required to direct any comments or changes to these minutes to the project manager or representative within three (3) days from the date of receipt. If no changes or comments are received within the three (3) days, the meeting minutes will be kept by the project manager or representative and become part of the project file.

1.05 BASELINE PROJECT SCHEDULE

A baseline project schedule shall be prepared by the Contractor and submitted at the pre-construction meeting. This schedule shall be maintained and updated as necessary to accurately reflect past progress and the most probable future progress.

1.06 PERMITS

A. The City will make application to the applicable authorities for any required building permits and shall pay for them ahead of pick-up by the contractor or pay at direct cost via Force Account with no contractor mark-up.

B. Electrical permits required by Washington State Labor and Industries (L&I), will be applied for by the Contractor and paid via Force Account with no contractor mark-up. Questions concerning this process shall be directed to the project manager or representative.

1.07 DIVISION OF WORK

A. Materials furnished and installed by the Contractor:

1. The Contractor shall furnish and pay for all necessary materials (except those specifically noted City-furnished) and shall provide all labor, tools, equipment and superintendent, and perform all work incidental to the completion of the project as required by this Contract in accordance with the Contract Documents, and instructions of the City's project manager or representative.

2. Requests for substitutions or alternative materials shall be in accordance with specification Section 01 25 00 – Substitution Procedure.

B. City furnished Materials installed by the Contractor:

1. The City may provide materials as directed by the City's project manager or representative.

2. All material received by the Contractor from the City shall become the Contractor's responsibility and the Contractor shall be liable for any materials lost or damaged after receipt.

3. It shall be the responsibility of the Contractor to provide 48-hour notice prior to obtaining the City-furnished material from the Tacoma Power Warehouse, 3628 South 35th Street (rear), Tacoma, Washington, between the hours of 10:00 a.m. and 3:00 p.m. on regular City working days with the Contractor's own forces and equipment. All materials received by the Contractor shall become their responsibility, and they shall be liable for any material lost or damaged after receipt.

C. The Contractor shall give the City's project manager or representative a minimum of four (4) working days notice prior to requiring any work performed by the City.

D. Items noted Not In Contract (NIC) on the drawings will be furnished and installed by the City before or concurrently with the work of this Contract, and are not included as part of this Contract.

E. The Contractor shall be responsible for coordinating and scheduling the work to be performed by the City so that it coincides with the Contractor's work and schedule.

1.08 HAZARDOUS MATERIALS

A. The City has tested areas throughout each facility for hazardous materials. Some of these areas may be disturbed during construction and include hazardous materials. Work areas tested and found to be positive for asbestos or lead have been abated before the start of construction. If, during the project, the City or Contractor identifies additional areas that require testing, those tests and any resulting abatement will be the responsibility of the City.

1.09 CONTRACT CHANGES

A. The City has developed four (4) forms to facilitate and track communications with the contractor.

1. Request for Information (RFI);
2. Project manager or representative Change Directive (ECD);
3. Proposal Request (PR);
4. Change Order Proposal (COP).

The City's project manager or representative will provide these forms to the contractor during the pre-construction meeting.

B. A Request for Information (RFI) shall be used by the Contractor whenever a conflict occurs in the Contract Documents, insufficient or un-constructible detail(s) are shown on the drawings, or any other issue which should be documented arises. The City may also use the form to inquire about the Contractor's methods, schedule, or other issues not warranting more formal letter correspondence. The Contractor shall maintain the numbering system, and RFI's issued by the City will be unnumbered until delivered to the Contractor.

C. Project manager or representative Change Directive (ECD) will be used by the City to transmit new or revised drawings, issue additions or modifications to the Contract or furnish any other direction which should be documented. ECD's are effective immediately.

1. Should the Contractor believe that the ECD should result in either a change in cost or time for the project, they shall notify the City's project manager or representative and submit a Change Order Proposal prior to the start of such work.
2. A Change Order Proposal shall be submitted no later than seven (7) working days from receipt of ECD.
3. In the event the City does not receive a Change Order Proposal from the contractor within seven (7) calendar days of the Contractor's receipt of an ECD from the City, the Contractor shall have no claim for extra cost or time or impacts attributable to the work required by the ECD.
4. Upon establishing a cost agreeable by both the City and Contractor for the requested changes required by the ECD and COP, it is agreed and understood that the price reflected by the COP shall include all direct costs, indirect costs, and the Contractor's estimate of impacts to its work, including but not limited to delay impacts and shall represent a full and final settlement of all issues pertaining to the Work required by the ECD, and work performed by the Contractor up to the date of the Change Order Proposal.
5. ECDs will be numbered by the City

D. Proposal Request (PR) shall be used by the City to request pricing on a possible change in plans or additional work.

1. The PR may also be used to request credits for deletion or changes in scope of work.
2. The Contractor shall respond to such requests with a Change Order Proposal within seven (7) working days from receipt of PR unless more time has been agreed to.
3. Proposal Requests are numbered by the City.

E. A Change Order Proposal (COP) shall be used by the Contractor to respond to City-issued PR, ECD, or when the Contractor believes that changed conditions or omitted, but necessary, work items exist.

1. The COP may be used for requested changes in cost or time of the contract.
2. Whenever possible, the contractor shall submit in advance and in writing, a COP for changes in the scope of work and/or Contract amount.
3. Each COP submitted to the City will be either accepted or rejected in writing by the City's project manager or representative prior to work commencing.
4. When no agreement can be reached, the City may order extra work on force account.
5. COPs shall be numbered by the Contractor, and, in the case of revision or resubmission of the same basic COP, the number shall be hyphenated with the letter "B", "C", etc.

1.10 DIFFERING SITE CONDITION

A. Differing site conditions shall be administered in accordance with Section 1-04.7, and 1.09.11 of the Washington State Department of Transportation (WSDOT) Standard Specifications for Road, Bridge and Municipal Construction M41-10,2024, except as stipulated in these Special and General Provisions.

B. The Contractor shall have no claim for additional costs or work, if it fails to submit a written RFI to the City immediately upon encountering any differing site condition, conflicts in the plans, specifications, or constructability issues.

C. The Contractor shall promptly, and before conditions are disturbed, notify the City's project manager or representative or their field representative of problems with subsurface conditions at the site, problems or conflicts in the plans or specifications, or problems with constructability.

D. A written Request for Information (RFI) shall immediately be submitted by the Contractor when they believe such problems exist and direction is required from the City.

E. The City's project manager or representative shall promptly investigate the conditions, and if agreed upon with the Contractor, adjustments shall be made on the appropriate details in written response to the RFI. In addition to the written response to the RFI, the City's project manager or representative may issue an ECD or PR.

F. No claim by the contractor under this differing site condition shall be allowed except as agreed upon in writing with the project manager or representative.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 01 32 00 – CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.01 RELATED WORK DESCRIBED ELSEWHERE

The provisions and intent of the Contract, Including the Procurement and Contracting Requirements and General Requirements, apply to this work as if specified in this section. Work related to this section is described throughout these specifications.

1.02 CONSTRUCTION SCHEDULE

A. The Contractor shall prepare a construction schedule showing specific tasks, dates, and critical path necessary for completion of the project within the Contract time limits. A preliminary schedule will be submitted at the pre-construction meeting or at a minimum of ten (10) working days after the Contract Award. After review, if changes are required by the project manager or representative, resubmit required revised project schedule within five (5) working days. Upon acceptance by the City the schedule shall become the Project Construction Schedule.

B. Prior to each weekly project meeting this Project Construction Schedule shall be reviewed and updated. All changes to the Project Construction Schedule of more than 3 working days shall be documented on the updated progress schedule and be submitted to the City in writing or electronic format (e-mailed). The Project Construction Schedule, as accepted by the City will be an integral part of the Contract and will establish interim completion dates for the various activities under the Contract.

C. The Construction Project Schedule shall include sufficient time for cleaning, punch list review and completion of punch list items prior to the designated substantial Completion date.

D. The Construction Project Schedule shall be used to justify time extension days requested by the Contractor. For additional days requested, the Construction Project Schedule shall be detailed enough to identify the work item(s) affected and relationship to the changed or added work.

E. Should any activity not be completed by the stated schedule date, the City will have the right to require the Contractor to expedite completion of the activity by whatever means appropriate and necessary, without any additional compensation to the Contractor.

1.03 ON-SITE DOCUMENTS

A. The Contractor shall maintain at the Project Site, in good order for ready reference by the City, one complete record copy of the Contract Documents, including the Addenda, Change Orders, working drawings, Progress Schedule, and other approved submittals. The Contractor shall generate and keep onsite all documents and reports required by the permit conditions.

B. Contract record drawings shall be marked to record all changes made during construction. The Contract's record drawings shall be updated on a weekly basis and before elements of the Work are covered or hidden from view. After the completion of the work or portions of the work and before requesting final inspection, the record copy of the Drawings shall be given to the City. The City reserves the right to withhold progress payments until such time as the record drawings are brought current.

1.04 DOCUMENTATION OF BI-WEEKLY QUANTITIES

The Contractor shall meet with the City's project manager or representative bi-weekly to agree upon the quantities of materials or work completed during the week's work. Both parties shall initial the Project Weekly Quantities Report that shows an agreement (or lack of agreement) over the amount of work performed in that two-week period.

PART 2 - PRODUCTS

2.01 NOT USED

PART 3 - EXECUTION

3.01 NOT USED

END OF SECTION

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 01 33 00 – SUBMITTAL PROCEDURE

PART 1 - GENERAL

1.01 RELATED WORK DESCRIBED ELSEWHERE

A. The provisions and intent of the Contract, including the Procurement and Contracting Requirements and General Requirements, apply to this work as specified in this section. Work related to this section is described throughout these specifications.

B. Individual submittals are required in accordance with the pertinent sections of these specifications. Other submittals may be required during the project and are considered part of the normal work to be completed under this Contract.

1.02 SUBMITTAL LOG

A. The Contractor shall prepare and submit to the City project manager or representative, within ten (10) days after the Contract notice to proceed, a Submittal Log listing all submittals required by the Contract documents and the schedule showing estimated submission dates, review, and approval.

B. The Submittal Log shall be organized using the Construction Specifications Institute's (CSI) MasterFormat® list of specification division numbers, section numbers, and titles. Include the submittal number, item description or identification, submission, and review schedule.

1.03 COMPLIANCE

A. Submittals and shop drawings submitted to the City as specified herein are intended to show compliance with the contract documents. Signatures, corrections, or comments made on submittals do not relieve the contractor from compliance with requirements of the drawings and specifications.

B. Neither does acceptance or approval of submittals by signature add to or delete from any contract requirements resulting from these specifications, regardless of the wording of the submittals. Submittals will not be reviewed or approved when the term "By Others" is used. Submittals are reviewed or approved for general conformance with the design concept of the project and general compliance with the information given in the contract documents. The contractor is responsible for confirming and correlating all quantities and dimensions, selecting fabrication processes and construction techniques, coordinating their work with other contractors and agencies, and performing their work safely and satisfactorily. A piecemeal of submittals shall not be accepted.

C. Failure to indicate compliance with material or product specifications, or submission of incomplete submittals, shall be deemed as the Contractor's concurrence to furnish the exact materials specified by the contract documents, or when directed the materials and products specified by the Engineer.

PART 2 - PRODUCTS

2.01 SHOP DRAWINGS

A. Provide shop drawings to the City for approval. The City will not accept shop drawings that prohibit the City from making copies for its own use.

B. Develop and provide detailed drawings in a manner identical to the requirements for shop drawings.

C. Prepare shop drawings accurately and to a scale sufficiently large to indicate all pertinent features of the products and the method of fabrication, connection, erection, or assembly with respect to the work.

D. All shop drawings shall be submitted to the City for approval, and shall be drawn on full-size (ANSI D) or half-scale sets on 11-inch by 17-inch, bond paper only. Electronic versions of the drawings shall be submitted in PDF format, and formatted to print on half-scale 11-inch by 17-inch paper.

E. Unless approved otherwise by the City, submit the following

1. Submit electronically in legible portable document format (PDF). Provide first-generation PDFs instead of scanned images. If requested by the city, provide up to six (6) paper copies in addition to the electronic copies.

2.02 MANUFACTURERS' LITERATURE

A. Submit the manufacturer's original electronic issues of the literature in PDF format for approval. If requested by the City, submit up to two (2) paper copies of the manufacturer's literature.

B. For catalog cuts or brochures, show the type, size, ratings, style, color, manufacturer, and catalog number of each item and be complete enough to provide for positive and rapid identification in the field. Submit catalog data in an orderly bound form, so not submit general catalogs or partial lists.

2.03 CERTIFICATES AND TEST REPORTS

A. Certificates: Submit to the City written statements certifying compliance with the requirements contained on the drawings or within these specifications. Submit product, installer, manufacturer, and material certificates on manufacture's letterhead.

B. Test Reports: Submit to the City reports written by qualified testing agency, indicating and interpreting test results of materials or products for compliance requirements.

2.04 ERRORS AND SUBSTITUTIONS

A. Refer to Section 01 25 00 – Substitution Procedures.

B. Review and verify all information contained in submittals prior to submission for acceptance. Review submittals for errors or deviations from the Contract Documents, including the information received from subcontractors and suppliers, and obtained from websites or catalog data.

C. Unless the Contractor has in writing calling the City's attention to, and highlighted, contractual deviations for consideration, the Contractor shall not be relieved of the responsibility for supplying the materials, products, equipment, etc., as specified by the Contract Documents.

D. Erroneous or other catalog data for alternate products, equipment, or materials, not highlighted for substitution consideration, but inadvertently accepted by the City, will not supersede the requirements of the Contract Documents.

E. Submittal acceptance or approval by the City shall not relieve the Contractor from responsibility for complying with the requirements of the drawings and these specifications.

PART 3 - EXECUTION

3.01 SUBMITTAL PROCEDURES

A. General: Submit all shop drawings, catalog cuts, brochures, samples, certificates, test results, etc., as required under the individual sections within these specifications. Submittals not requested will not be recognized or processed.

B. Preparation: Prepare a separate submittal form for each product or procedure. Identify each submittal by referencing the specification section and paragraph number. Number each submittal consecutively.

C. Transmittal Form: Accompany each submittal with a transmittal letter. The City project manager or representative will supply the transmittal form.

D. Submittals may be submitted electronically as PDFs as stipulated by the City project manager or representative.

E. The City intends to complete the review of a submittal within seven (7) working days of receipt. When incomplete, revise and resubmit, or rejected submittals are returned, make appropriate revisions, and re-submit.

F. Contract time shall not be extended because the Contractor experienced delays due to submittals marked revise and resubmit or rejected.

G. Date, sign and certify each submittal as being correct and in conformance with the Contract Documents. The City's review of submittals shall not relieve the Contractor of the entire responsibility for correctness of details and dimensions. The Contractor shall assume all responsibility and risk for any errors in submittals.

H. Whenever materials or equipment are described by using the name of a proprietary item or the name of a particular supplier, the naming of the item establishes the type, function, and quality required. If the name is followed by the words "or equivalent" or "or equal," indicating that a substitution is permitted, the Owner may accept materials or equipment of other suppliers. Submit sufficient information to allow the Owner to determine that the material or equipment proposed is equivalent to that named, subject to the following requirements:

1. The burden of proof as to the type, function, and quality of any such substitute material or equipment shall be upon the Contractor.
2. The City will be the sole judge as to the type, function, and quality of any such substitute material or equipment, and the City's decision shall be final.
3. The City may require additional data about the proposed substitution, which the Contractor will furnish at its expense.
4. The City's acceptance of a substitute item does not relieve the Contractor of the responsibility for full compliance with the Contract Documents and adequacy of the substitute item.

I. No substitute materials or equipment shall be installed until written approval has been obtained from the City authorizing the material as an "approved equivalent" or "approved equal".

J. All equipment, materials, and articles incorporated into the permanent Work:

1. Shall be new unless otherwise stated in the drawings or in these specifications.
2. Shall meet the requirements of the Contract Documents and be approved by the City.
3. May be inspected or tested at any time during their preparation or use.
4. Shall not be used in the Work if they become unfit after being previously applied.

3.02 COORDINATION

A. Submit shop drawings and manufacturer's literature in related packages. Submit equipment or material details that are interdependent or related in any way in order to indicate the complete installation. Do not alter submittals once approved for Construction. Submit revisions for approval by the City, with revisions clearly marked and dated.

B. The Contractor shall thoroughly review all shop and detail drawings before submittal to ensure coordination with other parts of the work. Failure to do this will be the cause for rejection. Submittals shall bear the Contractor's approval stamp and initials.

C. Components or materials that require shop drawings and arrive at the job site prior to the approval of shop drawings shall be considered not being made for this project and shall be subject to rejection and removal from the premises.

END OF SECTION

Submittal No.: ☐ *(Contractor Assigns)*

Date: _____

Project Title: _____

Specification No.: _____ Contract No.: _____

Contractor:

Owner:
Tacoma Power/ Power Shared Services
3628 South 35th Street
Tacoma, WA 98409

Subject: _____

☐ Architectural ☐ Civil ☐ Structural ☐ Mechanical ☐ Electrical ☐ Other

Sending the Following Item(s):

☐ Submittals ☐ Product/Data ☐ Samples ☐ Plans ☐ Shop Drawings ☐ Copies
☐ Specifications ☐ Contract ☐ Other: _____

Copies	Section	Description of Product/Data	Manufacturer

Transmitted as:

☐ For Approval ☐ For Your Use ☐ Per Your Request ☐ For Review and Comment
☐ Other: _____

Remarks:

For Use by Architect/Project manager or representative:

☐ No Exception Taken ☐ Make Corrections Noted ☐ Revise and Resubmit ☐ Rejected (See Response)

Corrections or comments made on the shop drawings during this review do not relieve Contractor from compliance with the requirements of the drawings and specifications. This check is only for review of general conformance with the design concept of the project and general compliance with the information given in the contract documents. The contractor is responsible for confirming and correlating all quantities and dimensions, selecting fabrication processes and techniques of construction, coordinating his work with that of all other contractors and agencies performing his work in a safe and satisfactory manner.

Response Date: _____ Response By: _____
(Date) *(Name*

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 01 35 29 – HEALTH, SAFETY, AND EMERGENCY RESPONSE PROCEDURES

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. The work includes the requirements for health and safety provisions necessary for all work at the site for this project. The work also includes compliance with all laws, regulations and ordinances with respect to safety, noise, dust, fire and police action, civil disobedience, security or traffic.

B. The Contractor shall monitor waste materials for indications of materials containing or potentially containing hazardous materials (suspicious materials). If suspicious materials are encountered, the Contractor shall stop all work in that area and notify the City immediately.

1.02 SUBMITTALS

A. Submit to the City prior to the Pre-Construction meeting a Work Hazard Analysis Report as described in Paragraph 3.06(B) of the General Provisions.

B. Prior to the start of any work, prepare and submit a site-specific Chemical Release Prevention Plan (CRPP). The CRPP may be submitted with the Health and Safety Plan (HASP) described below, as one comprehensive document, or as a separate documents. If applicable and acceptable by the City's project manager or representative these may be provided at the onset of the Contract. Each revision to either the CRPP or HASP shall be submitted to the City with a revision number and date of revision.

C. Prior to the start of any work, prepare and submit a site-specific Health and Safety Plan, which meets all the requirements of local, state and federal laws, rules and regulations and the pertinent regulations listed in these specifications. The HASP shall address all requirements for general health and safety and shall include, but not be limited to, the following:

1. Description of work to be performed and anticipated chemical and/or physical hazards associated with the work.
2. Provide a copy of all equipment and staff certifications required until Federal, State, and Reginal Air Authority for managing Ozone Depleting Substances (ODS) and regulated refrigerants.
3. Provide a copy of all equipment and staff procedures for managing, handling, storage, transfer, and release response ODS and regulated refrigerants. The contractor still be required to notify the City the same calendar day if a release occurs. This notice shall include; the date, time, and location of the release, the type and volume of ODS/Refrigerant released, all notifications that have already been conducted, and corrective actions taken or planned.
4. Signage appropriate to warn site personnel and visitors of anticipated site hazards.
5. Engineering controls/equipment to be used to protect against anticipated hazards.
6. Personal protective equipment and clothing, including head, foot, skin, eye, and respiratory protection.
7. Procedures which will be used for:
    a. Asbestos and lead hazards;
    b. Suspicious materials;

c. Physical Hazards

8. Exposure monitoring to be used to evaluate actual hazards compared with anticipated conditions when applicable.
9. Site housekeeping procedures and personal hygiene practices.
10. Administrative controls.
11. Emergency plan including locations of and route to nearest hospital.
12. Name and qualification of person preparing the health and safety plan and person designated to implement and enforce the plan.
13. Signatory page for site personnel to acknowledge receipt, understanding, and agreement to comply with the plan.

1.03 POTENTIAL CHEMICAL HAZARDS

A. On-site Hazardous Materials

1. The Contractor must provide site workers with Hazard Communication standard information for known hazardous materials on-site (in accordance with WAC 296-62-010). The Contractor shall ensure that all site workers are aware of and understand this information.
2. Additional information shall also be provided by the Contractor, as necessary, to meet the Hazard Communication Standard and Health and Safety Plan requirements as noted in WAC 296-62. Workers shall be instructed on basic methods or techniques to assist in detecting suspicious material.

B. Potential Exposures Route

1. Inhalation: Airborne dust may be created during site activities. Inhalation of vapors or gases may occur if volatile contaminants or hydrogen sulfides are present.
2. Skin and Eye Contact: Dusts generated during site work activities may settle on the skin or clothing of site workers. Also, workers may contact sediments or water containing hazardous materials, in the normal course of their work. Precautions to prevent skin or eye contact with hazardous materials will be included in the Health and Safety Plan.
3. Ingestion: Inadvertent transfer of site hazardous materials from hands or other objects to the mouth could occur if site workers eat, drink, smoke, chew tobacco, or engage in similar activities in areas where such materials exist. This could result in ingestion of site contaminants. Precautions to prevent accidental or inadvertent ingestion of hazardous materials will be included in the Health and Safety Plan.

C. Chemical hazards may also result from Contractor operations resulting in inadvertent release of chemicals in a manner that would expose workers.

1.04 POTENTIAL PHYSICAL AND OTHER HAZARDS

The Work of the Contractor is described elsewhere in these specifications. Precautions to prevent all anticipated physical and other hazards, including heavy equipment, shall be addressed in the Health and Safety Plan.

PART 2 - PRODUCTS

2.01 PRODUCTS SPECIFIED FOR HEALTH AND SAFETY

Provide the equipment and supplies necessary to support the work as described in the site-specific HASP. Equipment and supplies may include but are not limited to the following.

A. Chemicals to be used onsite including dust suppressants/wetting agents, cleaning degreasing, and/or welding/cutting supplies.

B. Hazardous materials inventory and SDS's for the chemicals brought onto the site.

C. Enclosure equipment (for dust asbestos fiber control)

D. Fencing and barriers

E. Warning signs and labels

F. Fire extinguishers

G. Personal protective equipment (hard hats, foot gear, skin, eye, and respiratory protection)

H. Area and personnel exposure monitoring equipment when applicable.

I. Demolition equipment and supplies

J. First aid equipment

K. Release prevention equipment

L. Field documentation logs/supplies

PART 3 - EXECUTION

3.01 WORK AREA PREPARATION

A. Comply with health and safety rules, regulations, ordinances promulgated by the local, state, and federal government, the various construction permits, and other sections of the Contract Documents. Such compliance includes, but not specifically limited to: any and all protective devices, equipment and clothing; guards; restraints; locks; latches; switches; and other safety provisions that may be required or necessitated by state and federal safety regulations. Determine the specific requirements for safety provisions and shall cause inspections and reports by the appropriate safety authorities to be conducted to ensure compliance with the intent of the regulations.

B. Inform employees and subcontractors and their employees of the potential danger in working with any contaminated materials or equipment at the project site.

C. Perform whatever work is necessary for safety and be solely and completely responsible for conditions of the job site, including safety of all persons (including employees of the City, Contractor, and other contractors) and property during the Contract period. This requirement applies continuously and is not limited to normal working hours.

D. The City's review of the Contractor's performance does not include an opinion regarding the adequacy of, or approval of, the Contractor's safety supervisor, the site specific HASP, safety program or any safety measures taken in, on, or near the construction site.

E. Report accidents causing death, injuries, or damage immediately to the City in person or by telephone or messenger. In addition, promptly report in writing to the City all accidents whatsoever arising out of, or in connection with, the performance of the work whether on, or adjacent to, the site, giving full details and statements of witnesses.

F. If a claim is made by anyone against the Contractor or any subcontractor on account of any accident, report the facts in writing within 24 hours after occurrence to the City, giving full details of the claim.

3.02 SITE MAINTENANCE

A. Keep the work site, staging areas, and facilities clean and free from rubbish and debris. Remove materials and equipment from the site when they are no longer necessary. Upon completion of the work, and before final acceptance of the work, clear the site of equipment, unused materials and rubbish to present a clean and neat appearance in conformance with the present condition of the site.

1. Cleanup

   a. Do not permit waste material of any kind to remain on the site of the work. Immediately upon such materials becoming unfit for use in the work, collect, carry off the site and dispose of.
   b. Keep all facilities clear of refuse, rubbish and debris that may accumulate from any source and keep facilities in a neat condition to the satisfaction of the City.
   c. In the event that waste material, refuse, debris and/or rubbish are not so removed from the work site, the City reserves the right to have the waste material, refuse, debris and/or rubbish removed and the expense of the removal and disposal charged to the Contractor.
   d. Handle hazardous substances and other construction materials with care. Dispose of excess materials off site in accordance with applicable local, state and federal regulations.

END OF SECTION

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 01 60 00 – PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED WORK DESCRIBED ELSEWHERE

The provisions and intent of the Contract, including the Procurement and Contracting Requirements and General Requirements, apply to this work as specified in this section. Work-related to this section is described throughout these specifications.

1.02 SUBMITTALS

A. Product Data Submittals: Prepare and submit manufacturer-standard published data. Mark each copy to identify the applicable products, models, options, and other pertinent data. Supplement the manufacturer's standard published data and provide pertinent project-specific information where applicable.

B. Shop Drawing Submittals: Prepare and submit detailed and legible project-specific shop drawings.

1.03 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by the Contract Documents, or the City project manager or representative.

B. Product Options

C. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or descriptions.

PART 2 - EXECUTION

2.01 TRANSPORTATION AND HANDLING

A. Coordinate the schedule of product delivery to designated prepared areas to minimize the site storage time for materials.

B. Transport and handle products in accordance with the manufacturer’s instructions.

C. Transport materials in covered trucks to prevent contamination of products and littering of surrounding areas.

D. Deliver with labels and written instructions for handling, storing, protecting, and installing.

E. Promptly inspect shipments to ensure that products comply with requirements and that quantities are correct.

F. Provide equipment and personnel to handle products by methods to prevent soiling.

2.02 STORAGE AND PROTECTION

A. Designate a receiving/storage area for incoming products so that they are delivered according to the installation schedule and placed conveniently in the work area to minimize waste due to excessive materials handling and misapplication.

B. All products shall be stored at a minimum following the Original Equipment Manufacturer's (OEM) recommendation to prevent any and all forms of damage to materials, equipment, and property. Any forms of damage caused by means or methods of storage not pursuant to minimum OEM recommendations shall be remedied at the contractor’s expense. Maintain and regulate temperature and humidity within acceptable OEM range.

C. Provide equipment and personnel to store products using methods that prevent soiling.

D. Store heavy items in a manner that will not endanger supporting construction.

E. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in the as-delivered new condition.

2.03 NON-SALVAGEABLE MATERIAL

A. Property of the Contractor:

1. Demolition, not indicated for salvage, becomes property of Contractor. Removed from site at Contractor's expense to a legal waste site obtained by the Contractor.

2. Materials deemed to be non-salvageable by the City's project manager or representative shall be disposed by the Contractor to a legal dump site obtain by them unless otherwise directed by the City. All costs to dispose of non-salvageable materials shall be the Contractor's responsibility.

END OF SECTION

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 01 70 00 – EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED WORK DESCRIBED ELSEWHERE

A. The provisions and intent of the Contract, Including the Procurement and Contracting Requirements and General Requirements, apply to this work as if specified in this section. Work related to this section is described throughout these specifications.

B. Prior to requesting a final inspection by the City, inspect all work products for defects, damage, specification-consistent quality, functioning equipment, etc., and ensure that all testing and commissioning is complete, and that the Contract is ready for final Completion.

1.02 SUBMITTALS

A. Project Record Documents: Per Section 01 78 00 Closeout Submittals.

1.03 PROJECT CONDITIONS

A. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.

B. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.

C. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.04 COORDINATION

A. See Section 01 10 00 Summary of Work for occupancy-related requirements.

B. Coordinate scheduling, submittals, and work of the various sections of the Contract Documents to ensure an efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

C. Coordinate completion and clean-up of work of separate sections.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substructure surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Examine and verify specific conditions described in individual sections.

C. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or mis-fabrication.

D. Verify that utility services are available, of the correct characteristics, and in the correct locations.

E. Prior to demolition: Examine existing conditions prior to commencing work, including elements subject to damage or movement during demolition. After uncovering existing work, assess conditions affecting performance of work. Beginning of demolition means acceptance of existing conditions.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying the next material of substance in accordance with the manufacturers recommendations.

B. Seal cracks or openings prior to applying next material of substance.

3.03 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated in the Contract Documents.

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated in the Contract Documents.

3.04 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain the site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.05 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in the immediate work area to prevent damage.

D. Remove protective coverings when no longer needed; reuse or recycle plastic coverings if possible.

3.06 CLOSE-OUT COORDINATION

A. See Section 01 10 00 – Summary of Work for occupancy-related requirements.

B. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure an efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

C. Verify that utility requirements and characteristics of new 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.

D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on Drawings. Follow Coordination Drawings routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

F. Coordinate completion and clean-up of work of separate sections.

3.07 SUBSTANTIAL COMPLETION

A. Substantial Completion is defined in the General Conditions

B. Preliminary Procedures: Prior to requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request, provide detailed work plan to complete each item and anticipated dates of completion.

1. Submit Contractor's Punch List. For each item, include the dollar value of Work remaining, and reasons why the Work is not complete.
2. Submit substantial completion checklist.
3. Advise the City of pending insurance changeover requirements.
4. Obtain and submit releases permitting City unrestricted use of the Work and access to services and utilities. Include operating certificates, and similar releases.
5. Prepare and submit initial Operation and Maintenance Manuals, damage or settlement surveys, property surveys, and similar final record information.
6. Participate in commissioning in accordance with individual specification section requirements.
7. Submit test/adjust/balance records.
8. Terminate and remove temporary facilities from Project site.
9. Submit changeover information related to City’s occupancy, use, operation, and maintenance.
10. Complete final cleaning requirements.

C. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, the City’s project manager or representative will either proceed with inspection or notify Contractor of unfulfilled requirements. During inspection, the City’s project manager or representative will verify submitted Contractor's Punch List and will add or deduct items as necessary to form the City’s Substantial Completion Punch List. The City’s Substantial Completion Punch List will subsequently be provided to the Contractor for resolution. The City’s project manager or representative will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on the Contractor's Punch List or the City’s Substantial Completion Punch List that must be completed or corrected before certificate will be issued.

1. Re-inspection: If, following City’s inspection, Certificate of Substantial Completion is not granted, request re-inspection when the Work identified as incomplete is completed or corrected. Unless waived by City, a deductive Change Order for A/E costs will be executed for all Substantial Completion re-inspections.
2. Results of completed inspection will form the basis of requirements for Final Completion.

D. Checklist: In order to certify, Substantial Completion, all elements on the Substantial Completion Checklist (provided by the City at the pre-construction meeting) MUST be complete.

3.08 FINAL COMPLETION

A. Preliminary Procedures: Prior to requesting final inspection for determining date of Final Completion, complete the following:

1. Submit specific warranties, workmanship bonds, maintenance service agreement, final certifications, and similar documents.
2. Submit copy of the City's Substantial Completion Punch List, with signed and dated certification by the Contractor's Quality Assurance Manager, stating that every item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Prepare and submit Project Record Documents, final Operation and Maintenance Manuals, and similar final record information.
5. Deliver tools, spare parts, extra materials, and similar items to a location designated by the City. Label with manufacturer's name and model number where applicable. Except where impractical, provide parts and materials in original unopened packaging.
6. Complete any deferred testing as defined in these specifications.
7. Instruction the City's employees in operation, adjustment, and maintenance of products, equipment, and systems.
8. Submit Application for Final Payment and required support documentation and certifications in accordance with the Section 01 20 00 – Payment Procedures.

B. Inspection: Submit a written request for final inspection for acceptance. Upon receipt or request the City with either proceed with the inspection or notify the Contractor of unfulfilled requirements. The City will certify Application for Final Payment after inspection or will notify the Contractor of construction that must be completed or corrected prior to issuance of the certificate.

1. Re-inspection: Request re-inspection when the work identified in previous inspections as incomplete is completed or corrected. Unless waived by the City, a deductive Change Order for City costs will be executed for Final Completion re-inspections greater than one (1) in number.

C. Checklists: In order to certify, Final Completion, all elements on the Final Completion Checklist (provided by the City's project manager) must be complete.

3.09 FINAL CLEANING

Execute final cleaning prior to Substantial Completion.

A. After all trades have completed their work, and just prior to occupancy, the general contractor shall:

1. Leave the entire space perfectly clean and ready for occupancy.
2. Use cleaning materials that are nonhazardous.
3. Clean surfaces exposed to view; remove temporary labels.
4. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
5. Dust removal of all interior surfaces

6. Removal of all temporary surfaces
7. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

B. All surfaces disturbed shall be restored to a condition equal to or better than before the work began.

C. Surplus conduit material, tools, temporary structures, dirt and rubbish shall be removed and disposed of by the contractor, and the project area shall be left clean to the satisfaction of the project manager or representative.

D. Clean up is considered incidental to the project and no measurement and payment will be allowed.

END OF SECTION

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 01 78 00 – CLOSEOUT SUBMITTALS

PART 1 - GENERAL

1.01 RELATED WORK DESCRIBED ELSEWHERE

The provisions and intent of the Contract apply to this work as if specified in this section. Work related to this section is described throughout these specifications.

1.02 RELATED REQUIREMENTS

A. Section 01 30 00 – Administrative Requirements: Submittals procedures, shop drawings, product data, and samples

B. Section 01 70 00 – Execution and Closeout Requirements: Contract closeout procedures. Substantial Completion and Final Completion Checklists.

C. Individual Product Sections: Specific requirements for operation and maintenance data.

D. Individual Product Sections: Warranties required for specific products of Work.

1.03 SUBMITTALS

A. Project Record Documents: Submit documents to the City with claim for final Application for Payment.

B. Operation and Maintenance Data:

1. Submit PDF preliminary draft or proposed formats and outlines of contents at least ten (10) working days prior to requesting inspection for Substantial Completion. The City will review the draft and return with any comments.

2. For equipment, or component parts of equipment put into service during construction and operated by the City, submit completed documents within ten (10) working days after acceptance.

3. Submit completed record documents ten (10) working days prior to final inspection. These record documents will be reviewed and returned by the City after the final inspection, with comments as applicable. Revise all of the record document sets as required by the City prior to final submission.

4. Submit revised final record documents in final for ten (10) working days after final inspection.

C. Warranties and Bonds:

1. For equipment or component parts of equipment put into service during construction with City's permission, submit documents within ten (10) working days after acceptance.

2. Make other submittals within ten (10) days after Date of Substantial Completion, prior to final Application for Payment. Provide original hardcopy in binder and digital copy as PDF, provide tabs for all future items.

3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten (10) working days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 RECORD DRAWINGS

A. Record Prints: Maintain on full-size hard copy black and white prints of the Contract Drawings and Shop Drawings.

1. Identification: In red ink and block letters, label each Record Drawing, including cover sheets, "PROJECT RECORD DRAWING" in a prominent location on title block. Show all addenda changes on the applicable drawing sheet or specification section.
2. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
    a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    b. Accurately record information in an understandable drawing technique.
    c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
3. Content: Types of items requiring marking include, but are not limited to, the following:
    a. Dimensional changes to Drawings.
    b. Revisions to details shown on Drawings.
    c. Changes made by Change Order.
    d. Changes made by Supplemental Instruction.
    e. Details not on the original Contract Drawings.
    f. Field records for variable and concealed conditions.
    g. Record information on the Work that is shown only schematically.
4. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
5. Mark record sets with erasable, red-colored pencil. Use other reproducible colors to distinguish between changes for different categories of the Work at same location.
6. Mark important additional information that was either shown schematically or omitted from original Drawings.
7. Note alternate numbers, Change Order numbers, Supplemental Instruction numbers, and similar identification, where applicable.

B. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing Record Drawings where the City or City's consultant determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.

1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
2. Consult the City for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared Record Drawings into Record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting. Include title blocks matching original drawings and assign appropriate sheet numbers.

C. Binding: Organize Record Prints and newly prepared Record Drawings into manageable sets and create organized, tabbed PDFs at full scale. Include identification on cover sheets and tabs.

3.02 MISCELLANEOUS RECORD SUBMITTALS

Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Provide full size PDFs in an organized and tabbed file for miscellaneous records and identify each.

3.03 O&M MANUALS, GENERAL

A. Provide PDF files that are organized by section and file and fully tabbed and labeled. Provide files in original size, oriented and rotated in the document to read from top to bottom or screen. Scan or save files at a resolution suitable to clearly read all information at original size. Do not use overly large file sizes. Operation and maintenance documentation includes information furnished by multiple sources, and information is assembled and coordinated into a comprehensive whole. Eliminate all redundant, inapplicable, or unnecessary information so that submitted documentation reflects only actual installation. The Contractor is responsible for final assembly of manuals.

B. Identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

C. Directory: Provide a separate directory PDF file summarizing the contents of all O&M Manuals. Include a section in the directory for each of the following:

1. Tables of Contents: Include a table of contents for each O&M Manual.
2. List of Systems and Subsystems: List systems alphabetically. Include references to O&M Manuals that contain information about each system, and separate references to Specification Sections in which each system or subsystem is addressed.
3. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.

3. Manual contents.

E. Title Page: Tab and label the title page. Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of City.
4. Date of submittal.
5. Name, address, and telephone number of Contractor.
6. Name and address of Engineer.
7. Cross-reference to related systems in other O&M Manuals.

F. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

G. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

1. Files: File type and format as approved by the City. Documents shall be PDFs in 8-1/2-by-11-inch format.

a. If two or more files are necessary to accommodate data of a system, organize data in each into groupings by subsystem and related components. Cross-reference other files if necessary to provide essential information for proper operation or maintenance of equipment or system.

b. Identify each file," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets. Use layout supplied by City in electronic format approved by City.

2. Dividers: Reinforced heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software media for computerized electronic equipment.

4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.

5. Drawings: Scan at original size at resolution suitable to read all documentation on the drawing sheet. Do not use higher than necessary resolution resulting in overly large files.

3.04 PRODUCT MAINTENANCE COMPONENT OF O&M MANUALS

A. Content: Organize digital PDF manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer' s written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

3.05 SYSTEMS AND EQUIPMENT MAINTENANCE COMPONENT OF O&M MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

3.06 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within ten (10) days after completion of the applicable item of work. Except for items put into use with the City’s permission, leave date of beginning of time of warranty until the Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Manual: Bind in commercial quality 8-1/2 by 11 inch (216 by 279 mm) three D side ring binders with durable plastic no-print-transfer-type covers.

F. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.

G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.

H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

END OF SECTION

DIVISION 20 – GENERAL MECHANICAL

SECTION 20 00 00 – REFERENCE STANDARDS, ABBREVIATIONS, AND DEFINITIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.02 WORK INCLUDED

A. Definitions, acronyms used to identify reference standards and abbreviations which may be in the Contract Documents.

B. Specification conventions.

1.03 QUALITY ASSURANCE

A. Application: When a standard is specified by reference, comply with requirements and recommendations stated in that standard, except when requirements are modified by the Contract Documents, or applicable codes establish stricter standards.

B. Publication Date: The latest published or adopted editions in effect on the date of issue of Contract Documents, except when a specific date (or edition) is referenced.

1.04 DEFINITIONS

A. Abbreviations and Terms: The following definitions, of terms or words which may be used in the Contract Documents, are in addition to those stated elsewhere in the Contract Documents. Where not defined elsewhere in the Contract Documents, the abbreviations and terms shall be as defined in RS Means Illustrated Construction Dictionary, Fourth Addition, and in the ASHRAE Handbook of Fundamentals, Latest Edition.

B. Where the words “approved”, "or approved", “approved equal”, "as approved" or "for approval" are used, means the approval or acceptance as determined solely by the Architect/Engineer unless a specific reference is made to another entity.

C. The term "Owner" and “City” are used interchangeably, as used herein, shall mean “The City of Tacoma” as defined in Division 01.

D. The term "Architect," "Architect/Engineer" or "Engineer," means Hultz/BHU Engineers, 1111 Fawcett Avenue, Suite 100, Tacoma, WA, 98402.

E. "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."

F. "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.

G. "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".

H. The words "cut" or "cutting" means saw cut in a manner to allow for a neat and straight finished installation, unless other neat and straight line methods of removal are approved by the Architect/Engineer.

I. "Finished Areas" means "areas receiving a finish coat of paint on one or more wall surface."

J. "Furnish" means "purchase, pay for, receive and/or store the material, item or equipment at the Site ready for installation or erection" unless specifically noted otherwise.

K. "Install" means "pay for, and do all work necessary for installing and/or erecting and/or connecting the item or material complete in place", unless specifically noted otherwise.

L. The words "local jurisdiction", "Authority Having Jurisdiction" and "AHJ" mean governmental or other agency with authority regarding construction of the Project.

M. "Product" includes materials, systems and equipment.

N. "Provide" means "furnish, install, and pay for, complete in place".

O. 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.

P. Where the words "similar to" are used and followed by a manufacturers name and product, model, or type number, such manufacturer, product, model or type number shall be considered as the standard of quality for the product or work specified, in a general and technical sense, not meaning "identical".

Q. "Trade" means "an individual or group of people providing materials and/or labor on this Project".

R. "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".

S. "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.

T. "Code" means "All applicable local, State, Federal and International Codes".

1.05 SPECIFICATION CONVENTIONS

A. General: The specifications are addressed to the Contractor who is legally responsible for constructing the project. The Contractor shall furnish, install or provide, as applicable, all items and perform all operations, services, and incidentals required for completion of the Work.

B. Writing Style: These Specifications are written in the imperative mood in most cases, in an abbreviated or "streamlined" fashion, and frequently include incomplete sentences. In sections or parts of Sections written in the imperative mood, words such as "shall", "shall be", "the Contractor shall", and similar mandatory phrases and the words "of", "the", "a", "an", and "all", shall be supplied by inference, in the same manner as for notes on the Drawings. The words “Contractor shall” are removed in most cases, and are implied to be inserted after colons where the colons are used in specification paragraphs defining products or executable tasks.

C. Singular Reference: Wherever in these documents an article, device or piece of equipment is referred to in the singular number, such reference shall mean to include as many such articles as are shown on the drawings or are required to complete the installation.

D. Installation Requirement Abbreviations: For purposes of abbreviation, the words "install" and/or "erect" and/or "connect" and/or "apply" in accordance with the manufacturer's written recommendations shall not, in all cases, be repeated hereinafter in these specifications. However, in all cases, each and every item, material and/or equipment shall be installed and/or erected and/or connected and/or applied strictly in accordance with the manufacturer's written recommendations.

1.06 REFERENCE STANDARDS

A. Applicable standards and codes listed include, but are not necessarily limited, to standards promulgated by the following agencies and organizations, and may be used in the Contract Documents. Obtain copies of referenced standards direct from publication source, when needed for proper performance of work, or when required for submittal by Contract Documents:

AA	Aluminum Association 1525 Wilson Blvd., Suite 600 Arlington, VA 22209
AABC	Associated Air Balance Council 1518 K Street NW Washington, D.C. 20005
ACI	American Concrete Institute 38800 Country Club Drive Farmington Hills, MI 48331

AHRI	Air-Conditioning, Heating, and Refrigeration Institute 2111 Wilson Blvd., Suite 500 Arlington, VA 22201
AIA	American Institute of Architects 1735 New York Ave. N.W. Washington, D.C. 20006
AMCA	Air Movement and Control Association 30 West University Drive Arlington Heights, IL 60004
ANSI	American National Standards Institute (Operations) 25 West 43rd Street, 4th Floor New York, NY 10036
APA	American Plywood Association 7011 S. 19th Street Tacoma, WA 98466-5333
ASHRAE	American Society of Heating, Refrigerating and Conditioning Engineers 1791 Tullie Circle, N.E. Atlanta, GA 30329
ASM	Architectural Specification Manual Painting, Wall Covering and Gypsum Wallboard Finish By: Specification Services, Inc. 614 Industry Drive Tukwila, WA 98188
ASME	American Society of Mechanical Engineers Three Park Avenue

	New York, NY 10016-5990
ASTM	American Society for Testing and Materials International 100 Barr Harbor Drive PO Box C700 West Conshohocken, PA 19428-2959
AWS	American Welding Society 550 NW LeJeune Road Miami, FL 33126
CDA	Copper Development Association 260 Madison Avenue New York, NY 10016
CPSC	Consumer Product Safety Commission 4330 East West Highway Bethesda, MD 20814
CRSI	Concrete Reinforcing Steel Institute 933 North Plum Grove Road Schaumburg, IL 60173-4758
CS	Commercial Standard (US Department of Commerce) Government Printing Office Washington, D.C. 20402
DLI	Washington State Department of Labor & Industries 7273 Linderson Way S.W. Tumwater, WA 98501-5414
EPA	Environmental Protection Agency 1595 Wynkoop Street Denver, CO 80202-1129

IAPMO	International Association of Plumbing and Mechanical Officials 4755 E. Philadelphia Street Ontario, CA 91761 – USA
IBC	International Building Code of ICC 500 New Jersey Avenue, N.W., 6th Floor Washington, D.C. 20001
IFC	International Fire Code of ICC 500 New Jersey Avenue, N.W., 6th Floor Washington, D.C. 20001
IMC	International Mechanical Code of ICC 500 New Jersey Avenue, N.W., 6th Floor Washington, D.C. 20001
NEC	National Electrical Code 1 Batterymarch Park Quincy, MA 02169-7471
OSHA	Occupational Safety and Health Administration (U.S. Department of Labor) 200 Constitution Avenue Washington, D.C. 20210 Regional Office: 300 Fifth Avenue, Suite 1280 Seattle, WA 98104-2397
PS	Product Standard U.S. Department of Commerce Washington, D.C. 20203

PSCAA	Puget Sound Clean Air Agency 1904 Third Avenue, Suite 105 Seattle, WA 98101
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association 4201 Lafayette Center Drive Chantilly, VA 20151-1219
UL	Underwriters' Laboratories, Inc. 2600 NW Lake Rd. Camas, WA 98607-8542
UPC	Uniform Plumbing Code 5032 Alhambra Avenue Los Angeles, CA 90032

B. Washington State Regulations for Barrier Free Facilities as adopted by the Washington State Building Code Advisory Council.

C. Rules and regulations adopted by the State Building Code Advisory Council establishing thermal efficiency and lighting standards.

D. The State Building Code supersedes all county, city or town building regulations containing less than the minimum performance Standards and objectives contained in the State Building Code.

1.07 ABBREVIATIONS

A. Abbreviations on the following list, including symbols used as abbreviations, may be used in the Contract Documents. See drawings for additional abbreviations.

AB	ANCHOR BOLT
ABI	ACOUSTIC BATT INSULATION
ABS	ACRYLONITRILE BUTADIENE STYRENE
ADJ	ADJUSTABLE OR ADJACENT
AF	AIR FOIL
AFF	ABOVE FINISHED FLOOR

AHJ	AUTHORITY HAVING JURISDICTION
ALT	ALTERNATE
APD	AIR PRESSURE DROP
APPROX	APPROXIMATE
APWA	AMERICAN PUBLIC WORKS ASSOCIATION
ARCH	ARCHITECT, OR ARCHITECTURAL
ASHRAE	AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR CONDITIONING ENGINEERS
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
ASTM	AMERICAN SOCIETY OF TESTING AND MATERIALS
AUTO	AUTOMATIC
AWWA	AMERICAN WATER WORKS ASSOCIATION
BD	BOARD
BHP	BRAKE HORSEPOWER
BI	BACKWARD INCLINED
BLDG	BUILDING
BOD	BOTTOM OF DUCT
BOT	BOTTOM
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT PER HOUR
BTWN	BETWEEN
CAP	CAPACITY
CFM	CUBIC FEET PER MINUTE
CG	CORNER GUARD
CLG	CEILING
CLR	CLEAR
CMU	CONCRETE MASONRY UNITS
COL	COLUMN
COMP	COMPRESSOR
CONC	CONCRETE

CONN	CONNECT
CONT	CONTINUOUS
CORR	CORRIDOR
COP	COEFFICIENT OF PERFORMANCE
CPVC	CHLORINATED POLYVINYL CHLORIDE
dB	DECIBEL
DB	DRY BULB
DEG F, F	DEGREE FAHRENHEIT
DEMO	DEMOLITION, or DEMOLISH
DET	DETAIL
DIAG	DIAGONAL
DIAM	DIAMETER
DIM	DIMENSION
DN	DOWN
DR	DOOR
DS	DOWNSPOUT
DWG	DRAWING
EA	EACH
EAT	ENTERING AIR TEMPERATURE
EBI	EXISTING BOARD INSULATION
EC	ELECTRICAL CONTRACTOR (DIVISION 26)
EDB	ENTERING DRY BULB
EER	ENERGY EFFICIENCY RATIO
EFF	EFFICIENCY
ELEC	ELECTRICAL
ELEV	ELEVATION
ENGR	ENGINEER
ENT	ENTERING
EOL	END OF LINING
EQ	EQUAL
EQUIP	EQUIPMENT
ESP	EXTERNAL STATIC PRESSURE

ETR	EXISTING TO REMAIN
EWB	ENTERING WET BULB
EXH	EXHAUST
(E), EXIST	EXISTING
EXP	EXPOSED
EXT	EXTERIOR
FC	FORWARD CURVED
FF	FINISH FACE
FIN	FINISH
FL	FLOOR
FLA	FULL LOAD AMPS
FLAM	FLAMMABLE
FLASH	FLASHING
FLEX	FLEXIBLE
FLR	FLOOR
FPM	FEET PER MINUTE
FS	FEDERAL SPECIFICATIONS
FT	FEET OR FOOT
FV	FACE VELOCITY
G	GAS
GA	GAUGE
GALV	GALVANIZED
GC	GENERAL CONTRACTOR
GEN	GENERAL
GL	GLASS
GWB	GYPSUM WALLBOARD
HORIZ	HORIZONTAL
HP	HORSE POWER
HR.	HOUR
HT	HEIGHT
HVAC	HEATING, VENTILATING, AIR CONDITIONING

IAPMO	INTERNATIONAL ASSOCIATION OF PLUMBING AND MECHANICAL OFFICIALS
IBC	INTERNATIONAL BUILDING CODE
ID	INSIDE DIAMETER
INSUL	INSULATION
INT	INTERIOR
IN	INCH
IEEE	INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS
IMC	INTERNATIONAL MECHANICAL CODE
IN	INCH
INTEGR.	INTEGRAL
JAN	JANITOR
KW	KILOWATT
L	LENGTH
LAT	LEAVING AIR TEMPERATURE
LB	POUND
LB/HR	POUNDS PER HOUR
LDB	LEAVING DRY BULB
LH	LEFT HAND
LRA	LOCKED ROTOR AMPS
LWB	LEAVING WET BULB
MAX	MAXIMUM
MBH	THOUSAND BTUH
MC	MECHANICAL CONTRACTOR
MCA	MINIMUM CIRCUIT AMPS
MIN	MINIMUM
MECH	MECHANICAL
MEZZ	MEZZANINE
MFR	MANUFACTURER

MIN	MINIMUM
MISC	MISCELLANEOUS
MP	MEDIUM PRESSURE
MSS	MANUFACTURERS STANDARDIZATION SOCIETY
MTL	METAL
MUA	MAKE UP AIR
NA	NOT APPLICABLE
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NIC	NOT IN CONTRACT
NO.	NUMBER
NOM	NOMINAL
NTS	NOT TO SCALE
OA	OUTSIDE AIR
O&M	OPERATIONS AND MAINTENANCE
OBD	OPPOSED BLADE DAMPER
OC	ON CENTER
OD	OUTSIDE DIAMETER
OPG	OPENING
OPP	OPPOSITE
ORIG	ORIGINAL
OV	OUTLET VELOCITY
OXY	OXYGEN
PD	PRESSURE DROP
PDI	PLUMBING AND DRAINAGE INSTITUTE
PER	IN ACCORDANCE WITH
PH	PHASE
PLCS	PLACES

PSI	POUNDS PER SQUARE INCH
PT	POINT
PVC	POLYVINYL CHLORIDE
R	RETURN
RA	RETURN AIR
RAD	RADIUS
REF	REFERENCE
REINF	REINFORCED, OR REINFORCING
REQ'D	REQUIRED
RH	RIGHT HAND
RLA	RATED LOAD AMPS
RM	ROOM
RO	ROUGH OPENING
RPM	REVOLUTIONS PER MINUTE
S	SINK
SA	SUPPLY AIR
SCHED	SCHEDULE
SECT	SECTION
SF	SQUARE FEET
SHEATH	SHEATHING
SHT	SHEET
SIM	SIMILAR
SIM OPP	SIMILAR, OPPOSITE HAND
SMACNA	SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION
S.O.	SCREENED OPENING
SP	STATIC PRESSURE
SPEC	SPECIFICATION
SQ	SQUARE
SQ. IN.	SQUARE INCH
SS OR SST	STAINLESS STEEL
STD	STANDARD

STL	STEEL
STOR	STORAGE
STRUCT	STRUCTURAL
SUSP	SUSPENDED
SYM	SYMMETRICAL
TD	TRANSFER DUCT
T&G	TONGUE AND GROOVE
TG	TRANSFER GRILLE
TEMP	TEMPERATURE
TOS	TOP OF SLAB
TSP	TOTAL STATIC PRESSURE
TSTAT	THERMOSTAT
TYP	TYPICAL
UL	UNDERWRITER'S LABORATORY
UNO	UNLESS NOTED OTHERWISE
UPC	UNIFORM PLUMBING CODE
V	VOLTS, VOLTAGE
VEL	VELOCITY
VERT	VERTICAL
VEST	VESTIBULE
VFD	VARIABLE FREQUENCY DRIVE
W	WIDTH
W/	WITH
WA	WATT
WB	WET BULB
w.g.	WATER GAUGE (INCHES OF WATER)
WSEC	WASHINGTON STATE ENERGY CODE

END OF SECTION

DIVISION 20 – GENERAL MECHANICAL

SECTION 20 02 00 – OPERATION AND MAINTENANCE MANUAL FOR MECHANICAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.02 WORK INCLUDED

A. Operation and Maintenance Manual.

1.03 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

2.01 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.

B. CD Electronic Copy: Shall contain pdf open format copies of the entire O&M manual, pdf open format copies of record drawings, and ACAD files for record drawings where ACAD shop drawings or ACAD record drawings are required (see individual specifications Sections for requirements). Files shall be bookmarked by section and by product. Drawings shall be bookmarked and labeled by sheet number and name.

2.02 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.

2.03 SYSTEM DESCRIPTIONS

A. General: Provide brief description of the project's mechanical systems to give an overview to Owner's maintenance and facilities staff.

B. HVAC Systems: Include type of HVAC system, system major characteristics, equipment used, areas served, how system is sub-divided into zones, how system is intended to operate and system setpoints, and any significant safety or operational aspects

2.04 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.

PART 3 - EXECUTION

NOT USED

END OF SECTION

DIVISION 20 – GENERAL MECHANICAL

SECTION 20 05 00 – COMMON WORK RESULTS FOR MECHANICAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

B. Division 23 - Heating, Ventilation, and Air Conditioning (HVAC) Systems.

1.02 WORK INCLUDED

A. General Mechanical System Requirements.

B. Mechanical System Motors.

C. Identification and Labeling.

1.03 DEFINITIONS

A. Abbreviations, Terms and Symbols: 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 work covered by specification. 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".

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)”.

1.04 GENERAL REQUIREMENTS

A. Scope: Furnish all labor, materials, tools, equipment, and services for all mechanical work. This section applies to all specifications and to all project mechanical work.

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 materials purchased, 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.
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, seismic anchors, and for methods/means of accomplishing the work. Where design or performance criteria to be met is not stated (or is unclear), develop proposed criteria (based on code, similar projects, and related data) and submit the proposed criteria for review prior to performing full design 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, 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.

1.05 SUBSTITUTIONS

A. General: See Division 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).

1.06 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. 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. Anchorage/Support: The manufacturers recommended method of anchorage and support is consistent with the method indicated in the Contract Documents, and the item has provisions suitable for such anchorage/support.
8. Lead Time: The product's fabrication, shipping, and delivery period meets the project schedule requirements.
9. 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.
10. Controls: Item is compatible with the controls it will be connected to and has been coordinated with the firm providing the project control work to provide the specified (or required) sequence of operation.
11. 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.

1.07 SUBMITTALS

A. General:

1. See Division 01 for submittal requirements.
2. By making a submittal (of shop drawings or product data) the Contractor represents that they have reviewed them for compliance with the Contract Documents, including detailed connection and installation features and requirements, and that the submitted item is their proposed method of compliance with the Contract Documents.
3. Perform no portion of the work for which the Contract Documents require a submittal until the respective submittal has been made, the review completed by the Architect/Engineer, and all issues resolved.
4. The Owner and Architect/Engineer are depending on the submittal process as a final review and confirmation of materials and various aspects of the work, and may make changes in the project due to information contained in the submittals and with the understanding that the opportunity to make changes exist until submittals are made and the review is completed. The Contractor is responsible

for added costs which may be incurred if work is performed which limits the Owner the opportunity to make such changes (e.g. work done prior to a submittal being made or the submittal review being completed).

5. Submittals shall be logically organized, neat and legible. Submittals to include:
   a. Name of project.
   b. Owner's name.
   c. Specification section reference and paragraph (or drawing number or detail) submittal is for.
   d. Contractor name and contact information.
   e. Subcontractor name and contact information.
   f. Date of submittal.
6. Electronic Files: Submittals that are sent electronically shall have a separate .pdf file corresponding to the each specification section. Files shall be named with the specification number and title.

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. 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.

D. Product Submittals - Information Required:
1. Manufacturer's professionally developed documents, 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.
13. Edited Content: Submittals shall indicate the equipment and options that are to be provided. Copies of an unedited catalog will be rejected. Pages/items that are not applicable shall be deleted prior to submittal to the Engineer.

E. Shop Drawing Submittals:
1. Shop drawings shall be professionally drafted using AutoCAD, Revit, or an equivalent compatible program (hand sketches are not acceptable). Shop drawings shall be independently developed by the Contractor and not be a copy of the Contract Drawings.
2. Submit electronic files in original drafting format (i.e. *.dwg) and pdf format with as-built documentation.
    a. HVAC control systems.
    b. For any parts of any system which are to be installed differently than as shown on the drawings.
    c. Construction revisions to accommodate Substituted Equipment.
    d. Other areas/work as noted in the Contract Documents.
    e. For those systems requiring shop drawings, reference system's specification Section for additional requirements.

F. Re-Submittals: If submittals are marked ‘Rejected’ or ‘Revise and Resubmit’, the Contractor shall revise the submittal to satisfy the comments or conform to project requirements, and submit to the Engineer for review. Only those items that were rejected or required a resubmittal will be reviewed by the Engineer; All other items will not be reviewed. All re-submittals shall be at least one of the following:
1. Provide a ‘Re-Submittal Summary Sheet’ which indicates how each comment was addressed (it is acceptable to add the responses to a copy of the original submittal review comments).
2. Cloud (or otherwise clearly identify) the revised portions to indicate what is different from the original submittal.

1.08 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-Builts” 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 (may be scanned, and submitted in PDF format).

1.09 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 project final acceptance 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 Owner/Architect/Engineer).

1.10 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. Schedule of Work: Arrange work to comply with schedule of construction.

1.11 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 5 working 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. See Division 01 for compensation to the Engineer for required re-reviews.

1.12 REFERENCES

A. ASME A13.1: Scheme for the Identification of Piping Systems.

PART 2 - PRODUCTS

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.

2.02 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 Owner/

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 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.

2.03 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. Electrical disconnects shall be accessible as required by code, and shall not require removal of screens, equipment, or other items to access.

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.

F. Power Restart: All equipment, components and systems shall be configured to automatically restart upon restoration of power after a power failure (i.e. either generator power, UPS power, or utility power); unless specifically noted otherwise or required for safety reason to require manual restart. Provide staged restart as required by the control sequences or for proper generator operation or system operation.

2.04 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).

2.05 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. 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).

C. 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 Section 23 09 33 for labeling of low voltage control components.

D. 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.
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 fire dampers, fire/smoke dampers, smoke dampers, control dampers, items required by code, and control devices shall be labeled. 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).

E. Concealed Items:

1. General: 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.
2. Marking System: The marking system shall consist of an engraved phenolic label, minimum 1/16-inch thick and 3/4-inch high with 1/2-inch high lettering. Label shall be black with white lettering. Apply labels to ceiling grid system using 3M double sided tape (3M VHB #4945).
3. Labeling: Shall identify equipment using the same designation indicated on the plans. Prior to making labels, submit a list of all proposed labels.

PART 3 - EXECUTION

3.01 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, allow proper maintenance access, provide required clearances, and to allow for an organized and efficient installation of all systems.

C. Submittals: Perform no portion of the work for which the Contract Documents require a submittal until the respective submittal has been made, the review completed by the Architect/Engineer, and all issues resolved.

D. 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.

E. 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.

F. 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.

3.02 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:

1. Access doors are typically not shown on the drawings; provide where indicated and where needed to provide access to valves, drains, duct access doors, equipment, control devices, dampers, and similar items requiring service or access that would otherwise be inaccessible. Provide access doors to allow for

the future removal of items that would require the removal of permanent building construction (i.e. GWB ceilings, GWB walls, concrete construction, etc.)

2. Select size, quantity, and locations of access doors. Review all drawings, construction materials, and work of other trades in determining access door requirements.
3. Developed dimensioned locations where needed for use by other trades or for coordination purposes.
4. Coordinate access door locations, size, and details with other trades.

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 base mounted mechanical equipment shall be installed on a concrete pad (unless indicated otherwise). Pad shall be minimum 4-inch thick, minimum 4” wider than the equipment all around, with pad anchored to building structure. See structural drawings for pad details.

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

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.

3.03 PAINTING

A. General: Painting shall comply with Masters Painters Institute 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.

3.04 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.).

3.05 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 5 working days prior to the proposed start-up time.

3.06 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

DIVISION 20 – GENERAL MECHANICAL

SECTION 20 05 03 – EXISTING SYSTEMS WORK FOR MECHANICAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.02 WORK INCLUDED

A. Protection of Items from Damage.

B. Maintaining Utilities and Building Services.

C. Cleaning.

D. Review of Existing Conditions.

E. Cutting and Patching.

F. Mechanical Demolition and Disposal.

G. Hazardous Materials Discovery

1.03 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.

PART 2 - PRODUCTS

2.01 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

3.01 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.

6. Existing items to remain or to be relocated are assumed to be in acceptable condition at the start of the project.

F. Cutting:

1. 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.

2. Verify location of all utilities, footings, and other existing items prior to beginning cutting to prevent damage.

3. Existing concrete and masonry elements to be cut shall be x-rayed prior to cutting to determine existing reinforcement locations. Reinforcement shall not be cut without prior permission of the Engineer. Cuts and core drills shall maintain at least 6-inch distance from rebar and other structural elements in concrete (unless noted otherwise).

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. 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.

3.02 REVIEW OF EXISTING CONDITIONS

A. General: Provide field investigation of all systems and existing conditions to confirm extent of demolition, routing of existing systems, condition of items to be relocated, 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. Utility Locate: Locate locations of all utilities and all concealed systems in the area of work to prevent damage, and where connections are required to be made to existing systems. Locate work shall include the use of appropriate technologies to determine accurate locations (e.g. electronic detection methods, camera of pipelines with locate devices, ground penetrating radar, spot excavating with vacuum truck, etc.).

E. 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.

3.03 EXISTING CONSTRUCTION

A. 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).

B. Wall Construction: All walls shall be assumed to be constructed of 8 x 16 solid grouted CMU (unless noted otherwise).

3.04 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. Disposal: Dispose of all demolished items and all waste materials off site in accordance with code and legal requirements. See Division 01 for waste management requirements.

3.05 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

DIVISION 20 – GENERAL MECHANICAL

SECTION 20 05 22 – PIPING COVER SYSTEM FOR MECHANICAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.02 WORK INCLUDED

A. Piping Cover System.

1.03 SUBMITTALS

A. Submittals shall comply with Section 20 05 00.

B. Submit product data and installation instructions.

C. Submit shop drawings showing:

1. Details of sizing of cover system.
2. Building plans showing extent of the cover system, where to be located.
3. Pipe penetrations and related details.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Shall comply with Section 20 05 00.

B. Cover System: Grice Engineering, Rectorseal, DiversiTech.

2.02 GENERAL

A. Indoor:

1. Type: Factory fabricated plastic line set cover system, UV and weather resistant, UL 94V rated, paintable, flat bottom, specifically designed for refrigerant piping (Rectorseal Fortress or equal).

B. Outdoor:

1. Type: Factory-fabricated steel cover support system with concealed anchoring; for concealment of piping (and related building systems).
2. Security: At outdoor locations, the soffit/cover system shall incorporate a concealed snap-lock connection which, once assembled, renders the cover essentially irremovable with the use of ordinary tools.

2.03 MATERIAL

A. Soffit/Cover:

1. The soffit/cover shall be smooth in appearance and shall be made of 20-gauge G90 galvanized steel factory painted with color as selected by the Architect.

2. The cover shall be sized as small as possible to conceal piping as indicated on the plans, or as specified.
3. Cover joints shall be butt-joined with interlocking internal splice couplings and/or with male/female interlocking joints.
4. Cover design shall include a rollformed “groove” at the interfacing of the cover and the adjacent construction surface to facilitate the application of sealant/adhesive compounds and enhance the security of such compounds from dislodging.

B. Support/Attachment Devices: Spring steel shield clips of the size recommended by manufacturer, for securement of the cover. Clips shall be produced from 21-gauge minimum zinc-plated spring steel and shall have a reverse curvature design such that the clips soundly secure the soffit from easy removal. Each clip must be demonstrated as being able to resist a force of 100 lbs. uplift at the free end.

C. Accessories: The system shall include tamper-resistant end caps, prefabricated corners, wall flanges, couplings, access doors, ventilation openings and other items which may be necessary to complete the system, and shall be installed in accordance with manufacturer recommendations.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation of system shall be in strict accordance with manufacturer’s instructions.

B. Contractor is responsible to size and layout the cover system to suit all piping to be concealed, and all penetrations required for other piping.

C. Provide proper fasteners for the substrate encountered to adequately secure the pipe and cover system.

D. Cover shall be installed parallel to building lines, linear, and snug-fitting to surfaces. Support devices shall be anchored squarely and firmly against the structural surface in a straight line.

E. All field cut ends and scratches shall be repainted with matching paint.

F. Caulk joint where cover system abuts to wall and ceiling with color matching siliconized (or urethane) caulk.

END OF SECTION

DIVISION 20 – GENERAL MECHANICAL

SECTION 20 05 29 – HANGER AND SUPPORTS FOR MECHANICAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.02 WORK INCLUDED

A. Pipe Hangers and Supports.

B. Duct Hangers and Supports.

C. Mechanical Equipment Anchors and Supports.

1.03 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.

1.04 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.

1.05 GENERAL REQUIREMENTS

A. Seismic: Provide adequate hangers, supports, anchors, and bracing to serve as seismic restraints. Seismic anchoring and bracing methods shall comply with SMACNA SRM, Mason SRG, and code. Seismic restraints system shall be able to withstand seismic forces as required by code; provide seismic restraint calculations as required by the AHJ.

B. Design and Manufacture: All pipe hangers and supports shall be designed and manufactured in accordance with MSS-SP 58.

1.06 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

2.01 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.

2.02 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. 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:

Nominal Rod Diameter	Maximum Load
1/4 Inch	240 Pounds
5/16 Inch	440 Pounds
3/8 Inch	610 Pounds
1/2 Inch	1130 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:

Strap Size	Maximum Load
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. 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.

G. Manufactured Strut Systems:

1. Channels: Minimum 12 gauge, 1-5/8 x 1-5/8" (unless noted otherwise), with slots/holes to suit application 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.
2. 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).

H. Steel: Structural steel per ASTM A 36

I. 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.

J. 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”.

2.03 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. 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 In Inches	Insulation Length In Inches	Shield Length In Inches	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).

2.04 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

3.01 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. 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.

3.02 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. 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.

3.03 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:

Duct Area	Maximum Spacing
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:

Duct Area	Maximum Spacing
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. Exterior Duct: Provide supports for exterior ductwork as shown in SMACNA-DCS; spacing as specified herein.

J. End of Duct: At end of duct run, hangar shall be located no more than 1/2 the allowed hangar spacing from the end of the run.

3.04 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.

3.05 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: Provide anchors and bracing to resist seismic forces.

END OF SECTION

DIVISION 20 – GENERAL MECHANICAL

SECTION 20 05 30 – SLEEVES AND SEALS FOR MECHANICAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.02 WORK INCLUDED

A. Pipe Sleeves.

B. Duct Sleeves.

C. Duct Closure Collars.

D. Firestop Seals.

E. Non-Firestop Seals.

1.03 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.

1.04 SUBMITTALS

A. General: Shall comply with Section 20 05 00.

B. Product Data: Provide product data on all material to be use. 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.

DIVISION 20 – GENERAL MECHANICAL

SECTION 20 05 30 – SLEEVES AND SEALS FOR MECHANICAL

1.05 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.

1.06 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

2.01 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.

2.02 PIPE SLEEVES

A. Diameter: 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.

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: 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.

2.03 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: 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.

2.04 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.

2.05 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).

2.06 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”.

PART 3 - EXECUTION

3.01 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: Structural type.
    b. Other Walls: Non-Structural type

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).

3.02 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: Structural type.
    b. Other Walls: Non-structural type.
2. Vertical, Other than Slab on Grade: Not Required.

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).

3.03 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.

3.04 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 a minimum 5 working day 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.

3.05 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. No Sleeves: Provide “Link-Seal” type for belowground penetrations, vault wall penetrations, and slab-on-grade penetrations. Provide sealant at other areas, type to suit the application. Fully seal between outside of pipe or pipe covering (for covered piping systems) and surrounding construction. Seal depth shall be minimum 1-inch each side.

D. 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.

E. 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

DIVISION 20 – GENERAL MECHANICAL

SECTION 20 05 93 – TESTING, ADJUSTING, BALANCING FOR MECHANICAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.02 WORK INCLUDED

A. Air Balancing.

B. Report.

1.03 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 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.

1.04 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.

1.05 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.

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

2.01 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

3.01 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 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.

3.02 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.

2. Where new sheaves are required, calculate sizing of new sheave and coordinate requirements with the Division 23 Contractor; Division 23 Contractor to furnish new sheaves. Replace existing sheave with new one furnished by the Division 23 Contractor; include bid costs for sheave replacements on all belt driven fans.

3. Adjust belts for proper tension.

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. Static pressure drop across each filter bank and coil.
12. Final position of any speed controls (as percent of full).
13. 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. Filters sizes and quantities (where applicable).
    e. Motor manufacturer and complete nameplate data.
    f. Design operating conditions.
    g. Actual operating conditions (flows, pressure drops, rpm, etc.).

3.03 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 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.

END OF SECTION

DIVISION 20 – GENERAL MECHANICAL

SECTION 20 07 00 – MECHANICAL INSULATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.02 WORK INCLUDED

A. Duct Insulation.

B. Pipe Insulation.

C. Equipment and Specialties Insulation.

1.03 DEFINITIONS

A. R: Thermal resistance of insulation, in units of hr-sf-deg F/Btu.

B. 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.

C. 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.

1.04 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.

1.05 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.

1.06 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 200529 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 200529.

1.07 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

2.01 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 200500, 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.

2.02 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. 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.
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 Ductwork: No insulation required.

2.03 PIPE INSULATION

A. 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.

B. 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.

C. Pipe Insulation Types:

1. Aboveground-Inside Building: Elastomeric.

2. Aboveground-Outside Building: Same as specified above, with metal jacket.

D. 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.

2.04 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.

2.05 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

3.01 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.

3.02 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.

3.03 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. 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.

D. 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.

3.04 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.

END OF SECTION

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

SECTION 23 09 93 – SEQUENCE OF OPERATION FOR HVAC CONTROLS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.02 WORK INCLUDED

A. Sequence of Operation.

1.03 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; see Section 23 09 33

1.04 GENERAL REQUIREMENTS

A. Bidder Design: The control system is bidder design subject to the requirements of the Contract Documents.

B. 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).

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 GENERAL

A. General: Provide complete system with sequences of operation as specified herein.

B. Time Control: VRF System controls shall be used for system time/controls.

C. Miscellaneous Items: See plans for units with motorized dampers in the ducts and miscellaneous other items requiring control.

D. VRF Heat Pump System: Shall operate under controls furnished with the VRF system. See section 23 81 27 for VRF controls and sequences.

E. 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).

F. 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: See section 23 81 27 for VRF system. For other systems:

Occupied Heating	70 degrees F
Unoccupied Heating	65 degrees F
Occupied Cooling	75 degrees F
Unoccupied Cooling	85 degrees F

G. 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 5 HP (3.7 KW) and larger to minimize electrical surges.

H. Interlocks: Provide hard wired interlocks for equipment and control components that is specified (or required) to operate together. Provide time delay relay, where needed if delays in operation are required.

3.02 ENERGY RECOVERY UNIT - SEQUENCE OF OPERATION

A. General: VRF system controls shall provide time schedule control of the unit. Mode shall match the mode for the VRF system which corresponds to the area served by the ERV unit. Where the ERV unit serves areas served by multiple HVAC units, the ERV unit shall be in the occupied mode when any VRF unit is in the occupied mode.

B. Occupied Mode:

1. Fans: Supply and exhaust fans on.

2. Outside Air and Exhaust Air Dampers: 100% open.

C. Unoccupied Mode: Unit shall be off, dampers closed.

D. Warm-Up Mode: Unit shall be off, dampers closed.

E. Duct Heater: Shall be controlled by a supply air duct temperature sensor with an outdoor air temperature lockout. Heater shall be on when supply air temperature is below setpoint and off when temperature is 2 deg F or more above setpoint. Initial

setpoint shall be 70 deg F. Heater shall be off whenever the OA temperature is above the “OA Lockout” setpoint; initially set for 65 deg F. Control heater in stages (for heaters with multiple stages) or with proportional control (for SCR type).

END OF SECTION

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

SECTION 23 21 28 – HVAC CONDENSATE PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.02 WORK INCLUDED

A. Cooling Coil Condensate Drains.

B. Overflow, Miscellaneous Drains.

C. Condensate Pumps.

D. Testing and Inspection.

1.03 SUBMITTALS

A. Submittals shall comply with Section 20 05 00.

B. Submit product information on all items to be used.

1.04 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

2.01 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 20 05 00, 2.01, Acceptable Manufacturers.

B. Pipe and Fittings: Mueller, Cerro, Tyler, US Pipe, Charlotte Pipe and Foundry, Pacific States Pipe, Atlantic States, Spears Manufacturing, Cresline Northwest.

C. Condensate Pumps: Little Giant.

2.02 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, Type 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.

2.03 PIPE AND FITTINGS - APPLICATION

A. Cooling Condensate Drains: Copper DWV, copper, PVC DWV, or PVC.

2.04 CONDENSATE PUMP

A. Type: Automatic condensate pump with integral tank; for pumping cooling coil condensate, combustion condensate and similar fluids. Little Giant VCMA, VCMX or VCL series (or approved).

B. Capacity: Pump shall be rated to pump minimum of 1.4 gallons per hour per ton of unit cooling capacity served (e.g. 10 ton unit shall have a 1.4 x 10 = 14 gph capacity) at 15 feet of head (unless a different capacity is indicated). Pumps serving combustion condensate shall have a capacity of 25 gph per 1000 MBH of equipment capacity at 15 feet of head (unless a different capacity is indicated). Tank shall be 1/2 gallon capacity (unless indicated otherwise). Unit shall be rated for continuous operation.

C. Construction: Tank body and pump shall be constructed of oil resistant polypropylene or ABS, with discharge check valve, and float for pump on/off control, factory wired.

D. Accessories: Provide with overflow safety switch for wiring to low voltage controls to stop HVAC unit on high condensate (or to indicate an alarm).

E. Electrical: Provide with integral electric motor, having thermal overload protection, for use with 115 volt or 230 volt (as required to suit available power) AC single phase power, with minimum 6-foot 3-prong grounded plug.

PART 3 - EXECUTION

3.01 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.

3.02 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.

3.03 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

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

SECTION 23 31 00 – HVAC DUCTS AND CASINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.02 WORK INCLUDED

A. Environmental Ductwork Systems.

B. Flexible Duct.

C. Preparation of Duct for Service.

1.03 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.

1.04 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 3%.

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.

1.05 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.

1.06 DUCT PRESSURE CLASS

A. Constant Volume Systems: Ductwork shall be constructed to the pressure class corresponding to 1.2 times the static pressure indicated for the fan which serves the duct system (plus or minus as appropriate); unless noted otherwise. (For example, a fan designed to operate at 1-inch wc static pressure would require 2-inch pressure class duct construction as 1-inch x 1.2 = 1.2-inch; 2-inch is therefore the required pressure class.)

1.07 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

2.01 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.

2.02 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.

2.03 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.

3. Round-to-Round: 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).

2.04 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.

2.05 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

3.01 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. 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.

F. 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.

G. 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. 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.

H. Ductmate: All "Ductmate" and similar systems shall be installed in strict accordance with manufacturer's instructions.

I. 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.

3.02 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.

END OF SECTION

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

SECTION 23 33 00 – DUCT ACCESSORIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.02 WORK INCLUDED

A. Manual Dampers.

B. Flexible Connectors.

C. Duct Access Doors.

1.03 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.

1.04 SUBMITTALS

A. General: Submittals shall comply with Section 20 05 00.

B. Product Data: Submit product information on all items to be used.

1.05 REFERENCES

A. AMCA 500D: Laboratory Methods for Testing Dampers for Rating.

B. SMACNA-DCS: SMACNA HVAC Duct Construction Standards, 3rd Edition.

PART 2 - PRODUCTS

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. Flexible Connections: Ventfabrics, Duro-Dyne Elgen.

D. Duct Access Doors: National Controlled Air, Ventfabrics, United-McGill, Kees, Ruskin, Vent Products, Duro-Dyne.

E. Building Access Doors: J.R. Smith, Zurn, Acudor, Elmdoor, Kees, J.C. Industries, Milcor.

2.02 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:

Max. Blade Dimension	Duro-Dyne Regulator Set	Shaft Size
10" and less	KS-145, 145L	1/4"
11" to 14"	KSR-195, 195L	3/8"

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).

2.03 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.

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.

2.04 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).

2.05 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

3.01 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).

3.02 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. 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. At tilting heat pipe type heat recovery coils, provide sufficient flexible material to allow full tilting and operation of coil.

3.03 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 Section 23 09 33 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.

3.04 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: Coordinate location and installation of access doors with trades which are affected by the installation.

END OF SECTION

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

SECTION 23 37 00 – AIR OUTLETS AND INLETS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.02 WORK INCLUDED

A. GRD Outlets.

B. GRD Inlets.

C. Louvers.

1.03 DEFINITIONS

A. GRD's: Grilles, Registers, and Diffusers.

1.04 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.

1.05 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

2.01 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.

2.02 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.

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.

2.03 SUPPLY AIR OUTLETS

A. Ceiling Diffuser (CD): Aluminum or steel construction, have louver face, for horizontal discharge and square neck. Louver face shall be fixed, and be available for one, two, three or four way discharge configurations. Core shall be easily removed with no tools required. Krueger SH, SH5 Series (or approved equal).

B. Wall Supply Grille (WSG): Aluminum or steel construction, double deflection type, with horizontal face bars and vertical rear bars. Unit shall have outer frame borders 1-1/4-inch wide, with mitered corners, and perimeter gasket to prevent air leakage. Frame shall be constructed of minimum 22 gauge steel or minimum 0.032-inch thick aluminum. Deflecting bars shall be rigid extruded aluminum of semi-air-foil design, on 3/4-inch centers. Vertical and horizontal bars shall have friction pivots at each end to allow for blade angle adjustment without blade loosening or rattling. Krueger 5880H, 880H Series; Titus 300FL, 300FS Series (or approved equal).

2.04 EXHAUST AIR INLETS

A. Wall Exhaust Grille (WEG): Shall be of aluminum or steel construction, with 35 degree angular horizontal face bars. Unit shall have outer frame border, 1/4-inch wide, gasketed to prevent air leakage and minimize smudging. Deflecting bars shall be rigid extruded aluminum of semi-air-foil design, on 3/4-inch centers. Krueger Model No. S580H or S80H. Titus Series 350RL.

2.05 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.

2.06 MISCELLANEOUS

A. Screen: 1/2-inch mesh, constructed of either 0.051-inch aluminum wire or 19 gauge galvanized steel wire.

PART 3 - EXECUTION

3.01 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 and for the attachment of air inlets/outlets to the building and to supports. 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. Dampers: Install in accordance with manufacturer instructions. Check for free movement of dampers and proper control by damper actuator. See Section 23 09 33 for control of motorized dampers.

E. 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).

F. 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 Section 20 05 30.

G. Screened Openings: Provide screened openings (SO) on all duct openings where indicated and where openings do not have grilles or registers.

H. Louver and Wall Caps: Slope bottom of all ducts within 18 inches of connecting to louvers and wall caps at minimum 1% slope to the exterior and to allow drainage to the outside. Seal all joints within 6-inches of bottom of ductwork water tight where located within 18-inches of louver and wall caps.

END OF SECTION

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

SECTION 23 81 27 – VRF SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.02 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.

1.03 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.

1.04 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).

1.05 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).

1.06 WARRANTY

A. General: See Division 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.

1.07 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

2.01 ACCEPTABLE MANUFACTURERS

A. Products shall comply with Section 20 05 00, Paragraph 2.01, Acceptable Manufacturers.

B. VRF Heat Pumps: Mitsubishi.

C. Refrigerant Pipe and Fittings: Domestic made products only.

2.02 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.

2.03 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.

2.04 SPLIT SYSTEM HEAT PUMP – INDOOR – MULTI-POSITION AIR HANDLER

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. 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.

2.05 INDOOR - WALL MOUNT UNIT

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.

2.06 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.

2.07 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, dduty 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. 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.

F. 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.

G. 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

H. 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.

I. 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.

J. 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.

2.08 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

3.01 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. Protection: Equipment and all system components 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.

E. Cleaning: Units shall be thoroughly cleaned of all debris prior to operation. Units shall be clean and in new condition prior to Owner acceptance.

F. 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.

3.02 PIPE AND FITTINGS

A. General:

1. All piping in finished areas shall be installed concealed unless specifically noted otherwise.

2. Install piping at such heights and in such a manner so as not to obstruct any portion of windows doorways, passageways, or access to any items requiring routine service, maintenance, or inspection. Intsall piping to allow for the future removal of equipment, coils, fixtures, and similar items. Offset of reroute piping as required to clear any interferences which may occur.

3. Install all piping parallel to the closest wall and in a neat, workmanlike manner. Horizontal exposed 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.

B. Insulation: Allow sufficient clearances for installation of pipe insulation in thickness specified. If interferences occur, reroute piping to accommodate insulation.

C. Escutcheons: Provide escutcheons where exposed pipe passes through walls, floors, or ceilings.

D. Electrical Items: 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, and are required per this paragraph.

E. 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.

3.03 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. General: Perform leak testing and evacuation in accordance with manufactures published instructions and consistent with these specifications. Disconnect and isolate from the system any components that may be damaged by the test pressure.

C. Initial Test: 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 or manufacturer, 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. Leak Review: 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. Evacuation: 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. Charging: After satisfactory pressure testing and vacuum evacuation, fully charge the system with refrigerant. 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. 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.

G. Final Check: 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 and prior to system start-up.

3.04 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:

General Areas:	
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).

3.05 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.

3.06 ENERGY RECOVERY UNIT - SEQUENCE OF OPERATION

A. See Section 23 09 93.

3.07 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, auxiliary heaters (where applicable), refrigerant work, 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.

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.

3.08 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.

END OF SECTION

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

SECTION 23 82 46 – ELECTRIC HEATERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

B. Requirements of Section 20 05 00 apply to this Section.

1.02 WORK INCLUDED

A. Electric Heaters.

1.03 SUBMITTALS

A. General: Comply with Section 20 05 00.

B. Product Data: Submit product information on all items.

1.04 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

2.01 ACCEPTABLE MANUFACTURERS

A. Products: Shall comply with Section 20 05 00 Part 2.01 - Acceptable Manufacturers.

B. Duct Heaters: Brasch, Indeeco, Berko, Markel, Q-Mark, Warren.

2.02 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: For non-DDC control systems 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.

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.

3.02 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.

END OF SECTION

DIVISION 26 – ELECTRICAL

SECTION 26 01 00 – ELECTRICAL GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

B. Division 28 - Electronic Safety and Security.

1.02 SECTION INCLUDES

A. General requirements specifically applicable to Division 26.

B. General requirements of this section also apply to Division 28.

1.03 SCOPE OF ELECTRICAL WORK

A. Provide electrical systems and Work described, identified, specified, referenced, and shown in the Project Documents that are covered under Divisions 26 and 28 of the Construction Specifications Institute (CSI) and/or as otherwise regulated by national, state, and local electrical codes. Electrical Work includes providing all equipment, materials, devices, appurtenances, and accessories necessary to provide complete and operating systems according to the intent of Project Documents.

B. Electrical work is not limited to Division 26 and 28 specifications and what is shown on the electrical drawings. The Contractor is responsible to review all Project Documents for additional Electrical Work and requirements and to include this work as part of their scope under the Contract.

1.04 REGULATORY REQUIREMENTS

A. Comply with requirements of the following codes as adopted and supplemented by authority having jurisdiction:

ANSI/NFPA 70 - National Electric Code (NEC)
NFPA 101 - Life Safety Code
International Building Code (IBC)
International Mechanical Code (IMC)
WAC 296-46B - Washington State Electrical Safety Standards, Administration, and Installation
Washington State Energy Code (WSEC)

B. Comply with additional codes and regulations referenced in other sections.

C. Comply with additional codes and regulations required by authority having jurisdiction.

D. Obtain and pay for permits, and inspections from authorities having jurisdiction over work included under applicable Division Sections.

E. Include all testing, shop drawings, and documentation required by the inspection authorities for permitting and final approval.

1.05 SUBMITTALS

A. Comply with requirements of Division 01. Unless otherwise specified, furnish product data and shop drawings to Architect/Engineer within 30 calendar days from date of contract signing as follows:

1. Product information sheets shall be neat, readable, 8.5 x 11 inch, submitted in PDF format. Generic product sheets with multiple products or product

descriptions shall clearly highlight or otherwise indicate which product is being furnished. Product sheets shall be reasonably limited to not include entire catalog sections.

2. Furnish product submittals with a cover sheet and table of contents. Furnish a separate submittal and number for each section of the specifications. Cover sheet shall indicate name of the Project, Owner, Architect, Engineer, Contractor, and Date of Submittal. Product table of contents shall list each item submitted. Bookmark each submittal to facilitate browsing according to the type of products.
3. Furnish systems design shop drawings in PDF format. Title block shall include Project, Owner, Contractor, and Date of Submittal.
4. Furnish product data and shop drawings specifically indicating any conflict or deviation from requirements of contract documents.
5. Edited Content: Submittals shall indicate the equipment and options that are to be provided. Copies of an unedited catalog will be Rejected. Pages/items that are not applicable shall be deleted prior to submittal to the Engineer.

B. Confirm dimensions, ratings, and specifications of electrical materials, devices, fixtures, and equipment conform to project requirements prior to furnishing submittals. Coordinate electrical requirements with utilization equipment submitted under other sections and verify that voltage, phase, and rating are compatible with work shown in the electrical project documents.

C. Provide shop drawings showing proposed feeder and branch circuit wiring plan required under Section 26 05 00.

D. Do not order materials or commence Work until applicable submittal has been reviewed and the Architect/Engineer has accepted.

E. Re-Submittals: If submittals are marked ‘Rejected’ or ‘Revise and Resubmit’, the Contractor shall revise the submittal to satisfy the comments or conform to project requirements, and submit to the Engineer for review. Only those items that were rejected or required a resubmittal will be reviewed by the Engineer; All other items will not be reviewed. All re-submittals shall be at least one of the following:

1. Provide a ‘Re-Submittal Summary Sheet’ which indicates how each comment was addressed (it is acceptable to add the responses to a copy of the original submittal review comments).
2. Cloud (or otherwise clearly identify) the revised portions to indicate what is different from the original submittal.

1.06 SUBSTITUTIONS

A. Comply with requirements of Division 01. Products specified by naming one or more manufacturers establishes a basis for quality, styling, capacity, and function. Unless otherwise specified, written requests for substitution must be received at least 14 days prior to Bid Opening by Architect/Engineer who will determine acceptability of proposed substitution. Written acceptance must be obtained from Architect/Engineer prior to Bid Opening.

B. Substitution requests may be submitted for any manufacturer or named product unless specified as "no substitute".

C. Substitution approval does not relieve the Contractor of complying with the work requirements or the concept and intent of the project documents. Pay for any and all

additional project costs that may be caused by Contractor requested substitutions, regardless of whether or not additional costs are overlooked, missed, or unforeseen, and regardless of when substitutions may be approved.

1.07 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. 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. Anchorage/Support: The manufacturers recommended method of anchorage and support is consistent with the method indicated in the Contract Documents, and the item has provisions suitable for such anchorage/support.
8. Lead Time: The product's fabrication, shipping, and delivery period meets the project schedule requirements.
9. 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.
10. Controls: Item is compatible with the controls it will be connected to and has been coordinated with the firm providing the project control work to provide the specified (or required) sequence of operation.

11. 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.
12. 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.

D. 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).

1.08 RECORD DOCUMENTS

A. Comply with requirements of Division 01. Maintain at project site one set of clean, dry, and legible red-lined record drawings for submittal at Contract Close-out. Record information concurrently with construction progress.

B. Indicate electrical changes in the contract documents. Include change orders, revised branch circuit and feeder wiring layouts, revised circuit identification, pull & junction boxes added during construction, and actual dimensioned location and routing of each underground conduit on record drawings.

1.09 LABELING

A. Where labeling that includes room names and numbers is required for any system to identify devices or for programming purposes, use final room names and numbers determined during construction. Verify room names and numbers with Architect prior to manufacturing labels or programming software.

1.10 OPERATION AND MAINTENANCE MANUALS

A. Comply with requirements of Division 01. Unless otherwise specified, furnish one labeled CD in PDF format and two duplicate hard copy printed sets of Operation and Maintenance Manuals prior to completion of contract. Submit hard copy manuals in labeled and indexed 3-ring binder(s).

B. Include the following information as applicable:

1. Names, addresses, and telephone numbers of the contractor, the installing sub-contractor, and the local representative for each system or equipment.
2. All approved product data and shop drawings.
3. Identify all manufacturer warranties which exceed one year.
4. Model number and serial number of each piece of equipment provided.
5. Data from test results performed under the Contract.

C. Operation and maintenance data shall include complete parts lists, installation and maintenance instructions, safety precautions, operation sequence describing start-up, operation, and shut-down, internal and interconnecting wiring and control

diagrams with data to explain detailed operation and control, and testing methods for each system and item of equipment.

D. Furnish a draft copy of Operations and Maintenance Manual for Architect/Engineer review and incorporate comments prior to final submittal. Allow 14 days for Architect/ Engineer review.

1.11 CONFLICTS

A. Notify the Architect/Engineer of any conflicts or discrepancies before proceeding with any work or the purchasing of any materials related to the conflict or discrepancy 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.

1.12 WARRANTY

A. In addition to requirements covered under General Conditions or Division 01, include manufacturer product warranties that exceed one year. Assemble or list warranties that exceed one year in Operation and Maintenance Manuals indicating start date. Certificates of extended warranty shall identify the Owner as the beneficiary.

B. If the Electrical Contractor does not have offices located within 150 miles of the project, provide a service/warranty work agreement with a local electrical subcontractor approved by the Owner. The service/warranty work agreement shall extend for the contract warranty period, and a copy shall be included in the Operation and Maintenance Manuals.

1.13 INTENT OF PROJECT DOCUMENTS

A. Drawings and specifications are complementary and what is called for in either is binding as if called for in both.

B. The drawings are diagrammatic and show the general arrangement of the construction and do not attempt to show all features of work, exact construction details, or actual routing of conduit and cable. Provide all necessary supports, off-sets, bends, risers, fittings, boxes, wiring, and accessories which are required for a complete and operating installation. Determine locations for required electrical outlets and connections prior to rough-in base on equipment product and installation submittal data and/or review of equipment on site.

C. The level of design presented in the documents represents the extent of the design being furnished to the Contractor; any additional design needed to perform the Work 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. Contractor provided design services shall be included for but not limited to bidder design specifications, temporary electrical systems, layout routing to install the Work and share project space with other building systems, hanger and support systems, seismic bracing, preparation of shop drawings, locating and identifying requirements for equipment and fixture terminations, and methods/means of accomplishing the work.

1.14 COORDINATION

A. Examine architectural, civil, structural, and mechanical drawings and specifications and consult with other trades, as required to coordinate use of Project space and sequence of installation.

B. Arrange wiring and equipment to avoid interference with other work and to maximize accessibility for maintenance and repairs.

C. Coordinate with suppliers and installers to obtain product electrical data, shop drawings, and installation requirements for systems, equipment, and products furnished by Owner and/or other trades as required perform electrical work.

D. Contractor is responsible ensure that equipment, fixtures, and devices being furnished and installed shall fit the space available, taking into account connections, service access, and clearances required by product manufacturer and/or Code. Contractor shall make the necessary field measurements to ascertain the space requirements for proper installation, and shall furnish and/or install equipment so that final installation meets the intent of the Project Documents. If approval is received by Addendum or Change Order to use other than the originally specified items, Contractor shall be responsible for specified capacities and for ensuring that items to be furnished will fit the space available.

E. Contractor is responsible to review all the Project Documents and approved shop drawings provide under other divisions to identify and resolve conflicts between electrical systems and building construction, equipment, cabinets, counters, trim, and special finishes, prior to rough-in.

F. Facilitate coordination between low voltage system sub-contractors during construction. Include time for a minimum of one meeting with all sub-contractors prior to building rough-in to review requirements for each system per Section 26 05 30. Include a second meeting with all sub-contractors to review requirements for all systems utilizing IP structured cabling prior to cover.

1.15 REQUIREMENTS FOR EQUIPMENT FURNISHED UNDER OTHER SECTIONS OR BY OWNER

A. Provide power wiring, disconnect switches, electrical connection of equipment, installation of furnished electrical controllers, parts, and accessories, and field wiring for systems, equipment, and products furnished under other divisions or by Owner. Install controllers, operator stations, and control devices such as limit and temperature switches furnished with equipment.

B. Review equipment submittals prior to electrical rough-in and installation. Verify location, rating, size, type of connections, and required space requirements. Coordinate field wiring requirements and details with supplier and installer. Notify Architect/Engineer of conflicts between requirements for actual equipment being furnished and equipment indicated in contract documents prior to commencing Work.

C. Provide motor controllers and operator stations unless otherwise indicated on the project drawings.

D. D. Make final connections to equipment. Provide cord and plug where required for plug-in connection.

E. Integrated automation systems covered under Division 25 are not included as part of electrical work.

1.16 DEFINITIONS

A. Electrical terms used in these specifications are as defined in NEC Art. 100 unless otherwise noted.

B. Abbreviations: Where not defined elsewhere in the Contract Documents, shall be as defined in RS Means Illustrated Construction Dictionary.

C. Accessible Ceiling: Signifies access that requires the removal of an access panel or similar removable obstruction.

D. The term "Architect," "Architect/Engineer" or "Engineer," means Hultz|BHU Engineers, 1111 Fawcett Avenue, Suite 100, Tacoma, WA, 98402.

E. As Required: 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.

F. Concealed: Hidden from view as in walls, trenches, chases, furred spaces, crawl spaces, unfinished attics, and above suspended ceilings.

G. Conduit: Includes conduit and tubing raceways.

H. Coordinate: 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.

I. Equipment Connection: Make branch circuit connection, mount and connect control devices as required. Provide disconnect and overcurrent protection when required by NEC and IMC, if not otherwise indicated or furnished with equipment.

J. Exposed: Exposed to view in any room, hallway, passageway or outdoors.

K. Finished Areas or Spaces: Areas and/or spaces receiving a finish coat of paint on one or more wall surface.

L. Furnish: Obtain and/or prepare and deliver to the project.

M. Indicated: Shown, scheduled, noted, or otherwise called out on the drawings.

N. Install: Enter permanently into the project complete and ready for service.

O. Open Cable or Wiring: Conductors above grade not installed in conduit or raceway.

P. Panel: Distribution panelboard, lighting and appliance panelboard, load center, and/or low voltage cabinet.

Q. Provide: Furnish and install complete and ready for service.

R. Wiring: The assembly of conductors, raceways, an approved cable assembly, outlets, junction boxes, conduit bodies, fittings, and associated accessories.

S. Verify: Obtain, by a means independent of the project Architect/Engineer and Owner, the information noted and the information needed to properly perform the work.

1.17 SCHEDULE OF VALUES

A. Provide Schedule of Values for use by Architect/Engineer to evaluate progress payment requests during construction.

B. Submit Schedule of Values for review and approval. Include additional line items as requested.

PART 2 - PRODUCTS

2.01 MATERIALS, EQUIPMENT

A. General: Furnish only products that are new and free from defects with a manufacture date that is less than six months from date of installation. Where product and applicable software updates or upgrades are available from the manufacturer, furnish the latest version unless otherwise specified. Furnishing discontinued products and/or products of manufacturers who are no longer in business is not permitted.

B. Listing and Labeling: Furnish and install only products that are listed and labeled by one or more of the following testing laboratories as approved by the Authority Having Jurisdiction:

Underwriter's Laboratories, Inc.	(UL)
ETL Testing Laboratories, Inc.	(ETL)
Factory Mutual	(FM)

C. Each specified product and system to be furnished shall be from a single approved manufacturer. Providing multiple product brands or manufacturers for each type or category, or for multiple units of the same specified product and/or system, is not permitted.

D. Products shall be delivered, handled, and stored per manufacturer recommendations. Protect fixtures, materials, and equipment from rain, water, dust, dirt, snow, and damage. Do not install products that have marred, scratched, deformed, or otherwise damaged. Do not install products that have been wet or exposed to the weather prior to assembly and/or installation.

PART 3 - EXECUTION

3.01 WORKMANSHIP

A. Electrical work shall conform to requirements of ANSI/NECA 1-2015, Standard Practice of Good Workmanship in Electrical Construction.

3.02 INSTALLATION

A. Provide all electrical work as specified and shown in the Project Documents. Provide all labor, equipment, material, accessories, and testing for electrical systems complete and operating. Include all scaffolding, rigging, hoisting, and services necessary for delivery and installation of materials and equipment.

B. Include all required software applications, licensing and associated system programming for electronic products. Provide all software to owner for onsite programming and interfacing.

C. Provide as part of the Electrical Work all hangers, brackets, supports, framing, backing, accessories, incidentals, not specifically identified the project documents, but required to complete the system(s) in a safe and satisfactory working condition.

D. Quantity of materials and layout of the Work shall be provided based on field measurement of the actual project conditions and shall not be based on plan dimensions.

E. Provide all testing and documentation of electrical systems as required to demonstrate compliance with the Project Documents.

F. Provide testing, documentation, and filing required to comply with commissioning requirements of Section C408 of the Energy Code. Include documentation in Operation and Maintenance Manuals.

3.03 CUTTING AND PATCHING

A. Provide cutting and patching to complete electrical work and to provide openings in elements of Work for electrical penetrations. Comply with requirements of Division 01.

B. Locate and execute cuts so as not to damage other work or weaken structural components. Core drill or saw cut rigid materials.

C. Patch to restore to original condition. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.

END OF SECTION

DIVISION 26 – ELECTRICAL

SECTION 26 04 00 – EXISTING ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

A. Demolition of systems applicable to Division 26.

B. Requirements for remodeling applicable to Division 26.

C. Requirements of this section also apply to Divisions 28, and 33.

1.03 EXISTING CONDITIONS

A. The drawings show portions of existing electrical systems which are to remain, be removed, or be modified under the Contract. Concealed features of existing systems are based on field observation and existing record drawings. No guarantee is made as to their correctness.

B. Contractors shall visit the project site prior to bidding and become familiar with the existing conditions and all other factors which may affect the execution of the work. Include all costs related to existing site conditions in the initial bid proposal. Many systems may not comply with NETA or other maintenance standards and may require special precautions and procedures.

C. Failure to visit the project site prior to bid does not relieve the Contractor of the responsibility to provide all required work and a complete installation within the intent of the Contract Documents.

1.04 POWER AND SIGNAL OUTAGES

A. The facility will continue normal operations during the construction work. The Contractor shall schedule power outages with the Architect/Engineer in accordance with requirements of Division 01. Include coordination, identification of affected areas, work schedule, and re-energizing of electrical systems with minimal disruption to facility operations.

B. Unscheduled power or signal outages to Owner occupied areas and systems essential to facility operation or life safety shall not be permitted at any time. In the event that the Contractor's work causes or contributes to a power outage or other system fault, the Contractor is responsible for immediately correcting the problem.

C. Schedule power and signal outages for evenings, weekends, or holidays unless otherwise approved; include costs for overtime and work outside regular hours.

1.05 FIRE ALARM SYSTEM

A. Maintain and operate the existing fire alarm system during construction. Comply with alarm, incident response, and fire watch requirements of the Authorities Having Jurisdiction for all areas served by the system. Plan and provide fire watch and/or temporary wiring where new construction interrupts required system operation.

B. Provide dust protection for installed smoke detectors located within the work area. Clean detectors after work is completed and dust protection is removed.

C. Coordinate all planned shutdowns and tests of the fire alarm system with the Fire Department and Alarm Reporting Center. Notify the Alarm Reporting Center of false

alarms that occur during construction as required to mitigate Fire Department response.

D. Provide investigation, correction, and required repairs to the alarm system for false alarms and system trouble that occur during the project and for system failures cause by the Work. Fines and penalties for excessive false alarms that occur during the Project shall be the responsibility of the Contractor.

E. The Owner shall provide reimbursement for expenses associated with false alarms, system trouble, and system failure if the contractor can satisfactorily demonstrate that the incidents are not related to the Project.

1.06 INTRUSION ALARM SYSTEM

A. Maintain and operate the existing intrusion alarm system during construction. Comply with alarm and incident response requirements of the monitoring agency and Owner for all areas served by the system. Provide temporary wiring where new construction interrupts required system operation.

B. Provide dust protection for installed motion sensors located within the work area. Clean detectors after work is completed and dust protection is removed.

C. Coordinate all planned shutdowns and tests of the alarm system with Alarm Reporting Center. Notify the Alarm Reporting Center of false alarms that occur during construction as required to mitigate police response.

D. Provide investigation, correction, and required repairs to the alarm system for false alarms and system trouble that occur during the project and for system failures cause by the Work. Fines and penalties for excessive false alarms that occur during the Project shall be the responsibility of the Contractor.

E. The Owner shall provide reimbursement for expenses associated with false alarms, system trouble, and system failure if the contractor can satisfactorily demonstrate that the incidents are not related to the Project.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. New and Replacement Materials and Equipment: As specified in applicable sections, except product manufacture shall match existing for minor construction and for accessories to equipment that remains.

B. Materials and Equipment for Patching: Match existing products.

C. In finished spaces provide surface metal raceway systems as specified in other sections where existing construction does not permit concealed installation.

PART 3 - EXECUTION

3.01 PREPARATION

A. Field verify wiring and cabling for existing power and signal systems back to source of supply as required to perform Work.

B. Disconnect electrical systems in walls, floors, and ceilings being removed.

C. Provide temporary wiring and connections to maintain existing systems interrupted by new construction.

D. Carefully remove, store, and reinstall existing removable ceiling tiles where access to perform work is required.

E. Carefully remove, store, and reinstall existing light fixtures where access to perform work is required. Provide additional fixture support and seismic bracing for reinstalled fixtures where required to meet current Code.

F. Cut and Patch conduit penetrations and required holes to access work at walls.

3.02 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Remove, relocate, and extend existing systems to accommodate new construction. For selective demolition, refer to architectural and mechanical plans and include electrical demolition to support removal and replacement work not otherwise indicated in electrical drawings.

B. Electrical demolition includes the disconnecting, removal, and disposal of fixtures, devices and equipment where indicated, along with associated wiring.

C. The following shall be considered as abandoned unless otherwise indicated:

1. Wiring to fixtures, devices, and equipment being removed or disconnected.
2. Conduit containing conductors or cable that have been disconnected from a source of supply or left empty by the removal of conductors.
3. Open conductors or cable that have been disconnected from a source of supply.
4. Fixtures, devices, equipment, and outlets located in walls, ceilings, and floors indicated to be removed.
5. Fixtures, devices, and equipment identified as being replaced.

D. Remove abandoned wire and cable for power and signal systems to source of supply.

E. Remove abandoned conduit, cable, and outlets where exposed and within accessible ceiling, attic, crawl, plenum, and opened wall spaces. Cut conduit flush with walls and floors; patch surfaces in finished spaces. Outdoors remove abandoned conduit and cable down to 24 inches below grade and restore site to its original grade and finish.

F. Disconnect abandoned outlets and remove devices. Provide blank covers for abandoned outlet boxes in floors, walls, and hard ceilings to remain.

G. Disconnect and remove abandoned switchboards, panelboards, distribution equipment, and electrical devices.

H. Disconnect power to utilization equipment being removed or abandoned in place.

I. Disconnect and remove abandoned light fixtures, including brackets, stems, hangers, pole base and other accessories.

J. Repair adjacent construction and finishes damaged during demolition and extension work.

K. Cut-in flush outlet boxes and fish conduit in existing construction of remodeled areas where conditions permit. Flexible conduit is approved where fishing of conduit is required. Where existing construction does not permit flush installation, use surface metal raceway.

L. Extend existing outlet boxes as required to accommodate new surface treatments or to extend wiring with surface raceway.

M. Maintain access to existing electrical systems to remain active. Modify installation or provide access panels as appropriate.

N. Replace, modify or extend existing outlet boxes to meet volume requirements. Cut surfaces as required to replace (or modify) existing outlet boxes and to install supports for new boxes and fixtures and patch to match adjacent surface.

O. Provide new supports for existing conduit and open cable accessed during construction and which is to remain or be reused, as required to comply with current Code. Comply with requirements of applicable signal system specifications for support of signal cables.

3.03 DISPOSITION OF MATERIALS

A. Prior to start of demolition, coordinate with Owner to identify materials and equipment for salvage. Disconnect and remove items to be salvaged and deliver to an area on site designated by the Owner. Disconnect, remove, and handle salvage material and equipment in a manner so as not to damage or otherwise render unusable.

B. Materials and equipment removed and not reused or salvaged to the Owner shall become the property of the Contractor unless otherwise indicated. Remove such material and equipment from the Owner's property and dispose legally off site.

3.04 CLEANING AND REPAIR

A. Luminaires: Clean interior and exterior surfaces, reflectors, and lens. Replace lamps, ballasts, and broken electrical parts.

3.05 NAMEPLATES AND CIRCUIT DIRECTORIES

A. Provide nameplates for existing distribution equipment to indicate new and revised equipment, circuit, and load designations.

B. Update panelboard and load center circuit directories to indicate changes and additions to each circuit. Updated and existing circuits shall be typewritten on new removable circuit index cards.

C. Nameplates and circuit directories shall comply with requirements of Section 26 20 00.

END OF SECTION

DIVISION 26 – ELECTRICAL

SECTION 26 05 00 – BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

B. Section 26 01 00 - Electrical General Requirements.

C. Section 26 05 00 - Basic Materials and Methods.

1.02 SECTION INCLUDES

A. Conduit and Fittings.

B. Building Wire and Cable.

C. Wiring Connections and Terminations.

D. Boxes.

E. Wiring Devices.

F. Supporting Devices.

1.03 SUBMITTALS

A. Submit product data for conduit fittings, wire and cable, watertight connectors, and wiring devices.

1.04 OPERATION AND MAINTENANCE DATA

A. Include data for wiring devices in Operation and Maintenance Manuals.

PART 2 - PRODUCTS

2.01 CONDUIT

A. Rigid Steel Conduit (RGS): ANSI C80.1; hot dipped galvanized.

B. Intermediate Metal Conduit (IMC): Hot dipped galvanized.

C. Electric Metallic Tubing (EMT): ANSI C80.3; galvanized tubing.

D. Flexible Metal Conduit: Galvanized steel. Heavy wall except reduced wall may be used where concealed in building construction.

E. Liquid Tight Flexible Metal Conduit: Galvanized steel, PVC jacket.

2.02 FITTINGS

A. RGS and IMC Conduit: ANSI/NEMA FB 1; threaded type. Provide bushings, hubs and connectors with insulated throat, for conduit terminations.

B. EMT Conduit: ANSI/NEMA FB 1; steel, compression type. Crimp-on, drive-on, indenter, and set screw type prohibited. Provide connectors with insulated throat for conduit larger than 3/4-inch diameter. Provide raintight fittings for conduit installed outdoors.

C. Flexible Conduit: ANSI/NEMA FB 1; steel, single screw squeeze type.

D. Liquid Tight Flexible Conduit: ANSI C33.84, steel. Provide PVC coated fitting where installed outdoors.

E. Water and Vapor Conduit Sealants: Hydra-Seal S-50 conduit sealing putty or approved; Tyco/Rachem/TE blank duct plug or approved; Polywater FST conduit sealing foam system or approved.

F. Corrosion Protection: Zinc plated minimum indoors and hot dipped galvanized minimum outdoors and indoor wet locations for all metal fittings and accessories except use PVC coated or stainless steel for chlorine treatment rooms, agricultural buildings, within 100 feet of shoreline, and other corrosive environments.

2.03 WIRE AND CABLE

A. Copper Building Wire, Interior: Type THWN-2, 600 volt insulation; conductors 8 AWG and larger shall be stranded. Type XHHW-2 may be substituted for conductor sizes 4 AWG and larger.

2.04 WIRE CONNECTORS

A. Connectors for Wire Size 10 AWG and Smaller: Insulated steel spring twist-on pressure connector with plastic cap. Outdoors use watertight type with prefilled sealant gel.

B. Connectors for Wire Size 8 AWG and Larger: Solderless mechanical or compression type with pre-formed or shrink sleeve insulated cover. Outdoors make watertight using shrink sleeve or pigtail cap and sealing mastic.

2.05 BOXES

A. Outlet Boxes: ANSI/NEMA OS 1; galvanized sheet steel, with 1/2-inch male fixture studs or plaster rings as required.

B. Junction and Pull Boxes: Outlet box with blank cover except boxes larger than 4 inch square shall be screw cover type, galvanized steel with grey enamel finish, NEMA 1 indoors and NEMA 3R outdoors, unless otherwise indicated.

C. Barriers: Provide permanent barriers in outlet boxes to separate adjacent wiring devices where voltage exceeds 300 volts. Provide permanent voltage separation barriers in outlet and junction boxes to separate wiring above 100 volts from wiring below 100 volts and where otherwise required by Code.

D. Color Coding of Device and Junction Boxes for Special Systems: Field painted or otherwise manufactured in the specified color, both inside and outside of box and cover. Provide color identification for the following electrical systems: Fire Alarm System - RED, Emergency Systems (NEC 700) - ORANGE.

E. Sound Attenuation Wrap: UL listed, 0 VOC, sound attenuating wrap for sealing around outlet boxes. SpecSeal SSP Putty Pad or approved.

2.06 WIRING DEVICES

A. Duplex Receptacles: Specification grade 5362 series, NEMA 5-20R, grounding type, as manufactured by Hubbell, Leviton, Pass & Seymour, Cooper. Color: Ivory.

B. Ground Fault Circuit Interrupter (GFCI) Receptacles: Same manufacture, rating, and color as duplex receptacles except devices shall comply with UL 943, Class A, with self test.

C. Duplex Receptacles, Weather Resistant for Damp and Wet Locations: Same manufacture, rating, and color as duplex and GFCI receptacles except devices shall be UL listed as weather resistant and permanent special purpose identification shall be visible on the device.

D. Flush Mounted Device Plates: Super heavy duty for high abuse application, rigid high impact thermoplastic, smooth finish, color to match device. Thermoset, phenolic, urea, nylon, and flexible polycarbonate not approved. Cooper PJ series manufacture or approved.

E. Surface Mounted Device Plates: Raised galvanized steel on steel boxes; cast or stamped sheet aluminum on cast boxes.

F. Damp and Wet Location Device Plates: ANSI/UL 514D; Commercial grade, low profile, lockable, die cast metal cover assembly, listed as weatherproof when in use and identified as extra duty. Hubbell/TayMac MX series or approved.

2.07 SUPPORTING DEVICES

A. Metal Conduit Clamps and Straps: Steel, screw type; zinc or cadmium plated minimum indoors, hot dipped galvanized minimum outdoors.

B. Support Channel: Slotted 12-gauge steel channel with fittings, fasteners, brackets, clamps, floor plates, and accessories required; Pre-galvanized zinc coated (G90) indoors, ASTM 123 hot dipped galvanized outdoors.

C. Fasteners: Expansion anchors in concrete and solid masonry; toggle bolts in hollow masonry, plaster, or gypsum board wall construction; sheet metal screws in metal construction; wood screws in wood construction; set screw type beam clamps on steel columns and beams; U.L. listed clips for metal studs. Metal parts and accessories to be zinc or cadmium plated minimum indoors and hot dipped galvanized minimum outdoors.

D. Support Wires: Support wires above accessible ceiling grids, steel #12 AWG minimum.

E. Roof Supports: Do not install conduit exposed on roofs. Free standing, stackable, 7.5 inch square, one piece molded PVC pipe support with U shaped rolling cradle, MIRO Industries Pillow Block #24-R. Free standing molded thermoplastic pyramid style block with hot dipped galvanized channel strut support hardware, Erico Caddy ST series or approved.

2.08 ACCESSORIES

A. Pulling Wire:

1. Interior; continuous fiber pulling line, 190# tensile strength.

2. Below grade; Polyester measuring pulling tape 5/8 inch wide, 1800# tensile strength. Muletape.

PART 3 - EXECUTION

3.01 WIRING METHODS

A. General:

1. Fixed wiring shall be conductors installed in conduit.

2. Conceal all wiring within construction unless otherwise noted on drawings or specifically authorized by the Architect/Engineer.

3. Where contractor wiring methods require the application of conductor ampacity adjustment or correction factors under NEC 310.15, the contractor shall submit calculations that show Code compliance, except the adjusted ampacity of the

conductors installed shall not be less than the circuit overcurrent device rating shown or specified.

4. Conduit sizes shall not be reduced to smaller size than shown or otherwise noted on plans.
5. Feeders shown or otherwise noted on plans shall not be combined to share a common conduit homerun. Branch circuit homeruns shown or otherwise noted on plans shall not be combined to share a common conduit with other circuits.
6. Device Plates: It is the electrical contractor's responsibility to ensure that all line voltage and low voltage system faceplates and visible trim pieces are the same color. Exception: Where stainless steel device plates are used for line voltage systems, low voltage systems may use non-metallic plates of the same color.

B. Conduit Requirements:

1. Rigid Steel Conduit (RGS): May be used in all areas. Required at penetrations thru fire rated construction rated greater than 1 hour.
2. Intermediate Metal Conduit (IMC): May be used in all areas except where RGS is required or indicated.
3. Electrical Metallic Tubing (EMT): May be used in dry and damp locations where not subject to damage. May not be used in concrete, where in contact with earth, or where RGS is required or indicated. May not be used for service entrance conductors inside a building. Maximum trade size 2 inches.
4. Flexible Conduit: Required for final equipment connections (maximum length 36 inches) Use liquid tight in damp or wet locations.

C. Wire and Cable Requirements: Use copper conductors.

3.02 SUPPORT - GENERAL

A. Support wiring, conduit, raceways, boxes, equipment, and fixtures from building structural members. Provide additional framing, channel, or listed support attachments as required to span or support between structural members and to avoid interference from pipes, ducts, and other equipment.

B. Do not install support anchors to penetrate thru roof deck.

C. Do not violate the integrity or exceed the capacity of the building structure used for support. Provide/fabricate additional support elements to transmit loads to the floor or other parts of the building structure that can carry the load as approved by the Architect/Engineer.

3.03 CONDUIT SIZING, ARRANGEMENT, AND SUPPORT

A. Minimum conduit trade size 1/2-inch diameter except all homeruns and where installed below grade outdoors conduits shall be 3/4-inch minimum diameter.

B. Arrange conduit to maintain headroom and present a neat appearance.

C. Route conduit parallel and perpendicular to walls and adjacent piping.

D. Maintain 12-inch clearance between conduit and heat sources such as flues, steam pipes, and heating appliances.

E. Locate holes in joists within center third of member depth measured from the edge and at least 24 inches from load bearing points. Maximum hole diameter one inch.

F. Support conduits from building structure with conduit straps or rods and hangers. #8 solid wire and CADDY clips may be used to hang 3/4-inch diameter conduit and smaller above accessible ceiling spaces.

G. Group conduit in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps. Provide space for 25 percent additional conduit.

H. Do not support conduit with perforated pipe straps or tie wraps. Remove all wire used for temporary conduit support during construction, before conductors are pulled.

I. Do not bore holes in truss members or notch structural members.

J. Steel conduit installed as part of a 2 hour fire rated wiring assembly shall be supported 5 feet on center where required by the cable system installation requirements.

3.04 CONDUIT INSTALLATION

A. Use conduit hubs or sealing locknuts for fastening conduit to cast boxes and for fastening conduit to sheet metal boxes in damp locations.

B. Use conduit bodies to make sharp changes in direction, as around beams.

C. Use factory elbows for PVC conduit and for bends in metal conduit larger than 1 inch. Conduit bends for signal systems that are greater than 45 degrees shall be minimum radius sweeps as follows:

Under 2 inches	Standard radius
2 inches - 3 inches	24 inch radius
Over 3 inches	36 inch radius

D. Install insulated bushings on each end of conduit larger than 1 inch.

E. Use suitable conduit caps to protect installed conduit against entrance of dirt and moisture.

F. Install pull wire in empty conduits.

G. Conduits at Roof Decks: Conduit installed within 1.5 inches of the nearest surface of metal corrugated roof decks and conduit concealed within roofing systems on top of roof decks shall be RGS or IMC conduit.

H. Install flexible conduit thru oversized bushed sleeve or cored opening where conduit crosses building wall expansion or seismic joints. Provide up to 54 inches of flexible wiring with 6 inches minimum of conduit slack each side of the wall assembly to allow for free movement across the joint.

I. Do not install conduit in concrete slab on grade.

J. Do not install conduit in direct contact with underside of roof deck.

K. Seal all underground conduits entering and terminating within a building or structure using approved non hardening duct seal putty or a sealing bushing. Seal spare conduits using a watertight blank plastic duct plug. Seal all underground conduits entering and terminating below grade, such as in a crawl space or basement, using an approved closed cell foam sealant system.

3.05 CONDUIT PENETRATIONS

A. Roof Penetrations: Provide sheet lead flashing (4 pounds per square foot) around each conduit which penetrates a roof. Extend 10" in all directions from conduit, and up 8" on conduit sized to match conduit diameter. Seal top of flashing around conduit with a weatherproof non-hardening mastic.

B. Exterior Walls: Core drill or cast sleeve for each conduit one size larger than conduit diameter. Seal all openings at each penetration with acrylic weatherproof caulking suitable for painting. Below grade seal with "Chase-Foam" silicone sealant or other approved method acceptable to Architect/Engineer.

C. Interior Walls and Partitions: Cut one size larger than conduit diameter. Seal all openings at each penetration with low VOC level general purpose interior sealant as specified in Division 07.

3.06 CONDUCTOR INSTALLATION

A. Minimum Conductor Size: #12 AWG, except #10 AWG minimum for outdoor and exterior building lighting circuits and #14 AWG minimum for control circuits and for lighting fixture taps not to exceed 72 inches.

B. Splice conductors only in junction or outlet boxes.

C. Arrange conductors neatly at termination such that a clamp-on ammeter may be used.

D. Clean conduit free of debris before conductor installation; install conductors using pulling lubricant.

3.07 CONDUCTOR IDENTIFICATION

A. Provide non-metallic wire markers on each conductor in panelboards and in junction boxes having more than 6 conductors. Identify branch circuit or feeder number for power and lighting circuits.

B. Color Coding of Insulated Equipment Ground: Solid green.

C. Color Coding of 208/120Volt System: Phase A - black, Phase B - red, Phase C - blue, Neutral - white.

D. Color Coding of 480/277 Volt System: Phase A - brown, Phase B - orange Phase C - yellow, Neutral - gray.

3.08 BOX LOCATIONS

A. Provide electrical boxes for outlets, junctions and equipment connections as shown and as required for splices, taps, wire pulling, and code compliance.

B. Electrical box locations shown are approximate unless dimensioned. Obtain equipment outlet locations from equipment manufacturer prior to rough-in. Coordinate outlet and wall switch locations with casework and finish elements shown on Architectural drawings. Install to fit conditions or as directed.

C. Change location of wall outlets, wall switches, and lighting outlets up to fifteen feet without charge when requested by Architect/Engineer prior to installation.

D. Height of outlets unless otherwise directed: See Drawings.

3.09 BOX INSTALLATION

A. Set wall outlet and wall switch boxes vertically.

B. Support boxes independently of conduit, piping, and ductwork; securely fasten in place.

C. Provide recessed outlet boxes in finished areas. Flush front edge of box or plaster ring even with finished surface.

D. Provide blank cover plate over all boxes that do not contain devices or are not covered by equipment.

E. Do not install flush boxes on opposite sides of a wall within the same stud space. Maintain 24 inch minimum box separation in fire rated wall assemblies.

3.10 WIRING DEVICES

A. Ground Fault Circuit Interrupter (GFCI) Protection: Provide for receptacles located outdoors, within 6 feet of sinks, in bathrooms, kitchens, indoor wet locations, locker rooms with associated shower facilities, elevator pits, elevator machine rooms, crawl spaces, garages, service bays, rooftops, at counters and work surfaces where food and/or beverage preparation occurs, water coolers, and as otherwise indicated. GFCI receptacles are not required where branch circuit is protected by GFCI circuit breaker.

3.11 LABELING

A. Outlets: Identify panel and circuit number on faceplate of convenience and special purpose outlets. Use self-adhesive, polyester or vinyl laminated labels with machine generated alpha-numeric circuit identification, 1/4-inch high black letters on clear background. Exception: Use white letters on black or brown color device plates.

B. Junction Boxes: Label or mark cover with panel and circuit number. Locate on inside of cover except locate on outside of junction box cover in attics, crawl spaces, equipment rooms and above accessible ceilings.

3.12 TESTS

A. Perform continuity test on all feeder and branch circuit conductors. Verify proper phasing and that no short circuits or accidental grounds exist.

B. Check all convenience outlets for correct wiring connections using a polarity circuit tester. Test AFCI and GFCI circuits for proper operation with an approved tester.

C. Torque test conductor lug terminations to manufacturers recommended values.

END OF SECTION

DIVISION 26 – ELECTRICAL

SECTION 26 05 26 – GROUNDING AND BONDING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

A. Power System Grounding.

B. Electrical Equipment and Raceway Grounding.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Mechanical Connectors at Ground Connections: Heavy duty, solderless, bolted pressure or compression type connectors or clamps labeled as being suitable for the purpose. Manufacturer's standard grounding lug when furnished as part of panelboards and other equipment.

B. Ground & Bonding Conductors: Bare, soft drawn copper; stranded for 8 AWG and larger, unless otherwise indicated or specified. Equipment grounding conductors may be insulated with green color identification per Code.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Equipment Grounding Conductor: Provide separate insulated green equipment grounding conductor in feeders and in branch circuits to plug-in outlets. Provide equipment grounding conductor in non-metallic conduits and flexible conduit. Size equipment grounding conductors per NEC 250.122 unless larger size is shown or specified.

B. Provide grounding locknuts on each end of feeder conduits serving panelboards. Exception: Provide grounding bushing with bonding jumper where conduit is used as equipment ground.

C. Ground exposed non-current carrying metal parts of equipment fastened in place or connected by permanent wiring and likely to become energized per Code. In MDF and in IDF rooms, bond cable trays and equipment racks to terminal board ground bus using #6 minimum AWG conductor.

END OF SECTION

DIVISION 26 – ELECTRICAL

SECTION 26 20 00 – ELECTRICAL DISTRIBUTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

A. Panelboards and Circuit Breakers.

B. Disconnect Switches.

C. Fuses.

D. Compression Lugs.

1.03 SUBMITTALS

A. Submit product data for circuit breakers.

B. Coordinate dimensions of equipment with site and project space dimensions to verify equipment will fit, conform to indicated layout, and meet NEC and manufacturer clearance requirements.

1.04 OPERATION AND MAINTENANCE DATA

A. Include data for circuit breakers and fuses in Operation & Maintenance Manuals.

1.05 SPARE PARTS

A. Fuses: Furnish to Owner 3 spare fuses of each type and rating installed.

B. Fuse Pullers: Furnish 2 fuse pullers to the Owner.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Panelboards, Circuit Breakers and Disconnects: Square 'D' by Schneider

B. Fuses: Mersen

2.02 POWER DISTRIBUTION PANELBOARDS

A. Circuit Directory: Index card under plastic with metal frame holder on each branch switch.

B. Circuit Breakers: UL 489; molded case, thermal magnetic trip, AIC rating greater than available symmetrical short circuit amperes. Multi-pole breakers shall be single handle with common pole operation. Feeder circuit breakers required to selectively coordinate shall have LI or LSI solid state trip. Circuit breakers rated 1000 amps and larger shall have LSI solid state trip.

2.03 DISCONNECT SWITCHES

A. Safety Switches: NEMA KS 1; heavy duty, quick make, quick break, handle with lock out / tag out provisions. Provide rating, number of poles, and fusing required for load served.

B. Toggle Switches for Small Motors and Appliances: NEMA WD 1; horsepower rated 20 ampere general use snap switch with lock-out attachment.

C. Switch Enclosures: NEMA ICS 6; Type 1 for dry locations, Type 12 for industrial locations, Type 3R for damp or outdoor locations.

2.04 FUSES

A. Approved Fuses, 600 Amperes and Less, for Branch Circuits and Power Distribution:

1. ANSI/UL 198C Class J low peak with time delay unless otherwise indicated except ANSI/UL 198E Class RK5 may be used in safety switches for protection of motors and transformers.

2.05 NAMEPLATES AND LABELS

A. Nameplates: Engraved three-layer laminated plastic, white letters on black background, affixed with stainless steel screws, adhesive acceptable in dry locations.

B. Letter Height: 1/2 inch for series combination rating identification. 1/4 inch for switchboards, panelboards, motor control centers, circuit breakers, switches, and disconnecting means; 1/8 inch for motor starters, contactors, time switches, and equipment served.

PART 3 - EXECUTION

3.01 PANELBOARDS

A. Provide typewritten circuit directory for each panelboard listing load description for each circuit. Use final room names and numbers as verified with the Owner.

3.02 DISCONNECTS

A. Provide a disconnect in addition to the controller disconnecting means at installed motor loads that are not in sight of motor controller as required by NEC 430.102(B).

B. Safety Switches for Variable Frequency Drives (VFD): Provide two (2) #12 600 volt rated conductors with the motor feeder between VFD and load side motor disconnect interlock to disable controller operation when the safety switch handle is operated to the open position.

3.03 FUSES

A. Install fuses in fusible switches.

B. Size fuses for motor loads at 150% of nameplate full load amperes; size fuses for air conditioning and refrigeration equipment at maximum recommended nameplate rating.

3.04 CIRCUIT BREAKERS

A. Install circuit breakers in accordance with manufacturer instructions and recommendations.

B. Set adjustable breakers to comply with the approved protective device coordination study or as directed by the Engineer.

3.05 NAMEPLATES AND LABELS

A. Switchboards, Panelboards: Provide nameplate to identify equipment designation, voltage, and source of supply for each, e.g. Panel A, 208/120V, Fed from Panel M. Provide arc flash protection label. See below for example format of nameplate:

Panel A

208/120V
Fed From Panel M

B. Individual Circuit Breakers, Switches, and Motor Starters Installed in Switchboards, Distribution Panelboards Without Circuit Index: Provide nameplate to identify circuit source, circuit number, and load served.

C. Individual Enclosed Circuit Breakers, Safety Switches, and Disconnecting Means: Provide nameplate to identify load served and circuit source and circuit number.

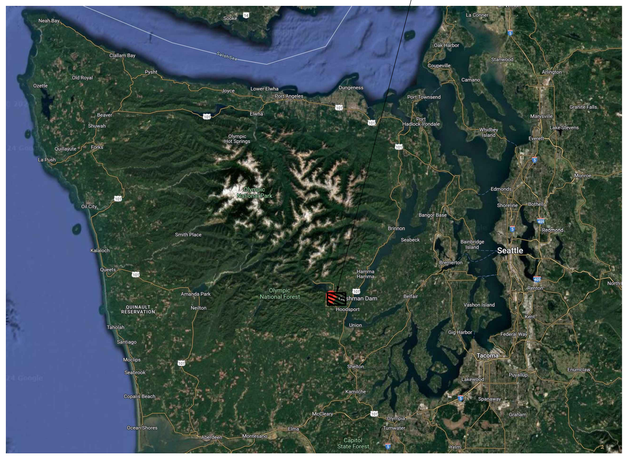
D. Equipment Served: Provide nameplate to identify equipment designation corresponding with nameplate of serving overcurrent device, disconnect switch, or controller when there is more than one of same type of equipment being served, e.g. Air Handler No. 2. Coordinate with Architect/Engineer to assign numbers when not designated in equipment schedules.

E. Nameplate and Label Location: Secure to equipment fronts, except recessed panelboards in finished locations secure nameplates and labels to inside face of door.

3.06 TESTS

A. Motors and Compressors: Record all nameplate data. Measure actual voltage and running amperes for each phase. Record manufacturer and catalog number of overload thermal units installed.

END OF SECTION



TACOMA POWER - CUSHMAN DAM
SERVICE HOUSE - HVAC UPGRADES

PROJECT INFORMATION

OWNER & PROJECT LOCATION

CUSHMAN DAM SERVICE HOUSE,
391 STANDSTILL DRIVE,
HOODSPORT WA 98548

HYDRO MANAGER: BRAD ENNIS bennis@cityoftacoma.org (253) 779-7206

PROJECT MANAGER: RYAN MCLAUGHLIN rmclaughlin@cityoftacoma.org (253) 307-7863

PROJECT DESCRIPTION

PROVIDE NEW VARIABLE REFRIGERANT FLOW (VRF) SYSTEM FOR HEATING/COOLING, AND A DEDICATED OUTSIDE AIR SYSTEM (DOAS) FOR VENTILATION AIR PER WASHINGTON STATE ENERGY CODE.

NOTE: THE ABOVE IS A SUMMARY DESCRIPTION ONLY; SEE COMPLETE PROJECT DOCUMENTS FOR ALL WORK.

DESIGN TEAM

ENGINEER

HULTZ BHU ENGINEERS, INC.
1111 FAWCETT AVENUE, SUITE 100
TACOMA, WASHINGTON 98402

MECHANICAL: JUSTEN COWAN justenc@hultzbhu.com (253) 383-3257

ELECTRICAL: JOHN MCINTIRE johnm@hultzbhu.com (253) 383-3257

TACOMA POWER QA/QC:

MECHANICAL LEAD: BLAKE YORK byork@cityoftacoma.org (253) 495-8297

ELECTRICAL LEAD: BIZHAN HOOMAN bhooman@cityoftacoma.org (253) 722-3348

WORK RESTRICTIONS

1. BUILDING WILL BE OCCUPIED AND IN USE BY OWNER DURING THE PROJECT. CONDUCT WORK IN A MANNER TO ALLOW OWNER'S CONTINUED USE & OPERATION.
2. ALL BUILDING UTILITY DOWNTIMES SHALL BE SCHEDULED WITH BUILDING OWNER IN ADVANCE. NOTIFY CITY IN WRITING 14 DAYS PRIOR TO ALL SCHEDULED DOWNTIMES.
3. NO CONTRACTOR ACCESS TO THE SUBSTATION YARD WITHOUT A DESIGNATED TACOMA POWER SAFETY WATCH BEING ON-SITE. PROVIDE 2 DAYS NOTICE PRIOR TO NEEDING THIS SAFETY WATCH.

DRAWING INDEX

GENERAL NOTES

1. CONTRACTOR SHALL VISIT THE SITE PRIOR TO CONSTRUCTION TO CONFIRM EXISTING SITE & BUILDING CONDITIONS, EXISTING CONSTRUCTION MATERIALS & OTHER ASPECTS OF THE WORK.
2. BUILDING & SITE FEATURES SHOWN ON PLANS ARE APPROXIMATE AND ARE BASED ON MODEST FIELD INVESTIGATION; A COMPLETE REVIEW IS REQUIRED TO BE MADE BY THE CONTRACTOR.
3. ALL ITEMS ARE NEW UNLESS SPECIFICALLY NOTED AS EXISTING.
4. PROVIDE BARRICADES AND SIMILAR PROTECTIONS TO KEEP NON-CONSTRUCTION PERSONNEL CLEAR OF CONSTRUCTION AREAS.
5. PROVIDE ALL CUTTING AND PATCHING AS NECESSARY TO ACCOMPLISH THE WORK INDICATED. PATCH AND RESTORE ALL AFFECTED AREAS TO PRE-CONSTRUCTION CONDITIONS OR BETTER.
6. ALL AREAS WORKED IN AS PART OF THIS PROJECT SHALL BE THOROUGHLY CLEANED BY THE CONTRACTOR, WITH ALL CONSTRUCTION DEBRIS REMOVED AND THE AREAS SWEPT CLEAN, DAILY.
7. CONTRACTOR SHALL USE CAUTION TO PREVENT DAMAGE TO EXISTING BUILDING & EQUIPMENT. RESTORE ALL DISTURBED AND DAMAGED AREAS TO PRE-CONSTRUCTION CONDITIONS OR BETTER.
8. CONTRACTOR SHALL PROVIDE TEMPORARY PROTECTION OR RELOCATE FURNITURE AS REQUIRED TO ACCOMPLISH WORK.

PROJECT LOCATION

NORTH
SITE MAP
NTS

PROJECT LOCATION, SEE "VICINITY MAP 2"

NORTH
VICINITY MAP 1
NTS

PROJECT LOCATION, SEE "SITE MAP"

NORTH
VICINITY MAP 2
NTS

BID SET 1-20-25

HULTZ BHU engineers inc
1111 Fawcett Ave Suite 100 Tacoma, WA 98402
Phone: (253) 383-3257 Fax: (253) 383-3283
general@hultzbhu.com Job Number: 24-149

WARNING
0 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

REVISION NO. 0

RICHARD A. HULTZ
23170
SIGNED
1-20-2025

CITY OF TACOMA
DEPARTMENT OF PUBLIC UTILITIES
LIGHT DIVISION

CUSHMAN DAM–SERVICE HOUSE
HVAC UPGRADES
COVER SHEET

SUBMITTED	DRAWN MB	STAMPED RH
	DATE 1/20/25	
APPROVED	DRAWING NO. G1.00	

MECHANICAL GENERAL NOTES

1. 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.

2. MECHANICAL COORDINATION: COORDINATE ALL MECHANICAL WORK W/ OTHER TRADES. MECHANICAL WORK IS NOT LIMITED TO MECHANICAL DRAWINGS AND DIVISIONS 20 AND 23 SPECIFICATIONS. THERE ARE ADDITIONAL ASPECTS OF THE MECHANICAL WORK INDICATED ON OTHER DRAWINGS. CONTRACTOR SHALL REVIEW ALL DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL MECHANICAL WORK.

3. BUILDING JOINTS: PROVIDE FLEXIBLE CONNECTIONS IN ALL PIPING & DUCT SYSTEMS WHICH CROSS SUCH JOINTS, SIZED/CONFIGURED TO ACCOMMODATE SPECIFIED MOVEMENT (SEE SPECIFICATIONS) IN ANY DIRECTION W/O PERMANENT DAMAGE. SUBMIT DETAILS OF FLEXIBLE CONNECTIONS & LOCATIONS.

4. PIPE ROUTING: ALL PIPING SHOWN IS SCHEMATIC, CONTRACTOR SHALL PROVIDE ALL OFFSETS/ELBOWS AS REQ'D TO ALLOW ROUTING AROUND STRUCTURE, ELECTRICAL, & OTHER INTERFERENCES. ALL PIPING SHALL BE RUN CONCEALED, UNO.

5. CONDENSATE DRAINS: PROVIDE PRIMARY CONDENSATE DRAINS FOR UNITS GENERATING CONDENSATE IN ACCORDANCE WITH CODE REQUIREMENTS.

6. CLOSURE COLLARS: ALL DUCT PENETRATIONS THRU WALLS SHALL BE PROVIDED WITH CLOSURE COLLARS (BOTH SIDES OF PENETRATION) AND BE TIGHTLY SEALED TO PREVENT THE TRANSMISSION OF NOISE.

7. COORDINATION: CONTRACTOR SHALL CAREFULLY COORDINATE WORK W/ ALL OTHER TRADES, ESPECIALLY IN CEILING SPACES WHERE SPACE IS TIGHT. SHEET METAL CONTRACTOR SHALL HAVE PRIORITY OVER OTHER MECHANICAL TRADES IN CEILING SPACE WHERE CONFLICTS OCCUR.

8. DUCT LAYOUT: ALL DUCTWORK SHOWN IS SCHEMATIC, CONTRACTOR SHALL PROVIDE ALL OFFSETS/ELBOWS AS REQ'D TO ALLOW ROUTING AROUND STRUCTURE, ELECTRICAL, & OTHER INTERFERENCES.

9. FLEXIBLE DUCT: LENGTH SHALL NOT EXCEED 8 FEET, AND MAY ONLY BE USED WHERE SPECIFICALLY SHOWN ON THE PLANS.

10. BALANCING DAMPERS: PROVIDE MANUAL VOLUME DAMPERS IN ALL BRANCH DUCTS AND SPLITS IN MAIN DUCTS AND WHERE REQUIRED BY BALANCERS; ONLY SOME OF THE REQUIRED DAMPERS ARE SHOWN ON THE PLANS.

11. DUCT SIZES: UNSIZED DUCTS SHALL MATCH THE SIZE OF THE LARGEST ADJACENT DUCT THAT IS SIZED. WHERE THE ADJACENT DUCT SIZE IS NOT SHOWN, PROVIDE THE FOLLOWING SIZED DUCTS (OR EQUIVALENT RECTANGULAR).

CFM	DUCTS TO AIR INLETS/OUTLETS	OTHER DUCT
0 - 100	6" Ø	6" Ø
101 - 150	8" Ø	8" Ø
151 - 250	10" Ø	8" Ø
251 - 400	12" Ø	10" Ø
401 - 500	14" Ø	12" Ø
501 - 700	16" Ø	12" Ø

>700 SIZE BASED ON 500 FPM SIZE BASED ON 0.08"/100' PD

12. BALANCING NOTES: PROVIDE AIR BALANCING OF HVAC SYSTEM.

13. CONCEALED: ALL DUCTWORK & PIPING SHALL BE RUN CONCEALED, UNO.

14. ACCESS DOORS: PROVIDE DUCT ACCESS DOORS AT ALL DAMPERS & BDD'S.

15. BALANCER CFM'S: WHERE RETURN GRILLE CFM'S ARE NOT INDICATED, BALANCER SHALL CALCULATE & SUBMIT FOR ENGINEER REVIEW. UNIT RA=SA-OA.

16. FLEX CONNECTORS: PROVIDE FLEX CONNECTORS IN DUCT CONNECTIONS TO ALL EQUIPMENT.

17. GRILLE ALIGNMENT: RESTROOM EXHAUST & TRANSFER GRILLES SHALL BE INSTALLED TO BE INLINE W/ EACH OTHER (UNO).

18. WHERE EXPOSED: VERIFY MOUNTING HEIGHTS OF ALL EXPOSED DUCTWORK & WALL GRILLES/WALL CAPS W/ CITY PRIOR TO BEGINNING WORK.

19. EQUIPMENT TRANSITIONS: PROVIDE TRANSITIONS FROM DUCT SIZES INDICATED TO CONNECTION SIZES AT EQUIPMENT TO MATCH UNIT CONNECTIONS. WHERE THE CONNECTING DUCT IS LINED, THE TRANSITION SHALL BE LINED.

20. DUCT PRESSURE CLASS: DUCTS SHALL BE CONSTRUCTED TO THE PRESSURE CLASS CORRESPONDING TO FAN INDICATED ESP (ROUND UP TO NEXT PRESSURE CLASS). SEAL DUCTS PER WSEC AND SPECIFICATIONS.

MECHANICAL LEGEND

SYMBOL	DESCRIPTION
C	CONDENSATE LINE (C)
RG	REFRIGERANT GAS (RG)
RL	REFRIGERANT LIQUID (RL)
	ISOLATION VALVE
	UNION
	CONCENTRIC REDUCER
	PIPE UP
	PIPE DOWN
	PIPE TEE IN LINE, BRANCH PIPE DOWN
20/12	DUCT (FIRST FIGURE, SIDE SHOWN)
R(D)	RISE (R) OR DROP (D) ARROW IN DIRECTION OF FLOW
	DUCT SECTION (SUPPLY)
	DUCT SECTION (EXHAUST OR RETURN)
Ø	ROUND DUCT
	VOLUME DAMPER (MANUAL)
	MOTORIZED DAMPER
	FLEXIBLE CONNECTION
	FLEXIBLE DUCT
	ELBOW WITH TURNING VANES
	DUCT UP (RECTANGULAR)
	DUCT UP (RECTANGULAR)
	DUCT DOWN (RECTANGULAR)
	DUCT DOWN (RECTANGULAR)
	DUCT UP (ROUND)
	DUCT DOWN (ROUND)
SIZE,SYMBOL CFM	CEILING OUTLET
SIZE,SYMBOL CFM	CEILING INLET
T	THERMOSTAT
2 / M3.1	DETAIL IDENTIFICATION NUMBER SHEET ON WHICH DETAIL IS SHOWN
A / M3.1	PHOTO IDENTIFICATION LETTER SHEET ON WHICH SECTION IS SHOWN

AHRI	AIR CONDITIONING, HEATING, AND REFRIGERATION INSTITUTE
ARCH	ARCHITECTURAL
AWG	AMERICAN WIRE GAUGE
BDD	BACKDRAFT DAMPER
BTUH	BRITISH THERMAL UNIT/HOUR
CF	CUBIC FEET
CFM	CUBIC FEET PER MINUTE
COP	COEFFICIENT OF PERFORMANCE
DB	DRY BULB
DDC	DIRECT DIGITAL CONTROL
DEG F, F	DEGREE FAHRENHEIT
DEMO'D	DEMOLISHED
DOAS	DEDICATED OUTSIDE AIR SYSTEM
DX	DIRECT EXPANSION
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
ECM	ELECTRONICALLY COMMUTATED MOTOR
EER	ENERGY EFFICIENCY RATIO
EOL	END OF LINING
ESP	EXTERNAL STATIC PRESSURE
EXH	EXHAUST
EXIST, (E)	EXISTING
FLA	FULL LOAD AMPS
FLEX	FLEXIBLE
FT, '	FEET
HR	HOUR
HVAC	HEATING VENTILATION AND AIR CONDITIONING
HZ	HERTZ
IBC	INTERNATIONAL BUILDING CODE
IMC	INTERNATIONAL MECHANICAL CODE
IN	INCH
KW	KILOWATT
L	LENGTH
LBS	POUNDS
MBH	THOUSAND BTUH
MCA	MINIMUM CIRCUIT AMPS
mm	MILLIMETER
MOP	MAXIMUM OVERCURRENT PROTECTION
N/A	NOT APPLICABLE
NO.	NUMBER
NTS	NOT TO SCALE
OA	OUTSIDE AIR
O&M	OPERATIONS & MAINTENANCE MANUAL
PD	PRESSURE DROP
PH	PHASE
R	QUANTITY
QTY	RADIUS
RA	RETURN AIR
RG	REFRIGERANT GAS
RH	RELATIVE HUMIDITY
RL	REFRIGERANT LIQUID
SA	SUPPLY AIR
SCR	SILICON CONTROLLED RECTIFIER
SF	SQUARE FOOT
TD	TRANSFER DUCT
TG	TRANSFER GRILLE
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
VOLT	VOLTAGE
VRF	VARIABLE REFRIGERANT FLOW
W	WIDTH
W/	WITH
WB	WET BULB
W/O	WITHOUT
WSEC	WASHINGTON STATE ENERGY CODE

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REVISION NO. 0

RICHARD A. HULTZ STATE OF WASHINGTON 13978 REGISTERED PROFESSIONAL ENGINEER

SIGNED 1-20-2025

BID SET 1-20-25

CITY OF TACOMA
DEPARTMENT OF PUBLIC UTILITIES
LIGHT DIVISION

CUSHMAN DAM–SERVICE HOUSE
HVAC UPGRADES

MECHANICAL LEGEND & NOTES

SUBMITTED	DRAWN	STAMPED
	MB	RH
APPROVED	DATE	
	1/20/25	
	DRAWING NO.	
	M0.01	

ENERGY CODE NOTES

PERFORMANCE, CRITERIA & SYSTEM DESIGN

1. LOAD CALCULATIONS HAVE BEEN PERFORMED IN ACCORDANCE WITH WSEC.
2. EQUIPMENT CAPACITIES ARE NO GREATER THAN THE SMALLEST AVAILABLE SIZE THAT EXCEEDS THE CALCULATED LOADS.
3. OUTPUT CAPACITIES OF HEATING AND COOLING EQUIPMENT AND SYSTEMS ARE NO GREATER THAN THE SMALLEST AVAILABLE EQUIPMENT SIZE THAT EXCEEDS THE CALCULATED LOADS.
4. ELECTRIC MOTOR EFFICIENCY: ALL ELECTRIC MOTORS SHALL MEET THE MINIMUM EFFICIENCY REQUIREMENTS OF WSEC. FRACTION HP FAN MOTORS 1/12HP OR GREATER UP TO 1HP NOT COVERED BY THE TABLES SHALL BE ECM TYPE OR SHALL HAVE A MINIMUM EFFICIENCY OF 70% OR GREATER AND HAVE THE MEANS TO ADJUST MOTOR SPEED.
5. FUNCTIONAL PERFORMANCE TESTING SHALL BE PERFORMED IN ACCORDANCE WITH WSEC.
6. HVAC AIR SYSTEMS SHALL BE BALANCED IN ACCORDANCE WITH THE SPECIFICATIONS AND THESE WSEC NOTES. SEE SPECIFICATIONS FOR FLOW RATE TOLERANCES.

FANS AND FAN CONTROL

7. ELECTRIC MOTOR EFFICIENCY: ALL ELECTRIC MOTORS SHALL MEET THE MINIMUM EFFICIENCY REQUIREMENTS OF WSEC. FRACTION HP FAN MOTORS 1/12HP OR GREATER UP TO 1HP NOT COVERED BY THE TABLES SHALL BE ECM TYPE OR SHALL HAVE A MINIMUM EFFICIENCY OF 70% WITH THE ABILITY TO ADJUST MOTOR SPEED.
8. FAN AIRFLOW CONTROL: DX UNITS 42 MBH AND GREATER AND CHILLED WATER UNITS WITH FANS 1/4 HP AND GREATER SHALL VARY THE FAN AIRFLOW AS A FUNCTION OF THE LOAD BASED ON SPACE TEMPERATURE WITH NO LESS THAN 2 FAN STAGES. LOW SPEED SHALL NOT BE GREATER THAN 66% OF FULL SPEEED. UNITS WITH ECONOMIZERS SHALL HAVE NO FEWER THAN TWO SPEEDS OF FAN CONTROL DURING ECONOMIZER OPERATION.

VENTILATION, EXHAUST & ENERGY RECOVERY

9. MECHANICAL VENTILATION AIR SYSTEMS SHALL BE CONFIGURED TO PROVIDE NOT MORE THAN 150%, BUT AT LEAST THE MINIMUM REQUIRED VOLUME OF OUTDOOR AIR TO EACH ZONE PER IMC. SEE MECHANICAL EQUIPMENT SCHEDULES FOR MINIMUM OUTSIDE AIR VALUES.
10. EXHAUST SYSTEMS ARE CONFIGURED TO PROVIDE NO MORE THAN 150% OF CODE MINIMUM.
11. VENTILATION AIR HEATING CONTROL: UNITS PROVIDING VENTILATION AIR TO MULTIPLE ZONES WITH SEPARATE ZONE HEATING/COOLING SHALL NOT HEAT THE VENTILATION AIR (VIA ADDED HEAT OR HEAT RECOVERY) TO A TEMPERATURE GREATER THAN 55 DEG F WHEN THE BUILDING LOADS OR OUTSIDE AIR TEMPERATURE INDICATE THAT THE MAJORITY OF THE ZONES ARE IN COOLING.
12. SHUTOFF DAMPERS FOR BUILDING ISOLATION: PROVIDE ALL OUTSIDE AIR, EXHAUST AIR, AND RELIEF AIR OPENINGS WITH CLASS 1 (MAX LEAKAGE OF 4 CFM/SF AT 1.0" W.C.) MOTORIZED DAMPERS.
13. SHUTOFF DAMPERS FOR RETURN AIR: PROVIDE RETURN AIR OPENINGS WITH CLASS 1 MOTORIZED DAMPER WHERE USED FOR AIRSIDE ECONOMIZER. WHERE INSTALLED IN UNITARY PACKAGED EQUIPMENT DAMPER, PROVIDE DAMPERS WITH LOWEST LEAKAGE RATE AVAILABLE FROM THE EQUIPMENT MANUFACTURER.
14. DAMPER ACTUATION: OUTSIDE AIR INTAKE, RELIEF AND EXHAUST DAMPERS SHALL AUTOMATICALLY CLOSE WHEN SYSTEM OR SPACES SERVED ARE NOT IN USE OR DURING WARM-UP AND SET BACK.

HVAC SYSTEM CONTROLS

15. DEADBAND: THERMOSTATIC CONTROLS SHALL BE CONFIGURED WITH 5°F MINIMUM DEADBAND FOR SYSTEMS THAT CONTROL BOTH HEATING AND COOLING.
16. SETPOINT OVERLAP RESTRICTION: WHERE SEPARATE HEATING AND COOLING SYSTEMS WITH SEPARATE THERMOSTATIC CONTROL DEVICES SERVE A ZONE, PROVIDE A LIMIT SWITCH, MECHANICAL STOP, OR DDC CONTROL TO PREVENT SIMULTANEOUS HEATING AND COOLING.
17. HVAC SYSTEMS SHALL BE EQUIPPED WITH AUTOMATIC CONTROLS CAPABLE OF STARTING AND STOPPING THE SYSTEM FOR SEVEN DIFFERENT DAILY SCHEDULES, AND SHALL HAVE MANUAL OVERRIDE CONFIGURED TO OPERATE THE SYSTEM FOR 2 HOURS.
18. AUTOMATIC START CONTROLS SHALL BE PROVIDED FOR EACH HVAC SYSTEM, AND BE CAPABLE OF AUTOMATICALLY ADJUSTING DAILY START TIME IN ORDER TO BRING EACH SPACE TO THE DESIRED OCCUPIED TEMPERATURE IMMEDIATELY PRIOR TO SCHEDULED OCCUPANCY.

DUCTING SYSTEMS

19. DUCTWORK SHALL BE CONSTRUCTED AND SEALED PER IMC. OUTSIDE AIR DUCTWORK SHALL MEET AIR LEAKAGE REQUIREMENTS OF WSEC AND VAPOR RETARDER REQUIREMENTS OF THE IBC.
20. ALL DUCTWORK SHOWN IS LOW PRESSURE DUCT, OPERATING AT STATIC PRESSURE LESS THAN OR EQUAL TO 2 INCHES WATER GAUGE (W.G.).
21. MINIMUM DUCT INSULATION PER WSEC IS AS FOLLOWS:

SERVICE	INSULATION LEVEL
OUTSIDE AIR DUCT SERVING INDIVIDUAL SUPPLY UNIT WITH LESS THAN 2,800 CFM OF SUPPLY AIR	R-7
SUPPLY & RETURN DUCTS IN UNCONDITIONED SPACES	R-6
SUPPLY DUCTS WITHIN CONDITIONED SPACE WHERE SUPPLY AIR IS < 55 DEG F. OR > 105 DEG F.	R-3.3
EXPOSED DUCTWORK WITHIN A ZONE THAT SERVES THAT ZONE	NO INSULATION REQUIRED
EXHAUST & RELIEF DUCTS DOWNSTREAM OF AUTO SHUTOFF DAMPER	R-16

PIPING SYSTEMS

22. INSULATE PIPING PER WSEC.

DEDICATED OUTDOOR AIR UNIT

23. PER WSEC DOAS UNIT SHALL NOT USE HEATING OR HEAT RECOVERY TO WARM SUPPLY AIR TO A TEMPERATURE ABOVE 55 DEG F, WHEN MAJORITY OF BUILDING ZONES REQUIRE COOLING.

PROJECT CLOSE OUT DOCUMENTATION

24. DOCUMENTATION SUBMITTAL REQUIREMENTS: SUBMIT ALL CLOSEOUT DOCUMENTATION INCLUDING AS-BUILTS AND O&M'S TO OWNER WITHIN 180 DAYS OF RECEIPT OF CERTIFICATE OF OCCUPANCY.
25. THESE "ENERGY CODE NOTES" ARE LISTED TO SATISFY THE BUILDING DEPARTMENT'S REQUIREMENT THAT CERTAIN INFORMATION BE PLACED ON THE PLANS, BUT DO NOT DIMINISH THE FULL PROJECT REQUIREMENTS. PROVIDE ITEMS IN EXCESS OF CODE WHERE NOTED ON DRAWINGS AND IN SPECIFICATIONS. FOR OTHER ADDED REQUIREMENTS, SEE SPECIFICATIONS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:

ITEM	SECTION#
AS-BUILT DOCUMENTS	20 05 00
O&M MANUALS	20 05 00
PIPING & DUCT INSULATION	20 07 00
DUCTWORK SEALING & TESTING	23 31 00
CONTROLS	23 81 27

OA VENTILATION CALCULATION - DOAS
PER IMC 2018

Date: 10/11/24
Calc By: JC

Project: **TACOMA POWER - CUSHMAN DAM - HVAC UPGRADES**
No: **24-149**

= Manually entered, from **Code**
= Manually entered, from **plans**
= Calculated

Az= zone area sf= square feet
Rp= OA per person*
P/1000 sf= People density
Pz= zone population
Ps= actual concurrent pop

Ra= OA per sf of area
Vbz= breathing zone OA = Rp*P/1000 + Ra*Az = *OA before corrections*
Ez= air distrib effectiveness
Voz= zone OA = Vbz/Ev

REQUIRED OA:

HVAC Unit	Zone #	Name	Occup Category	Az (sf)	People OA Rp	P/1000 sf	Pz	Rp*Pz	Area OA Ra	Ra*Az	OA Vbz	Ez	Voz (cfm)	Selected Airflow
	1	Office/Lunch	Conference Room	415	5	50	21	104.0	0.06	24.9	128.9	1	128.9	**180**
				415			20.8	104.0		24.9	**128.9**		**128.9**	**180**

REQUIRED EXHAUST:

HVAC Unit	Zone #	Name	Occup Category	Az (sf)	USING CODE MINIMUM CFM/SF: Exhaust Req'd (cfm/sf)	Code Exhaust (cfm)	Room Height (ft)	Room Volume (cf)	Result'g Air Chgs (per hr)	USING AIR CHANGES: Desired Air Chgs (per hr)	Calc'd Exhaust (cfm)	Selected Exhaust
	1	Restroom 1	Toilet	45	50*	50	12.0	540	5.6		0	**65**
	2	Restroom 2	Toilet	45	50*	50	12.0	540	5.6		0	**65**
	3	Janitor Room	Janitor	40	1	40	12.0	480	5.0		0	**50**
				130								**180**

*Per Water Closet

BID SET 1-20-25

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REVISION NO. 0

RICHARD A. HULTZ STATE OF WASHINGTON 32570 REGISTERED PROFESSIONAL ENGINEER
SIGNED
1-20-2025

CITY OF TACOMA
DEPARTMENT OF PUBLIC UTILITIES
LIGHT DIVISION

CUSHMAN DAM–SERVICE HOUSE
HVAC UPGRADES
ENERGY CODE NOTES

SUBMITTED
DRAWN MB
STAMPED RH
DATE 1/20/25
APPROVED
DRAWING NO. M0.02

AIR INLET & OUTLET SCHEDULE

SYMBOL	TYPE	MANUFACTURER AND SERIES NUMBER	REMARKS
CD	CEILING SUPPLY DIFFUSER	TITUS MCD	MODULAR CORE SQUARE NECK
WSG	WALL SUPPLY GRILLE	TITUS SERIES 300	DOUBLE DEFLECTION HORIZ. FACE BARS, VERT. REAR BARS, 3/4" O.C.
WEG	WALL EXHAUST GRILLE	TITUS SERIES 350	HORIZONTAL FACE BARS, 3/4" O.C. 35° DEFLECTION

NOTES:
1. CEILING DIFFUSERS (CD) SHALL HAVE NO. & DIRECTION OF THROWS AS INDICATED ON PLANS. (E.G. CD-3 = 3 WAY THROW)
2. SEE LEGEND FOR TERMINOLOGY USED IN AIR TERMINAL CALL-OUTS ON DRAWINGS.
3. PROVIDE AIR TERMINALS TO MATCH CEILING CONSTRUCTION INSTALLED IN.

VRF OUTDOOR HEAT PUMP SCHEDULE

SYMBOL	BASIS OF DESIGN MANUFACTURER AND SERIES NO.	AREA SERVED	COOLING CAP. *		HEATING CAP.**		OUTDOOR FAN	COMPRESSOR	MAX. WEIGHT LBS	UNIT ELECTRICAL			REMARKS
			MBH	EFF	MBH	EFF	QTY	QTY		MCA	MOP	VOLTS/PH	
HP-1	MITSUBISHI PURY-P120	ENTIRE BUILDING	120	10.8 EER	108	3.88 COP	2	1	700	25	40	460/3	W/ AE-200 CONTROLLER & BACNET INTERFACE

* COOLING CAPACITY IS AHRI RATING: AT 80°F DB; 67°F WB INDOOR COIL EAT AND 95°F OUTDOOR COIL EAT.
** HEATING CAPACITY IS AHRI HI-TEMP RATING: AT 70°F DB INDOOR COIL EAT AND 47°F DB; 43°F WB OUTDOOR COIL EAT.

VRF INDOOR HEAT PUMP SCHEDULE

SYMBOL	BASIS OF DESIGN MANUFACTURER AND SERIES NO.	TYPE	AREA SERVED	SERVED BY	CAPACITY (MBH)		CFM	ESP	FILTERS	UNIT ELECTRICAL		MAX WEIGHT	REMARKS
					COOLING	HEATING			TYPE	MCA	VOLT/PH		
BC-1	MITSUBISHI CMB-P1012	BRANCH CONTROLLER	SEE PLANS	HP-1	(1)	(1)	-	-	-	1.6	208/1	180	BC MAIN CONTROLLER W/ SERVICE VALVES AND CONDENSATE PUMP, 12 PORTS
CC-1	MITSUBISHI PLFY-P18	CEILING CASSETTE	OFFICE/LUNCH	HP-1, BC-1	18	20	400	-	MFR STD	0.5	208/1	40	W/ INTEGRAL CONDENSATE PUMP
CC-2	MITSUBISHI PLFY-P08	CEILING CASSETTE	RELAY ROOM	HP-1, BC-1	8	9	300	-	MFR STD	0.28	208/1	40	W/ INTEGRAL CONDENSATE PUMP
CC-3	MITSUBISHI PLFY-P08	CEILING CASSETTE	RELAY ROOM	HP-1, BC-1	8	9	300	-	MFR STD	0.28	208/1	40	W/ INTEGRAL CONDENSATE PUMP
CC-4	MITSUBISHI PLFY-P12	CEILING CASSETTE	OFFICE	HP-1, BC-1	12	13.5	300	-	MFR STD	0.29	208/1	40	(2) W/ INTEGRAL CONDENSATE PUMP
CC-5	MITSUBISHI PLFY-P05	CEILING CASSETTE	BATTERY ROOM	HP-1, BC-1	5	5.6	250	-	MFR STD	0.24	208/1	40	(2) W/ INTEGRAL CONDENSATE PUMP
CC-6	MITSUBISHI PLFY-P05	CEILING CASSETTE	OIL ROOM	HP-1, BC-1	5	5.6	250	-	MFR STD	0.24	208/1	40	(2) W/ INTEGRAL CONDENSATE PUMP
AH-1	MITSUBISHI PVFY-P36	MULTI-POSITION AIR HANDLER	TRANSFORMER ROOM	HP-1, BC-1	36	40	1000	-	MFR STD	4.13	208/1	40	W/ CONDENSATE PUMP
WM-1	MITSUBISHI PLFY-P18	WALL MOUNT	106 COMMUNICATIONS ROOM	HP-1, BC-1	24	27	570	-	MFR STD	0.63	208/1	40	W/ INTEGRAL CONDENSATE PUMP

NOTE: PROVIDE UNITS W/ CONDENSATE PUMPS AS REQUIRED FOR PROPER CONDENSATE DRAINAGE. (1) CAPACITY TO SUIT UNITS/SYSTEMS SERVED. (2) MODIFY FOR 3-WAY AIRFLOW, PROVIDE W/ AIR OUTLET SHUTTER PLATE.

DOAS ENERGY RECOVERY VENTILATOR SCHEDULE

SYMBOL	BASIS OF DESIGN MANUFACTURER AND SERIES NO.	AREA SERVED	SUPPLY FAN		EXHAUST FAN		UNIT ELECTRICAL					FILTERS		MAX UNIT WEIGHT (LBS)	REMARKS
			CFM	ESP	CFM	ESP	POWER	FLA	MCA	MOP	VOLTS/PH	TYPE	SIZE		
ERV-1	LIFEBREATH	ENTIRE BUILDING	180	0.75"	180	0.75"	1/6 HP	2.75	6.9	15	120/1	2" MERV-13	0.47 SF	150	W/ ECM

NOTES:
1. UNITS SHALL HAVE MINIMUM HEAT RECOVERY EFFICIENCY PER WSEC AT EXHAUST AIR OF 70°F, 30% RH & EAT OF 20°F, 90% RH.
2. PROVIDE UNITS OA & EA WITH MOTORIZED DAMPERS COMPLYING W/ WSEC.

ELECTRIC HEATER SCHEDULE

SYMBOL	BASIS OF DESIGN MANUFACTURER AND SERIES NO.	TYPE	AREA / UNIT SERVED	CFM	NOMINAL SIZE	ELECTRICAL		REMARKS
						POWER	VOLTS/PH	
DH-1	INDEECO QUA	DUCT HEATER	ERV-1	180	10x10	2.5 KW	208/1	W/ SCR CONTROL

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RICHARD A. HULTZ STATE OF WASHINGTON 19576 REGISTERED PROFESSIONAL ENGINEER

SIGNED
1-20-2025

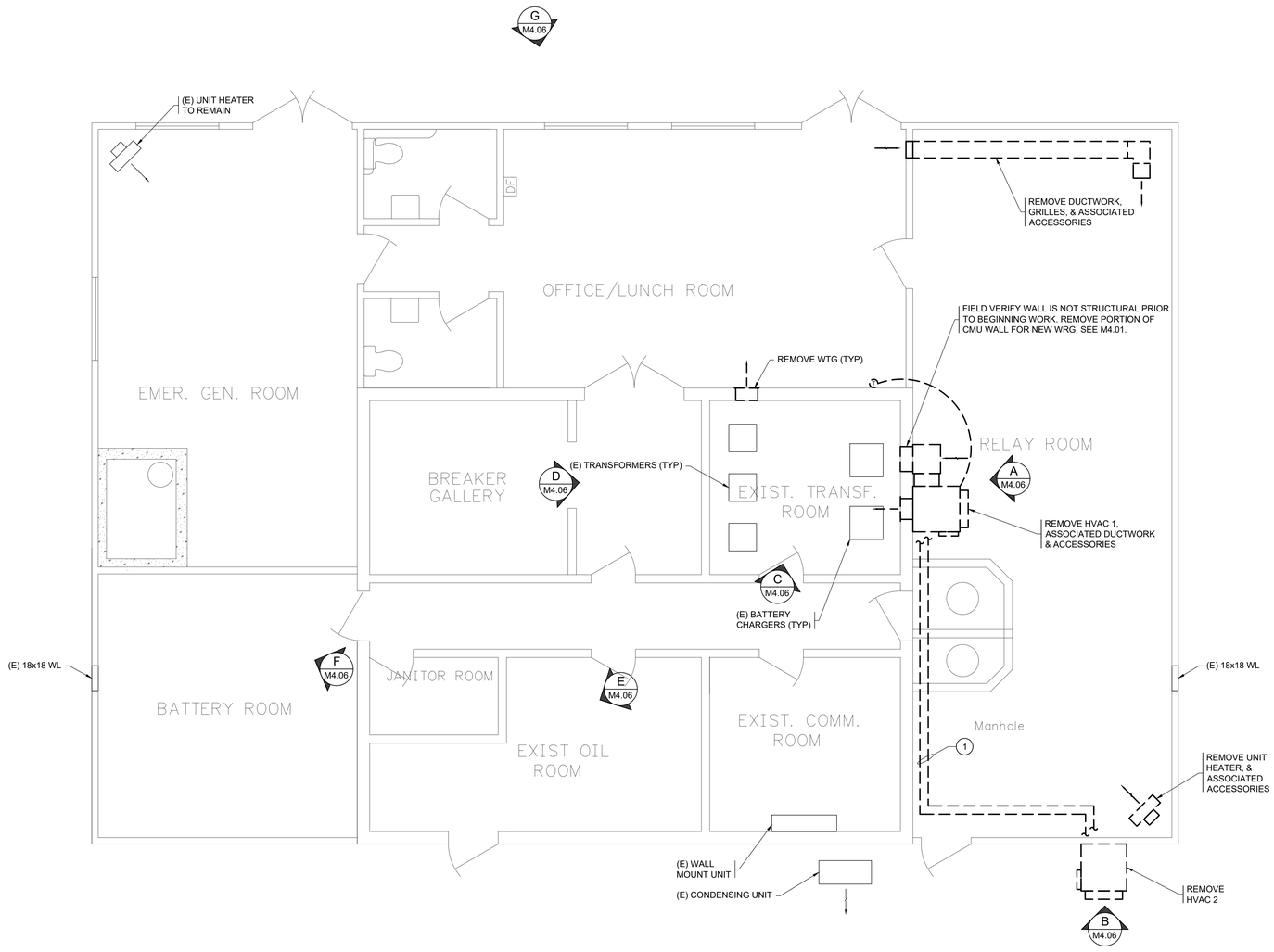
BID SET 1-20-25

CITY OF TACOMA
DEPARTMENT OF PUBLIC UTILITIES
LIGHT DIVISION

CUSHMAN DAM–SERVICE HOUSE HVAC UPGRADES

MECHANICAL SCHEDULES

SUBMITTED
DRAWN MB
STAMPED RH
DATE 1/20/25
APPROVED
DRAWING NO. M0.03



NORTH

MECHANICAL FLOOR PLAN - DEMO

SCALE: 1/4" = 1'-0"

GENERAL NOTES:

1. DEMOLITION DRAWINGS ARE INTENDED TO ONLY GIVE A GENERAL REPRESENTATION OF THE DEMOLITION INVOLVED, AND DO NOT CONSTITUTE A FULL LISTING OF ALL ITEMS REQUIRING REMOVAL.
2. IT IS THE CONTRACTOR'S RESPONSIBILITY TO REVIEW SITE CONDITIONS AND TO IDENTIFY ALL DEMOLITION WORK, AND INCLUDE IN HIS BID ALL COSTS FOR DEMOLITION & DISPOSAL.
3. EXISTING DUCTS, EQUIPMENT, PIPING, AIR INLETS/OUTLETS, PLUMBING FIXTURES SHOWN DASHED REPRESENT MAJOR MECHANICAL ITEMS TO BE REMOVED. SEE GENERAL NOTES, DRAWING NOTES & KEYED NOTES WHICH COVER OTHER MISCELLANEOUS MECHANICAL ITEMS TO BE REMOVED.
4. ALL EXISTING ITEMS NOT BEING REUSED SHALL BE REMOVED. THIS INCLUDES SUCH ITEMS AS THERMOSTATS, CONTROL DEVICES, DUCTS, FANS, PIPING, GRILLES, SUPPORTS, VALVES, CURBS, AND RELATED ACCESSORIES.
5. ABANDONED ITEMS, ANCHORS, INSERTS, PIPE STUBS, AND OTHER PROJECTIONS NOT BEING CONCEALED BY NEW CONSTRUCTION SHALL BE REMOVED TO 1" BELOW THE ADJACENT FINISHED SURFACE, AND THE DISTURBED AREA PATCHED.
6. PATCH ALL WALL/FLOOR/CEILING OPENINGS LEFT BY REMOVAL OF EXISTING ITEMS. PATCH SO AS TO MATCH FINISH OF ADJACENT UNDISTURBED AREA.
7. VERIFY SIZE & LOCATION OF ALL EXISTING ITEMS SHOWN TO BE DEMO'D. LOCATIONS SHOWN ARE APPROXIMATE AND ARE BASED ON MODERATE FIELD VERIFICATION.
8. LOCATIONS SHOWN ARE APPROXIMATE, FIELD VERIFY (E) CONDITIONS PRIOR TO BEGINNING WORK.
9. PROVIDE CORE DRILLS FOR NEW WORK, ALL WALLS ARE CONCRETE.

KEYED NOTES:

(1) REMOVE (E) RG/ RL, AND CONDENSATE PIPING. LOCATION SHOWN IS APPROXIMATE.

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RICHARD A. HULTZ STATE OF WASHINGTON 13575 REGISTERED PROFESSIONAL ENGINEER

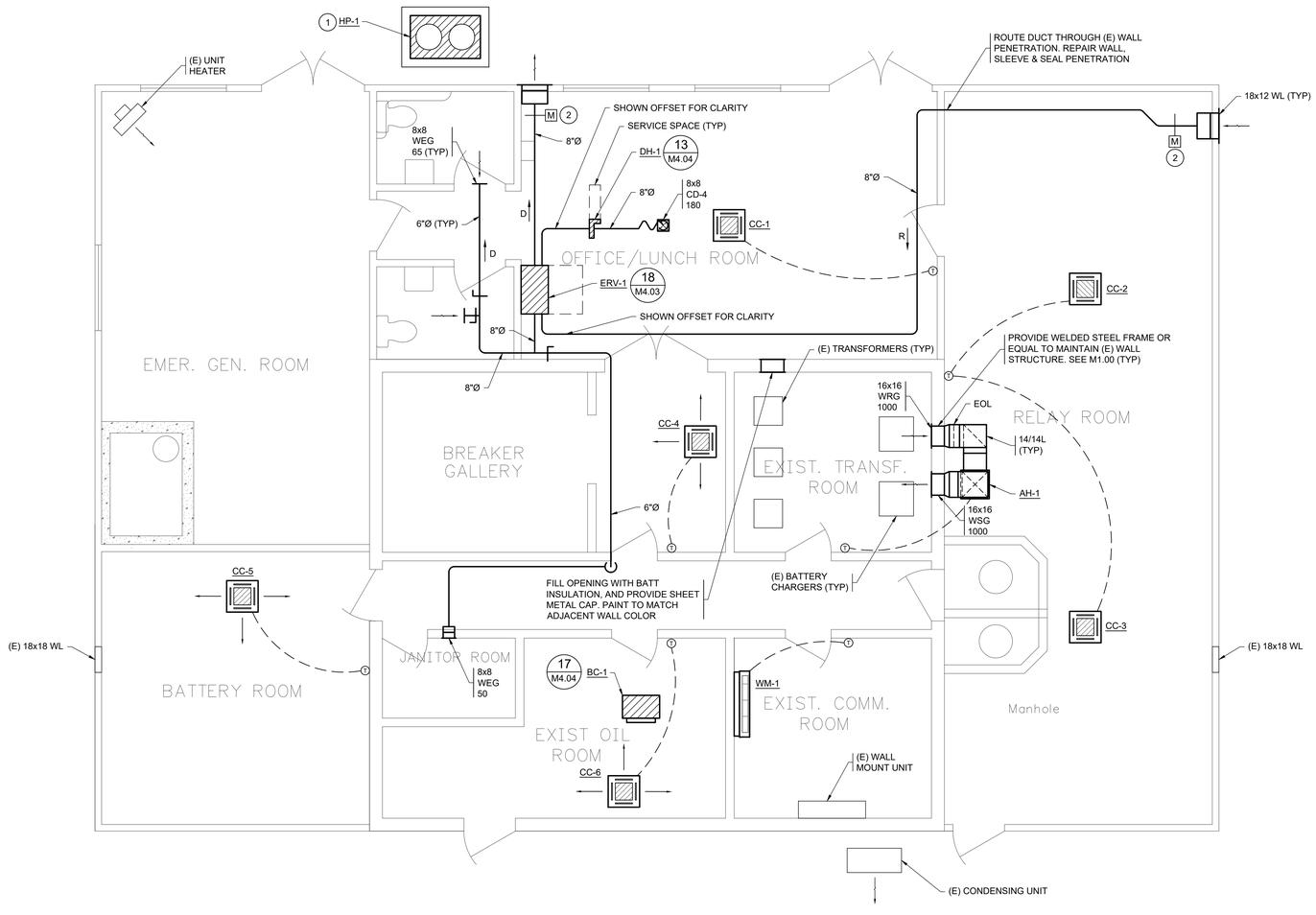
SIGNED
1-20-2025

CITY OF TACOMA
DEPARTMENT OF PUBLIC UTILITIES
LIGHT DIVISION

CUSHMAN DAM–SERVICE HOUSE
HVAC UPGRADES

MECHANICAL FLOOR PLAN–DEMO

SUBMITTED	DRAWN	STAMPED
	MB	RH
	DATE 1/20/25	
APPROVED		
	DRAWING NO. M1.00	



MECHANICAL FLOOR PLAN

NORTH

SCALE: 1/4" = 1'-0"

GENERAL NOTES:

1. SEE MECHANICAL GENERAL NOTES SHEET M0.01.
2. PROVIDE DUCT TRANSITIONS AT EQUIPMENT CONNECTIONS TO SIZE SHOWN; WHERE DUCT IS TO BE LINED, TRANSITIONS SHALL ALSO BE LINED.
3. SEE SHEET M4.02 FOR REFRIGERANT PIPE ROUTING. SEE SYSTEM SCHEMATIC DIAGRAM, DETAIL 16 ON SHEET M4.04 FOR REFRIGERANT PIPING SIZING.
4. PROVIDE 3/4" CONDENSATE DRAINS FOR ALL HVAC EQUIPMENT; ROUTE ALL HVAC CONDENSATE FREE OF ELECTRICAL ITEMS TO NEAREST LANDSCAPE AREA. SUBMIT SHOP DRAWINGS OF PROPOSED ROUTING.ROUTE PIPING TO PREVENT POSSIBILITY OF FREEZING, ADD INSULATION AS NEEDED.
5. DO NOT INSTALL MECHANICAL ITEMS ABOVE ELECTRICAL PANELS OR SWITCH GEAR.
6. PROVIDE FLEXIBLE DUCT CONNECTORS IN DUCT CONNECTIONS TO ALL HVAC EQUIPMENT.
7. VERIFY EQUIPMENT LOCATIONS & LOCATIONS OF WALL PENETRATIONS WITH OWNER PRIOR TO BEGINNING WORK.
8. ALL ITEMS ROUTED EXPOSED TIGHT TO STRUCTURE UNO.
9. INSTALL ALL EXPOSED ITEMS FOR BEST APPEARANCE, CLEANED OF ANY LABELS & FREE OF DENTS.
10. VERIFY LOCATIONS OF LIGHTS AND OTHER BUILDING FEATURES. PROVIDE OFFSETS AND SHIFT DUCTS, AIR INLETS AND OUTLETS, AND EQUIPMENT AS REQUIRED.
11. ALL EQUIPMENT IS SURFACE MOUNTED UNO.

KEYED NOTES:

1. ANCHOR UNIT TO 6" THICK CONCRETE PAD; PAD TO BE 6" LARGER THAN EQUIPMENT ALL AROUND. VERIFY EXACT LOCATION W/ GENERAL CONTRACTOR AND CITY PRIOR TO INSTALLATION. UNITS SHALL BE LOCATED CLEAR OF ROOF DRIP LINE.
2. INTERLOCK MOTORIZED DAMPER WITH ERV-1, TO BE OPEN WHEN UNIT IS ON.

BID SET 1-20-25

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WARNING
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IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

REVISION NO. 0

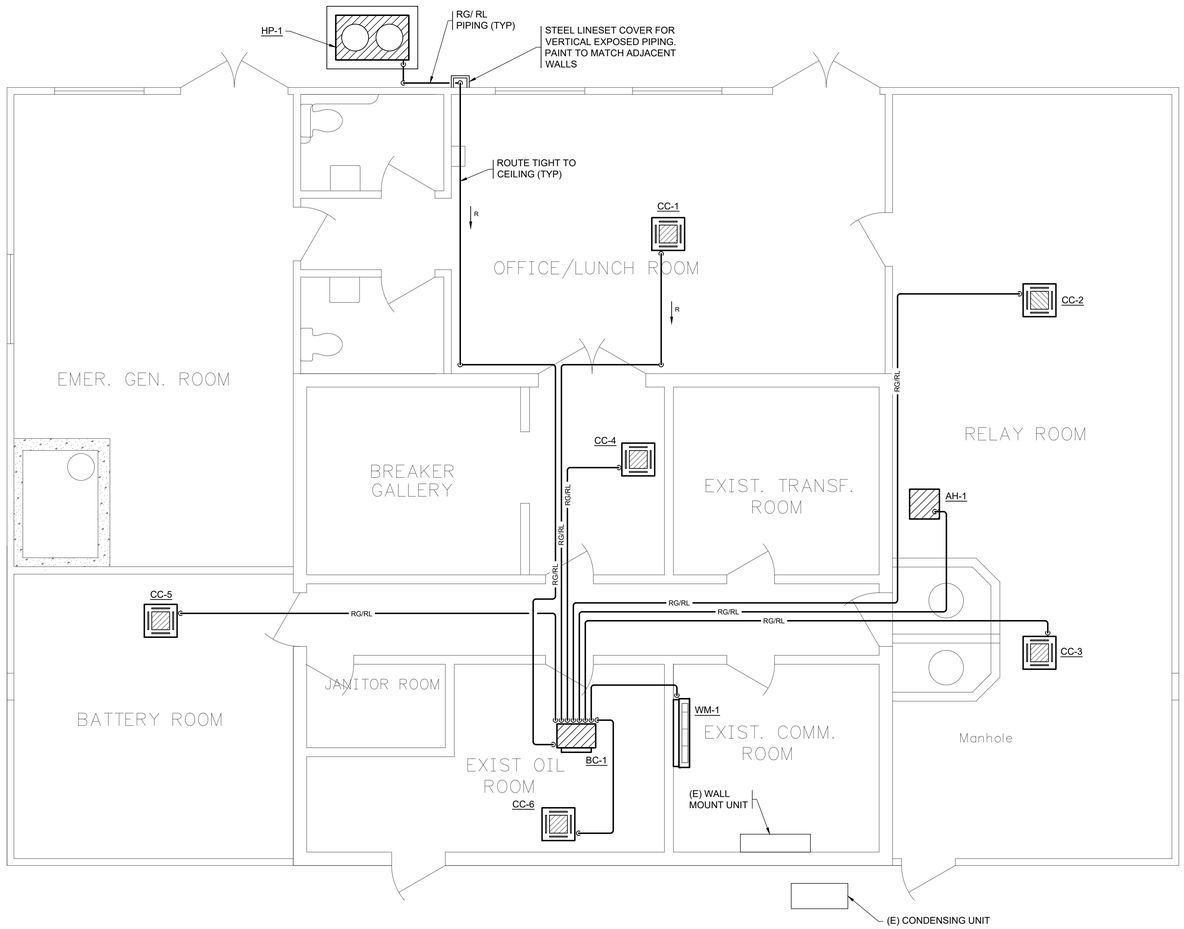
RICHARD A. HULTZ STATE OF WASHINGTON 22576 REGISTERED PROFESSIONAL ENGINEER
SIGNED
1-20-2025

CITY OF TACOMA
DEPARTMENT OF PUBLIC UTILITIES
LIGHT DIVISION

CUSHMAN DAM–SERVICE HOUSE
HVAC UPGRADES

MECHANICAL FLOOR PLAN–NEW

SUBMITTED	DRAWN	STAMPED
	MB	RH
	DATE 1/20/25	
APPROVED	DRAWING NO.	
	M4.01	



REFRIGERANT PIPING PLAN

NORTH

SCALE: 1/4" = 1'-0"

GENERAL NOTES:

1. SEE MECHANICAL GENERAL NOTES SHEET M0.01.
2. SEE SYSTEM SCHEMATIC DIAGRAM FOR REFRIGERANT PIPING AND SIZING, DETAIL 16 ON SHEET M4.04.
3. DO NOT INSTALL MECHANICAL ITEMS ABOVE ELECTRICAL PANELS OR SWITCH GEAR.
4. ROUTE ALL PIPING NEATLY TIGHT TO STRUCTURE. PROVIDE PIPING COVER SYSTEM AS SPECIFIED. COLOR TO MATCH (E) CONSTRUCTION.

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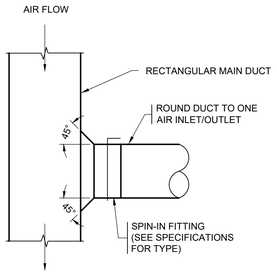
CITY OF TACOMA
DEPARTMENT OF PUBLIC UTILITIES
LIGHT DIVISION

CUSHMAN DAM–SERVICE HOUSE
HVAC UPGRADES

REFRIGERANT PIPING PLAN

SUBMITTED	DRAWN	STAMPED
	MB	RH
APPROVED	DATE 1/20/25	
	DRAWING NO. M4.02	



BRANCH SERVING MULTIPLE AIR INLETS/OUTLETS

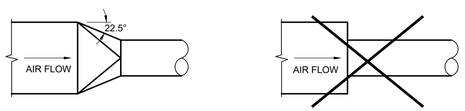
NOTE:

WHERE MAIN DUCT DOES NOT HAVE ADEQUATE HEIGHT TO ACCEPT ROUND DUCT, PROVIDE RECTANGULAR CONNECTION, WITH SAME FREE AREA AS ROUND DUCT, AND TRANSITION TO ROUND

RECTANGULAR-TO-ROUND BRANCH DUCT CONNECTION

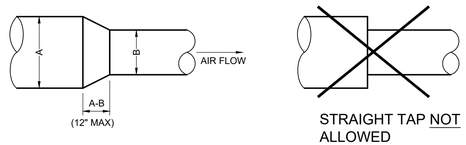
3 M4.03

NTS



STRAIGHT TAP NOT ALLOWED

RECTANGULAR - TO ROUND



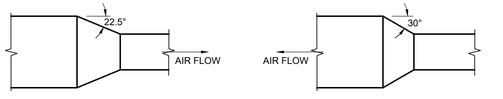
STRAIGHT TAP NOT ALLOWED

ROUND - TO ROUND

ROUND TRANSITIONS

6 M4.03

NTS



CONCENTRIC TRANSITION (DIVERGING)

CONCENTRIC TRANSITION (CONVERGING)

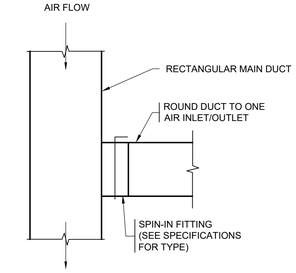
ECCENTRIC TRANSITION

STRAIGHT TAP NOT ALLOWED

RECTANGULAR-TO-RECTANGULAR TRANSITIONS

8 M4.03

NTS



SERVING ONE INLET/OUTLET

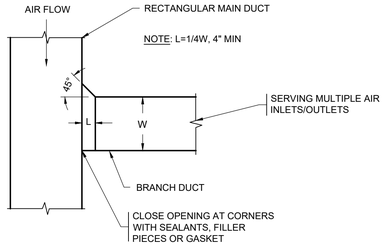
NOTE:

WHERE MAIN DUCT DOES NOT HAVE ADEQUATE HEIGHT TO ACCEPT ROUND DUCT, PROVIDE RECTANGULAR CONNECTION, WITH SAME FREE AREA AS ROUND DUCT, AND TRANSITION TO ROUND

RECTANGULAR-TO-RECTANGULAR BRANCH DUCT CONNECTION

2 M4.03

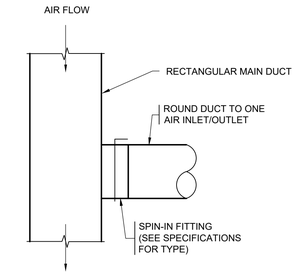
NTS



RECTANGULAR-TO-RECTANGULAR BRANCH DUCT CONNECTION

5 M4.03

NTS



SERVING ONE INLET/OUTLET

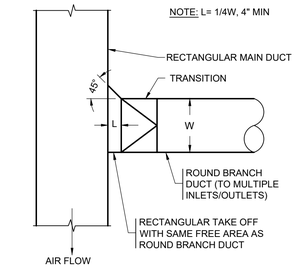
NOTE:

WHERE MAIN DUCT DOES NOT HAVE ADEQUATE HEIGHT TO ACCEPT ROUND DUCT, PROVIDE RECTANGULAR CONNECTION, WITH SAME FREE AREA AS ROUND DUCT, AND TRANSITION TO ROUND

RECTANGULAR-TO-ROUND BRANCH DUCT CONNECTION

7 M4.03

NTS

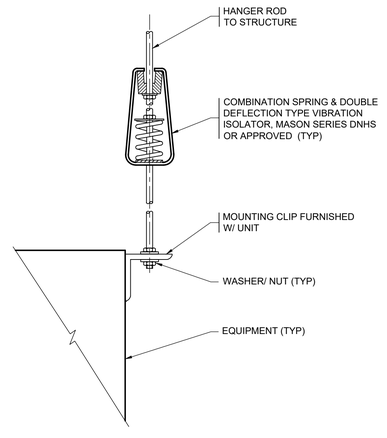


SERVING MULTIPLE INLET/OUTLET

RECTANGULAR-TO-ROUND BRANCH DUCT CONNECTION

4 M4.03

NTS



NOTES:

1. VIBRATION ISOLATORS SHALL BE SELECTED FOR 1" DEFLECTION.
2. MOUNT SPRING ISOLATOR AS CLOSE TO EQUIPMENT AS POSSIBLE.

SUSPENDED EQUIP. SUPPORT

18 M4.03

NTS

BID SET 1-20-25

WARNING
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REVISION NO. 0

RICHARD A. HULTZ STATE OF WASHINGTON 13975 REGISTERED PROFESSIONAL ENGINEER

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1-20-2025

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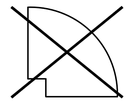
CITY OF TACOMA
DEPARTMENT OF PUBLIC UTILITIES
LIGHT DIVISION

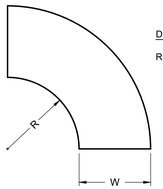
CUSHMAN DAM–SERVICE HOUSE
HVAC UPGRADES

MECHANICAL DETAILS

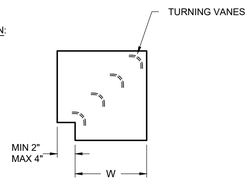
SUBMITTED	DRAWN	STAMPED
	MB	RH
	DATE	
	1/20/25	
APPROVED	DRAWING NO.	
	M4.03	



NOT ALLOWED



RADIUS ELBOW

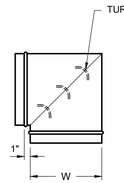


MITERED ELBOW

ELBOWS - RECTANGULAR

NTS

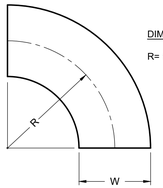
10
M4.04



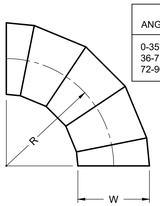
DIMENSION:

DIAMETER (INCH)	NUMBER OF VANES
3-9	2
10-14	3
15-19	4
20-60	5
OVER 60	12" MAX. SPACING

MITERED 90° ELBOW



DIE-STAMPED ELBOW



DIMENSION:

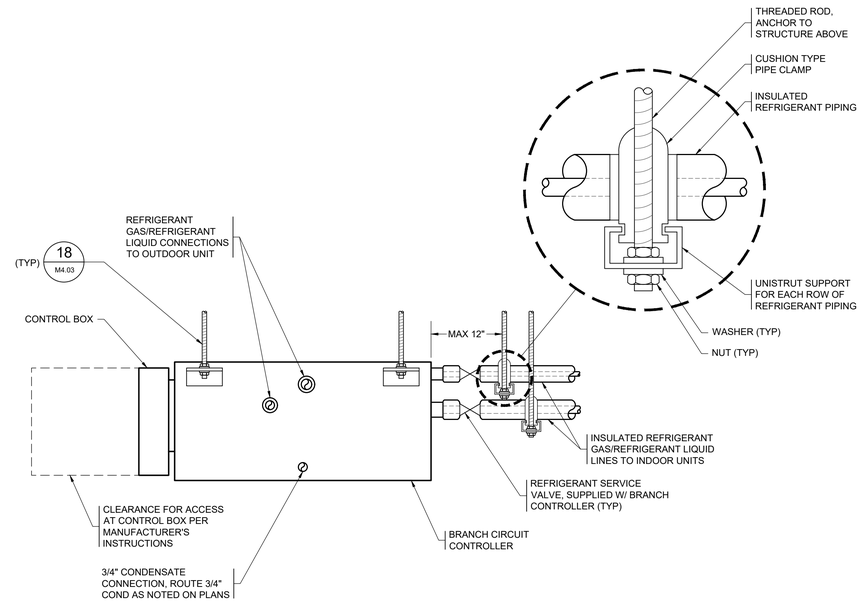
ANGLE	NUMBER OF GORES
0-35°	2
36-71°	3
72-90°	5

FABRICATED ELBOW

ELBOWS - ROUND

NTS

9
M4.04



BRANCH CIRCUIT CONTROLLER

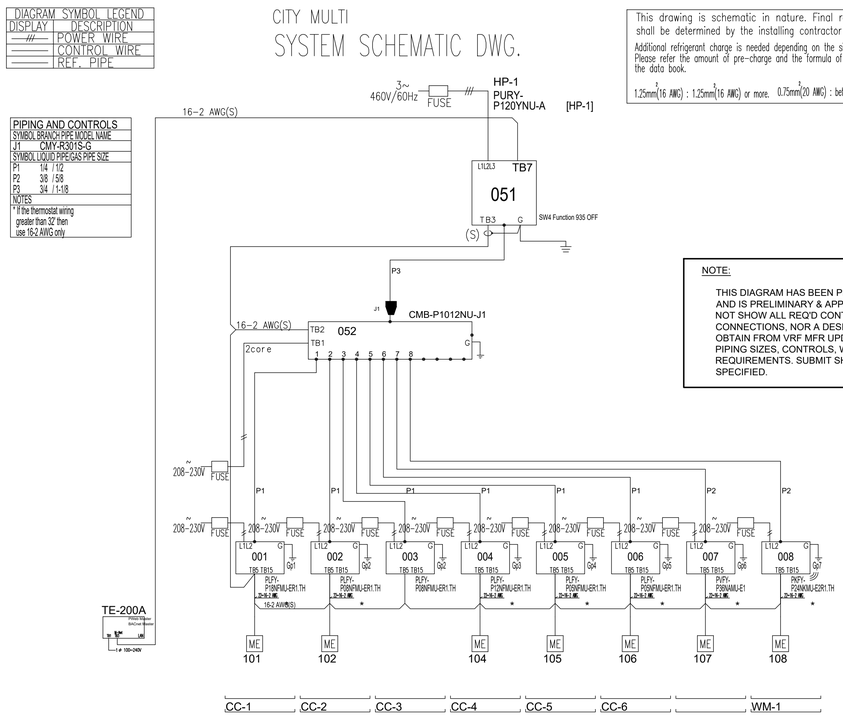
NTS

17
M4.04

DIAGRAM SYMBOL LEGEND	
DISPLAY	DESCRIPTION
—///	POWER WIRE
———	CONTROL WIRE
———	REF. PIPE

CITY MULTI

SYSTEM SCHEMATIC DWG.



PIPING AND CONTROLS
SYMBOL BRANCH PIPE MODEL NAME
J1 CMY-R301S-G
SYMBOL LIQUID PIPE/GAS PIPE SIZE
P1 1/4 / 1/2
P2 3/8 / 5/8
P3 3/4 / 1-1/8
NOTES
* If the thermostat wiring greater than 32' then use 16-2 AWG only

This drawing is schematic in nature. Final routing of piping & wiring shall be determined by the installing contractor and/or designer of record.

Additional refrigerant charge is needed depending on the size and length of extended piping. Please refer the amount of pre-charge and the formula of calculation which is mentioned on the data book.

1.25mm²(16 AWG) : 1.25mm²(16 AWG) or more. 0.75mm²(20 AWG) : between 0.5mm²(24 AWG) and 0.75mm²(20 AWG).

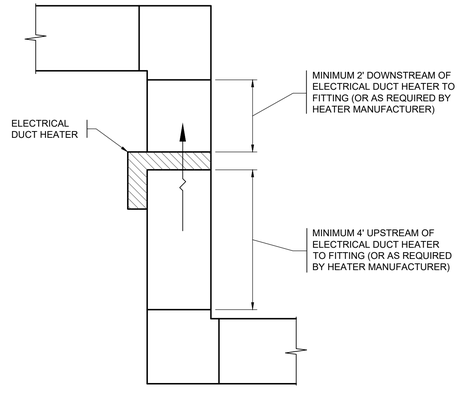
NOTE:

THIS DIAGRAM HAS BEEN PROVIDED BY THE VRF MFR AND IS PRELIMINARY & APPROXIMATE ONLY. IT DOES NOT SHOW ALL REQ'D CONTROL DEVICES NOR ALL CONNECTIONS, NOR A DESIGN FOR OTHER MFR'S. OBTAIN FROM VRF MFR UPDATED DIAGRAM WITH ALL PIPING SIZES, CONTROLS, WIRING, AND RELATED REQUIREMENTS. SUBMIT SHOP DRAWINGS AS SPECIFIED.

REFRIGERANT PIPING DIAGRAM

NTS

16
M4.04



ELECTRIC DUCT COIL

NTS

13
M4.04

BID SET 1-20-25

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REVISION NO. 0

RICHARD A. HULTZ STATE OF WASHINGTON 22570 REGISTERED PROFESSIONAL ENGINEER

SIGNED
1-20-2025

CITY OF TACOMA
DEPARTMENT OF PUBLIC UTILITIES
LIGHT DIVISION

CUSHMAN DAM-SERVICE HOUSE HVAC UPGRADES

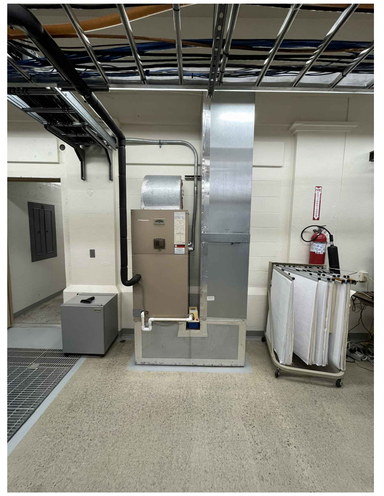
MECHANICAL DETAILS

SUBMITTED	DRAWN	STAMPED
	MB	RH
	DATE 1/20/25	
APPROVED	DRAWING NO. M4.04	

BREAKER GALLERY
NTS
D
M4.06

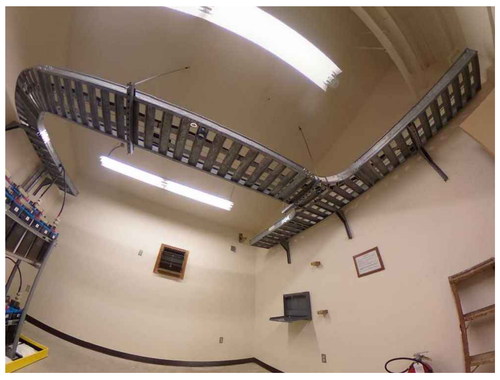
TRANSF. ROOM
NTS
C
M4.06

(E) HVAC-2
NTS
B
M4.06



(E) HVAC-1
NTS
A
M4.06

BUILDING EXTERIOR - EAST
NTS
G
M4.06



BATTERY ROOM
NTS
F
M4.06

OIL ROOM
NTS
E
M4.06

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RICHARD A. HULTZ STATE OF WASHINGTON 13575 REGISTERED PROFESSIONAL ENGINEER
SIGNED
1-20-2025

CITY OF TACOMA
DEPARTMENT OF PUBLIC UTILITIES
LIGHT DIVISION

CUSHMAN DAM–SERVICE HOUSE
HVAC UPGRADES
PHOTOS

SUBMITTED	DRAWN	STAMPED
	MB	RH
	DATE 1/20/25	
APPROVED	DRAWING NO. M4.06	

ABBREVIATIONS

(SOME ABBREVIATIONS MAY NOT BE USED ON DRAWINGS)

ABBREVIATION	DESCRIPTION	ABBREVIATION	DESCRIPTION
A or AMP	AMPERES	MECH	MECHANICAL
AC	ALTERNATING CURRENT	MH	MANHOLE
A/C	AIR CONDITIONING	MIN	MINIMUM
AIC	AMPERE INTERRUPTING CAPACITY	MLO	MAIN LUGS ONLY
AL	ALUMINUM	MOP, MOCP	MAXIMUM OVERCURRENT PROTECTION
ARCH	ARCHITECTURAL	MTD	MOUNTED
ATC	AUTOMATIC TEMPERATURE CONTROL	MTG	MOUNTING
ATS	AUTOMATIC TRANSFER SWITCH	NC	NORMALLY CLOSED
AWG	AMERICAN WIRE GAUGE	N, NEUT	NEUTRAL
BIL	BASIC IMPULSE LEVEL	NIC	NOT IN CONTRACT
BKR	BREAKER	NO	NORMALLY OPEN
BLDG	BUILDING	NTS	NOT TO SCALE
C	CONDUIT	OC	ON CENTER
C.O.	CONDUIT ONLY	OD	OUTSIDE DIAMETER
°C	DEGREES CELSIUS	OH	OVERHEAD
CB	CIRCUIT BREAKER	PA	PUBLIC ADDRESS
CCTV	CLOSED CIRCUIT TELEVISION	PB	PULLBOX
CFM	CUBIC FEET PER MINUTE	PF	POWER FACTOR
CKT	CIRCUIT	Ø or PH	PHASE
CL	CENTER LINE	PNL	PANEL
CLG	CEILING	PR	PAIR
CONC	CONCRETE	PRI	PRIMARY
CT	CURRENT TRANSFORMER	PT	POTENTIAL TRANSFORMER
CU	COPPER	PVC	POLYVINYL CHLORIDE
CW	COLD WATER	RECPT	RECEPTACLE
BD	DECIBELS	REQ	REQUIRED
DC	DIRECT CURRENT	RF	RADIO FREQUENCY
DIA	DIAMETER	RM	ROOM
DIV	DIVISION	RMS	ROOT MEAN SQUARE
DPDT	DOUBLE POLE, DOUBLE THROW	SEC	SECONDARY
DPST	DOUBLE POLE, SINGLE THROW	SHT	SHEET
DWG	DRAWING	SMR	SURFACE METAL RACEWAY
EGC	EQUIPMENT GROUND CONDUCTOR	SN	SOLID NEUTRAL
ELEC	ELECTRIC	SP	SINGLE POLE
EMT	ELECTRICAL METALLIC TUBING	SPD	SURGE PROTECTIVE DEVICE
EXST, (E)	EXISTING	SPDT	SINGLE POLE, DOUBLE THROW
ETR	EXISTING TO REMAIN	SPST	SINGLE POLE, SINGLE THROW
°F	DEGREES FAHRENHEIT	SS	STAINLESS STEEL
FA	FIRE ALARM	STD	STANDARD
FC	FOOTCANDLE	SW	SWITCH
FLA	FULL LOAD AMPS	SWBD	SWITCHBOARD
FLEX	FLEXIBLE CONDUIT	TEL	TELEPHONE
GALV	GALVANIZED	TV	TELEVISION
GFCI	GROUND FAULT CIRCUIT INTERRUPTER	TTB	TELECOMMUNICATIONS TERMINAL BOARD
GND	GROUND	TYP	TYPICAL
H-O-A	HAND - OFF - AUTO	UL	UNDERWRITERS LABORATORY
HP	HORSEPOWER	UF	UNDERFLOOR
HPF	HIGH POWER FACTOR	UG	UNDERGROUND
H & V	HEATING AND VENTILATION	V	VOLTS
HVAC	HEATING, VENTILATION & AIR CONDITIONING	VA	VOLT AMPERES
HZ	HERTZ	VAC	VOLTS ALTERNATING CURRENT
IDF	INTERMEDIATE DISTRIBUTION FRAME	VAR	REACTIVE VOLT AMPERES
J-BOX	JUNCTION BOX	VAV	VARIABLE AIR VOLUME
KV	KILOVOLTS	VD	VOLTAGE DROP
KVA	KILOVOLT AMPERES	VDC	VOLTS DIRECT CURRENT
KVAR	REACTIVE KILOVOLT AMPERES	VFD	VARIABLE FREQUENCY DRIVE
KW	KILOWATTS	VT	VAPORTIGHT
KWH	KILOWATT HOURS	W	WATTS
LT	LIGHT	WP	WEATHERPROOF
LTG	LIGHTING	/W	WITH
MAX	MAXIMUM	W/O	WITHOUT
MCA	MINIMUM CIRCUIT AMPS	XFER	TRANSFER
MCB	MAIN CIRCUIT BREAKER	XFMR	TRANSFORMER
MCC	MOTOR CONTROL CENTER	XLP	CROSS-LINKED POLYETHYLENE
MCM, KCM	THOUSAND CIRCULAR MILS	XP	EXPLOSION PROOF
MDF	MAIN DISTRIBUTION FRAME	Z	IMPEDANCE

ELECTRICAL LEGEND

(SOME SYMBOLS MAY NOT BE USED ON DRAWINGS)

SYMBOL	DESCRIPTION
(#)	BUBBLE NOTE TAG SYMBOL: # – IDENTIFYING NUMBER
	SCHEDULED EQUIPMENT CONNECTION (INCLUDE ALL WIRING, DISCONNECTING MEANS, CONTROL AND OTHER REQUIREMENTS SCHEDULED)
	STRIP LUMINAIRE (LENGTH TO SCALE)
⊗	EXIT FIXTURE
	EMERGENCY FIXTURE – TWIN HEAD
S_{OS}	SINGLE POLE SWITCH WITH OCCUPANCY SENSOR
	HEAVY LINE WEIGHT = NEW WORK (RECEPTACLE SHOWN)
	STANDARD LINE WEIGHT = EXISTING TO REMAIN (RECEPTACLE SHOWN)
	BROKEN LINE WORK = ELECTRICAL DEMOLITION (RECEPTACLE SHOWN)

SYMBOL	DESCRIPTION
	DUPLEX RECEPTACLE (NEMA 5–20R)
	FOURPLEX RECEPTACLE (NEMA 5–20R)
	GFCI DUPLEX RECEPTACLE (NEMA 5–20R) SUBSCRIPT: REF REFRIGERATOR DW DISHWASHER FREZ CHEST FREEZER MWO MICROWAVE OVEN
J	JUNCTION BOX
	PANELBOARD
	FUSED DISCONNECT SWITCH
200–4–G	FEEDER CALLOUT X–Y–Z. SEE SCHEDULE.
200/150–3P	DEVICE SIZE / FUSE OR TRIP RATING – No. OF POLES

GENERAL ELECTRICAL NOTES:

1. BRANCH CIRCUIT NOTES:
   A. VERIFY BRANCH CIRCUIT WIRE COUNT BEFORE PULLING CONDUCTORS. PROVIDE REQUIRED CONDUCTORS TO EACH OUTLET AND DEVICE FOR PHASE, NEUTRAL AND EQUIPMENT GROUND BASED ON CIRCUIT DESIGNATIONS SHOWN AND AS OTHERWISE INDICATED ON PLANS OR NOTE BELOW.
   B. PROVIDE SEPARATE NEUTRAL CONDUCTOR FOR BRANCH CIRCUITS SERVING RECEPTACLE OUTLETS UNLESS OTHERWISE INDICATED.
2. MINIMUM CONDUIT SIZE FOR HOMERUNS AND FOR CONDUIT INSTALLED BELOW GRADE OUTDOORS SHALL BE 3/4 INCH.
3. VERIFY BACK BOX REQUIREMENTS OF EQUIPMENT FURNISHED UNDER OTHER THAN DIVISION 26 SECTION AND EQUIPMENT FURNISHED BY OWNER.

ELECTRICAL EQUIPMENT CONNECTION NOTES:

1. VERIFY VOLTAGE, PHASE, FLA/MCA OF EACH CONNECTION WITH EQUIPMENT SUPPLIER PRIOR TO ROUGH-IN. NOTIFY THE CITY OR OWNER WHEN SCHEDULED SUPPLY WILL NOT MEET NATIONAL ELECTRIC CODE (NEC) REQUIREMENTS.
2. OUTLETS, DISCONNECTS, CONTROLLERS, AND EQUIPMENT CONNECTIONS FOR OUTDOOR EQUIPMENT SHALL BE WEATHER PROOF.
3. LOCATION OF OUTLETS, DISCONNECTS, CONTROL DEVICES, AND EQUIPMENT CONNECTIONS ARE TO BE LOCATED IN FIELD BY THE CONTRACTOR. UNLESS OTHERWISE INDICATED ON PLANS, INSTALL SCHEDULED DISCONNECTS AND CONTROL DEVICES IN SIGHT OF EQUIPMENT. ARRANGE WIRING AND EQUIPMENT TO AVOID INTERFERENCE WITH OTHER WORK AND TO MAXIMIZE ACCESSIBILITY FOR MAINTENANCE.
4. COORDINATE WITH THE OTHER INSTALLING CONTRACTORS TO ENSURE NATIONAL ELECTRIC CODE (NEC) REQUIRED ACCESS TO DISCONNECTS IS PROVIDED FOR EACH PIECE OF EQUIPMENT.
5. WIRING BETWEEN EQUIPMENT DISCONNECT AND POINT OF CONNECTION SHALL COMPLY WITH NATIONAL ELECTRIC CODE (NEC) BASED ON EQUIPMENT NAMEPLATE RATING EXCEPT MINIMUM BRANCH CIRCUIT RATING SHALL BE 20 AMPERES.
6. SIZE OF DISCONNECT SWITCH AND MOTOR STARTER SHALL BE SIZED TO COMPLY WITH NATIONAL ELECTRIC CODE (NEC) REQUIREMENTS. WHERE INDICATED MOTOR CONTROL IS NOT LOCATED IN SIGHT OF MOTOR AS DEFINED BY NATIONAL ELECTRIC CODE (NEC), PROVIDE ADDITIONAL DISCONNECTING MEANS TO COMPLY WITH NEC 430.102.
7. WIRING SIZES ARE BASED ON 60 DEGREE C. FOR AMPACITIES 100 AMPERES AND LESS. FOR FEEDERS LESS THAN 100 FEET IN LENGTH, CONDUCTOR SIZES MAY BE SELECTED BASED ON 75 DEGREE C. WHERE EQUIPMENT INSTALLED IS LABELED FOR 75 DEGREE C. WIRING.

HULTZ BHU engineers inc
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Phone: (253) 383-3257 Fax: (253) 383-3283
general@hultzbhu.com Job Number: 24-149

WARNING
0 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

REVISION NO. 0

THOMAS URQUHART STATE OF WASHINGTON REGISTERED PROFESSIONAL ENGINEER
SIGNED 01-20-2025

BID SET 01-20-25

CITY OF TACOMA
DEPARTMENT OF PUBLIC UTILITIES
LIGHT DIVISION

CUSHMAN DAM–SERVICE HOUSE
HVAC UPGRADES

ELECTRICAL ABBREVIATIONS, LEGEND, & NOTES

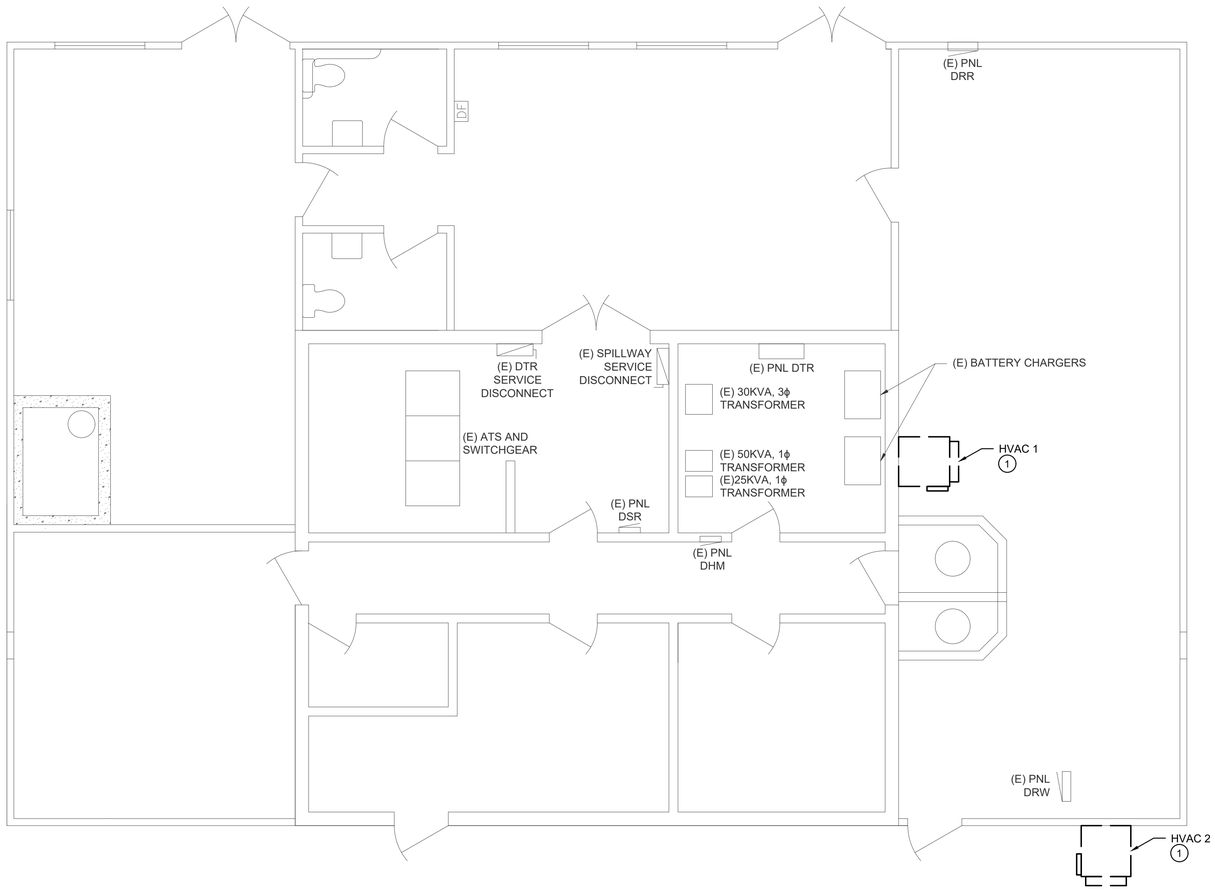
SUBMITTED	DRAWN	STAMPED
	JM	TU
	DATE 01/20/25	
APPROVED	DRAWING NO. E0.01	

GENERAL NOTES:

1. REFER TO SHEET E0.01 FOR ADDITIONAL ELECTRICAL NOTES.

PLAN NOTES:

(1) HVAC UNIT TO BE REMOVED BY CONTRACTOR. REMOVE ALL ELECTRICAL CONNECTIONS COMPLETE BACK TO SOURCE.
HVAC-1 FED FROM DRR-29,31.
HVAC-2 FED FROM DWR-32,34,36.
HVAC-2 CONDENSATE FED FROM DWR-31.



ELECTRICAL DEMOLITION PLAN

SCALE: 1/4" = 1'-0"

NORTH

1' 4'
0' 2' 8'

BID SET 01-20-25

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REVISION NO. 0

C. THOMAS URQUHART STATE OF WASHINGTON REGISTERED PROFESSIONAL ENGINEER

SIGNED
01-20-2025

CITY OF TACOMA
DEPARTMENT OF PUBLIC UTILITIES
LIGHT DIVISION

CUSHMAN DAM–SERVICE HOUSE
HVAC UPGRADES

ELECTRICAL DEMOLITION PLAN

SUBMITTED	DRAWN	STAMPED
	JM	TU
	DATE 01/20/25	
APPROVED	DRAWING NO.	
	E1.01	

FILED IN: I:\2024 Jobs\24-149\Drawings\Elec\24-149_E1.01.dwg SAVED: JohnM 12/3/2024 2:33 PM PLOTTED: John McIntire 1/17/2025 10:41 AM

MECHANICAL EQUIPMENT CONNECTION SCHEDULE

NAME	DESCRIPTION	LOCATION	MAXIMUM RATINGS						(CU) FEEDER	DISCONNECT		CONTROLS		REMARKS
			HP	KVA	FLA	MCA	MOCP	VOLT/PH		BY	DESCRIPTION	STARTER BY	DESCRIPTION	
HP-1	OUTDOOR HEAT PUMP	OUTDOOR		16.63	20.0	25.0	40	480 3	SEE ONE-LINE DIAGRAM	●	60AS/3P			
BC-1	BRANCH CONTROLLER	LUNCH ROOM		0.27	1.3	1.6	20	208 1	3/4"C-4#12 +#12G	●	TOGGLE			
CC-1	CEILING CASSETTE	LUNCH ROOM		0.10	0.5	0.6	20	208 1	3/4"C-4#12 +#12G	●	TOGGLE			
CC-2	CEILING CASSETTE	RELAY ROOM		0.06	0.3	0.4	20	208 1	3/4"C-4#12 +#12G	●	TOGGLE			
CC-3	CEILING CASSETTE	RELAY ROOM		0.06	0.3	0.4	20	208 1	3/4"C-4#12 +#12G	●	TOGGLE			
CC-4	CEILING CASSETTE	SWITCHGEAR ROOM		0.06	0.3	0.4	20	208 1	3/4"C-4#12 +#12G	●	TOGGLE			
CC-5	CEILING CASSETTE	BATTERY ROOM		0.05	0.2	0.3	20	208 1	3/4"C-4#12 +#12G	●	TOGGLE			
CC-6	CEILING CASSETTE	OIL ROOM		0.05	0.2	0.3	20	208 1	3/4"C-4#12 +#12G	●	TOGGLE			
AH-1	AIR HANDLER	RELAY ROOM		0.86	4.1	5.2	15	208 1	3/4"C-4#12 +#12G	●	TOGGLE			
WM-1	WALL MOUNT UNIT	COMM. ROOM		0.13	0.6	0.8	20	208 1	3/4"C-4#12 +#12G	●	TOGGLE			
ERV-1	ENERGY RECOVERY VENTILATOR	LUNCH ROOM		0.66	5.5	6.9	20	120 1	3/4"C-4#12 +#12G	●	TOGGLE			
DH-1	DUCT HEATER	LUNCH ROOM		2.50	12.0	15.0	20	208 1	3/4"C-4#12 +#12G	●	TOGGLE			

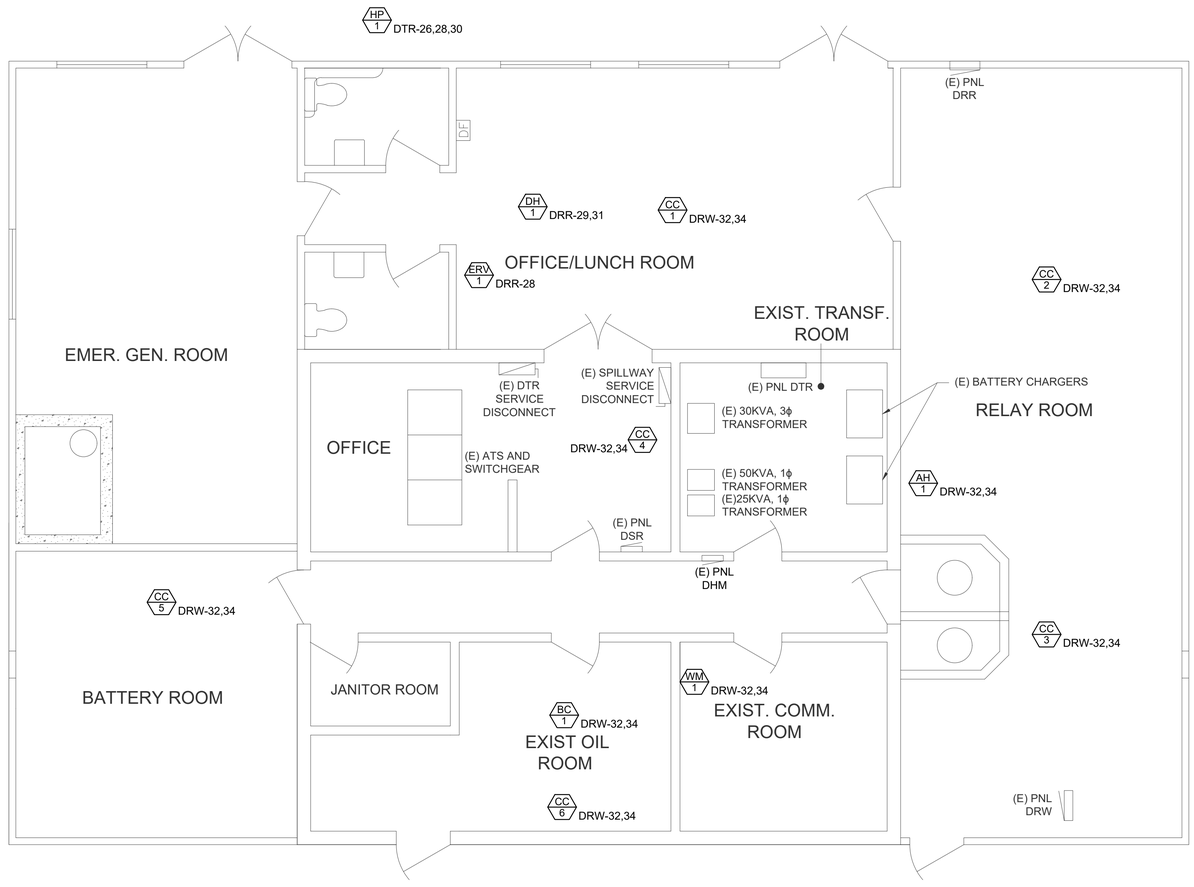
EQUIPMENT CONNECTION SCHEDULE NOTES:

1. SEE ELECTRICAL EQUIPMENT CONNECTION NOTES ON SHEET E0.01.

2. SCHEDULE LEGEND:
   - ● = FURNISH AND INSTALL NEW UNDER DIVISION 26
   - ○ = INSTALL UNDER DIVISION 26; FURNISHED WITH EQUIPMENT OR BY OTHERS.
   - X = FURNISH AND INSTALL BY OTHERS (NOT DIVISION 26)
   - * = EXISTING, RELOCATED EQUIPMENT

GENERAL NOTES:

1. REFER TO SHEET E0.01 FOR ADDITIONAL ELECTRICAL NOTES.



ELECTRICAL POWER PLAN

SCALE: 1/4" = 1'-0"

NORTH

1' 4'
0' 2' 8'

BID SET 01-20-25

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THOMAS URQUHART STATE OF WASHINGTON REGISTERED PROFESSIONAL ENGINEER

SIGNED 01-20-2025

CITY OF TACOMA
DEPARTMENT OF PUBLIC UTILITIES
LIGHT DIVISION

CUSHMAN DAM–SERVICE HOUSE
HVAC UPGRADES

ELECTRICAL POWER PLAN & EQUIPMENT SCHEDULE

SUBMITTED	DRAWN	STAMPED
	JM	TU
APPROVED	DATE 01/20/25	
	DRAWING NO. E3.01	

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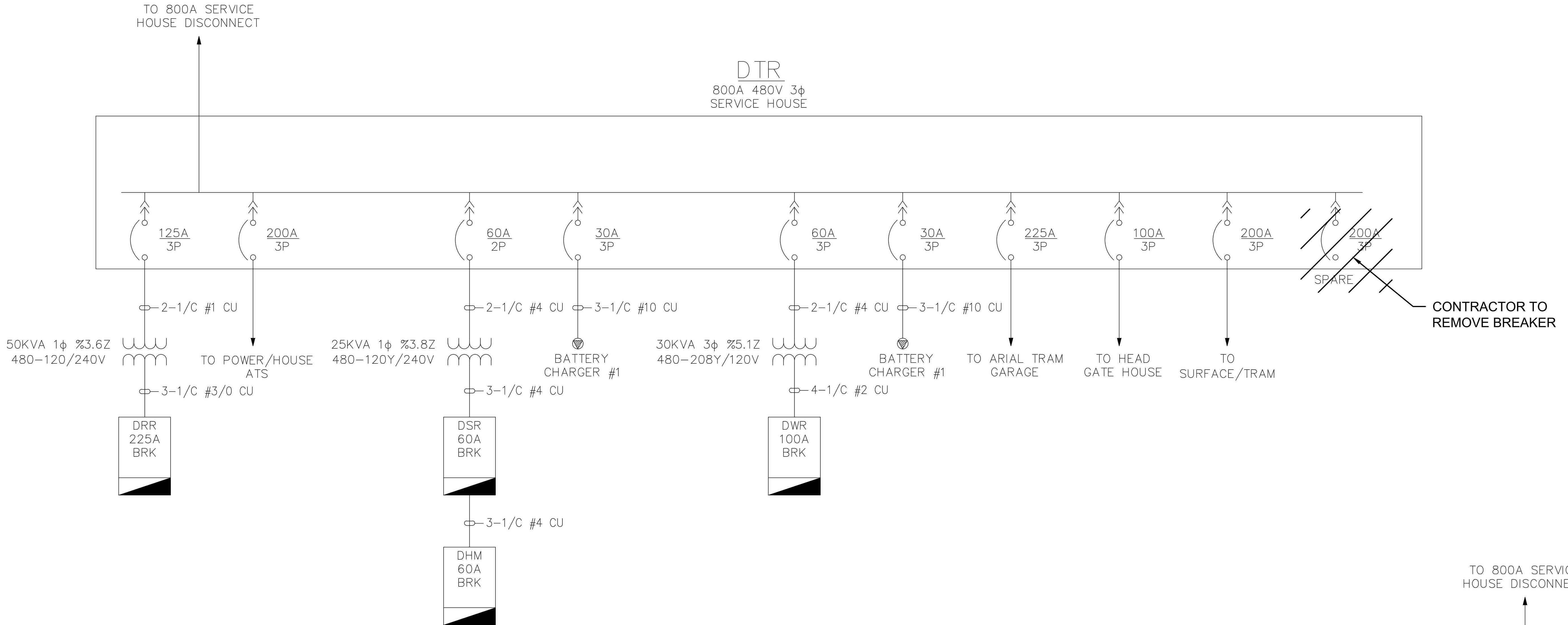
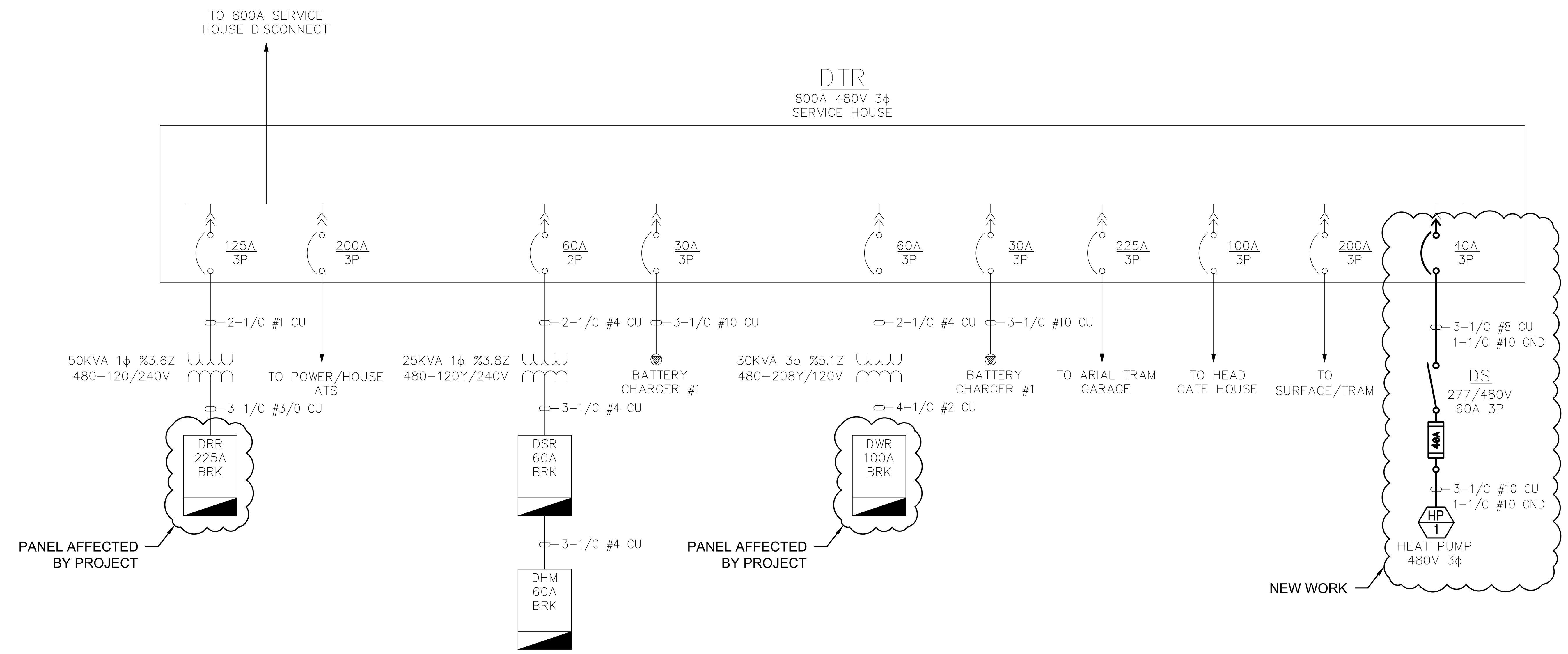


EXISTING PARTIAL ONE-LINE DIAGRAM

SCALE: N.T.S.



NEW PARTIAL ONE-LINE DIAGRAM

SCALE: N.T.S.

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WARNING
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ONE-LINE DIAGRAMS ARE BASED UPON EXISTING AS-BUILT PLANS. NEW WIRING SHALL BE CONDUCTORS IN CONDUIT SIZED PER CODE EXCEPT #1/0 AWG OR LARGER SINGLE CONDUCTORS MAY BE INSTALLED IN EXISTING CABLE TRAY WHERE SPACE IS AVAILABLE AND CONDUCTORS ARE SUITABLY LISTED FOR THE PURPOSE.

CITY OF TACOMA
DEPARTMENT OF PUBLIC UTILITIES
LIGHT DIVISION

CUSHMAN DAM-SERVICE HOUSE
HVAC UPGRADES

ELECTRICAL DISTRIBUTION
ONE-LINE DIAGRAM

REVISION NO. 0

C. THOMAS URQUHART, STATE OF WASHINGTON, REGISTERED PROFESSIONAL ENGINEER

SIGNED
01-20-2025

SUBMITTED	DRAWN	STAMPED
	JM	TU
	DATE 01/20/25	
APPROVED	DRAWING NO. E5.01	

BID SET 01-20-25

EXISTING — THREE PHASE PANEL SCHEDULE

DRW

VOLTAGE: 208/120 — 4W — RATING: 100 A — MAIN: — BREAKER

GRID
SECTION 1 OF1
LOCATION: RELAY ROOM

ENCLOSURE: FLUSH; X SURFACE; X NEMA TYPE 1; NEMA TYPE 3R; NEMA TYPE 12
ACCESSORIES: ISOLATED GROUND; SPD; 200% NEUTRAL; FEED THRU LUGS; DOUBLE LUGS
AIC ASSEMBLY: SERVICE RATED; SERIES RATED; X 10K; 22K; 42K

DESCRIPTION	*	VA	BKR	CKT	A	B	C	CKT	BKR	VA	*	DESCRIPTION
PCB 10-11 CHAGING MOTOR		916	20/2	1	1832			2	20/2	916		PCB 10-12 CHARGING MOTOR
		916		3		1832		4		916		
PCB 10-13 CHAGING MOTOR		916	20/2	5			1832	6	20/2	916		PCB 10-14 CHARGING MOTOR
		916		7	1832			8		916		
FILTER PRESS OUTLETS		2400	30/2	9		4400		10	30/1	2000		BKR. 10-11 HEATER & OUTLETS
		2400		11			4400	12	30/1	2000		PCB 10-12 HEATER & OUTLETS
LIGHTING FENCE SOUTH		1000	20/1	13	2000			14	20/1	1000		LIGHTING FENCE NORTH
PCB 10-13 HEATER & OUTLET		2000	30/1	15		2500		16	20/1	500		PANEL POWER, LINE 1&2 PML'S
PCB 10-14 HEATER & OUTLET		2000	30/1	17			2500	18	20/1	500		CVT1 HEATER
N. CAMERA POWER ON DAM LEFT		250	20/1	19	750			20	20/1	500		SCADA RTU PANEL
S. CAMERA POWER ON DAM RIGHT		250	20/1	21		750		22	20/1	500		CVT2 HEATER
MOD 10-01 HEATER		1500	20/1	23			2000	24	20/1	500		MOD 10-02 HEATER
POTLATCH 1 & 10-13 RECEPT		500	30/1	25	1000			26	30/1	500		POTLATCH 1 & 10-14 RECEPT
COMM. RM. RECEPT.		900	20/1	27		900		28	20/1			SPARE
SCADA RTU LIGHT & RECEPTACLE		900	20/1	29			2900	30	30/1	2000		COMM. INVERTER AC POWER
AIR COND. CONFENSATE PUMP		696	10/1	31	2276			32	30/3	1580		AIR COND. OUTDOOR UNIT
YARD VAULT SUMP PUMP		696	20/1	33		2276		34		1580		
COM RM - UPS		1500	20/1	35			1500	36				
20A 125V RCPT (THIS PANEL BOTTOM)		180	30/1	37	680			38	50/2	500		SF6 CART OUTLET 10-12 BREAKER
20A 4-PLEX COMM RACK BACKSIDE		360	20/1	39		360		40				
COMM ROOM RECPT. (COMMRACK)		720	20/1	41			720	42				SPACE

BREAKER CODE:
A=AFCI, G=GFCI, N=SWITCHED NEUTRAL, S=SHUNT TRIP
K=KEYED, P=PADLOCK ATTACHMENT

10370	13018	15852	VA PANEL DRW
			VA
			VA
10370	13018	15852	VA SUB-TOTAL

	KVA			KVA
LIGHTING	2.0	X	125%	2.5
RECEPTACLES	10.0	X	100%	10.0
RECEPTACLES OVER 10K	6.3	X	50%	3.2
MOTORS	11.9	X	100%	11.9
LARGEST MOTOR		X	125%	
KITCHEN		X	100%	
NONCOINCIDENT		X	0%	
REMAINDER	8.5	X	100%	8.5
EV CHARGER		X	125%	

TOTAL LOAD	KVA	AMPS
CONNECTED	**38.7**	**107.4**
CALCULATED	**36.0**	**100.0**

* REMARKS

REVISED — THREE PHASE PANEL SCHEDULE

DRW (R)

VOLTAGE: 208/120 — 4W — RATING: 100 A — MAIN: — BREAKER

GRID
SECTION 1 OF1
LOCATION: RELAY ROOM

ENCLOSURE: FLUSH; X SURFACE; X NEMA TYPE 1; NEMA TYPE 3R; NEMA TYPE 12
ACCESSORIES: ISOLATED GROUND; SPD; 200% NEUTRAL; FEED THRU LUGS; DOUBLE LUGS
AIC ASSEMBLY: SERVICE RATED; SERIES RATED; X 10K; 22K; 42K

DESCRIPTION	*	VA	BKR	CKT	A	B	C	CKT	BKR	VA	*	DESCRIPTION
PCB 10-11 CHAGING MOTOR		916	20/2	1	1832			2	20/2	916		PCB 10-12 CHARGING MOTOR
		916		3		1832		4		916		
PCB 10-13 CHAGING MOTOR		916	20/2	5			1832	6	20/2	916		PCB 10-14 CHARGING MOTOR
		916		7	1832			8		916		
FILTER PRESS OUTLETS		2400	30/2	9		4400		10	30/1	2000		BKR. 10-11 HEATER & OUTLETS
		2400		11			4400	12	30/1	2000		PCB 10-12 HEATER & OUTLETS
LIGHTING FENCE SOUTH		1000	20/1	13	2000			14	20/1	1000		LIGHTING FENCE NORTH
PCB 10-13 HEATER & OUTLET		2000	30/1	15		2500		16	20/1	500		PANEL POWER, LINE 1&2 PML'S
PCB 10-14 HEATER & OUTLET		2000	30/1	17			2500	18	20/1	500		CVT1 HEATER
N. CAMERA POWER ON DAM LEFT		250	20/1	19	750			20	20/1	500		SCADA RTU PANEL
S. CAMERA POWER ON DAM RIGHT		250	20/1	21		750		22	20/1	500		CVT2 HEATER
MOD 10-01 HEATER		1500	20/1	23			2000	24	20/1	500		MOD 10-02 HEATER
POTLATCH 1 & 10-13 RECEPT		500	30/1	25	1000			26	30/1	500		POTLATCH 1 & 10-14 RECEPT
COMM. RM. RECEPT.		900	20/1	27		900		28	20/1			SPARE
SCADA RTU LIGHT & RECEPTACLE		900	20/1	29			2900	30	30/1	2000		COMM. INVERTER AC POWER
SPARE			10/1	31	852			32	**20/2**	**852**	1	**BC-1, CC-1 THRU CC-6, AH-1, WM-1**
YARD VAULT SUMP PUMP		696	20/1	33		1548		34		**852**		
COM RM - UPS		1500	20/1	35			1500	36				**SPACE**
20A 125V RCPT (THIS PANEL BOTTOM)		180	30/1	37	680			38	50/2	500		SF6 CART OUTLET 10-12 BREAKER
20A 4-PLEX COMM RACK BACKSIDE		360	20/1	39		360		40				
COMM ROOM RECPT. (COMMRACK)		720	20/1	41			720	42				SPACE

BREAKER CODE:
A=AFCI, G=GFCI, N=SWITCHED NEUTRAL, S=SHUNT TRIP
K=KEYED, P=PADLOCK ATTACHMENT

8946	12290	15852	VA PANEL DRW (R)
			VA
			VA
8946	12290	15852	VA SUB-TOTAL

	KVA			KVA
LIGHTING	2.0	X	125%	2.5
RECEPTACLES	10.0	X	100%	10.0
RECEPTACLES OVER 10K	6.3	X	50%	3.2
MOTORS	9.7	X	100%	9.7
LARGEST MOTOR		X	125%	
KITCHEN		X	100%	
NONCOINCIDENT		X	0%	
REMAINDER	8.5	X	100%	8.5
EV CHARGER		X	125%	

TOTAL LOAD	KVA	AMPS
CONNECTED	**36.5**	**101.5**
CALCULATED	**33.9**	**94.1**

* REMARKS
1 REPLACE BREAKER WITH NEW

LIGHT LINE WEIGHT EQUALS EXISTING
HEAVY LINE WEIGHT EQUALS NEW

EXISTING — SINGLE PHASE PANEL SCHEDULE

DRR

VOLTAGE: 240/120 — 3W — RATING: 225 A — MAIN: — LUG

GRID
SECTION 1 OF1
LOCATION: BASEMENT

ENCLOSURE: FLUSH; X SURFACE; X NEMA TYPE 1; NEMA TYPE 3R; NEMA TYPE 12
ACCESSORIES: ISOLATED GROUND; SPD; 200% NEUTRAL; FEED THRU LUGS; DOUBLE LUGS
AIC ASSEMBLY: SERVICE RATED; SERIES RATED; x 10K; 22K; 42K

DESCRIPTION	*	VA	BKR	CKT	A		C	CKT	BKR	VA	*	DESCRIPTION
EMERGENCY GEN RM REC		900	20/1	1	1800			2	20/1	900		BATT ROOM REC
RELAY ROOM REC		900	20/1	3			1620	4	20/1	720		OFFICE LUNCH ROOM REC
MICROWAVE REC		1500	20/1	5	2400			6	20/1	900		RELAY RACK REC
LUNCH RM LIGHTS		400	30/1	7			560	8	20/1	160		BATT ROOM LIGHTS
P.C.S. PANEL		500	20/1	9	660			10	20/1	160		SWITCH ROOM LIGHTS
SPARE			20/1	11			160	12	20/1	160		REST ROOM LIGHTS
BATT RM HEAT		1500	30/2	13	3000			14	30/2	1500		GEN ROOM HEAT
		1500		15			3000	16		1500		
LUNCH ROOM HEAT		1250	20/2	17	6250			18	60/2	5000		RELAY ROOM HEAT
		1250		19			6250	20		5000		
HOT WATER HEATER		2250	30/2	21	3250			22	20/1	1000		OUTSIDE LIGHTS
		2250		23			2570	24	20/1	320		GEN ROOM LIGHTS
REST ROOM HEAT		1500	15/2	25	1750			26	20/1	250		DAMPERS
		1500		27			1500	28	20/1			SPARE
HEATER, AIR COND. INDOOR UNIT		4500	60/2	29	4820			30	30/1	320		RELAY ROOM LIGHTS
		4500		31			4820	32	30/1	320		RELAY ROOM LIGHTS
REALY ROOM HEATER		2000	20/2	33	2320			34	20/1	320		RELAY ROOM LIGHTS
		2000		35			2500	36	20/1	500		GEN. BATTERY CHARGER
AC UNIT SERVER ROOM		1976	30/2	37	1976			38				SPACE
		1976		39			1976	40				SPACE
MICROWAVE RM AIR COND.		1200	15/1	41	1200			42				SPACE

<ER CODE: A=AFCI, G=GFCI, N=SWITCHED NEUTRAL, S=SHUNT | 29426 | | 24956 VA PANEL DRR
K=KEYED | | | VA
29426 | 24956 VA SUB-TOTAL

	KVA			KVA
LIGHTING	3.2	X	125%	4.0
RECEPTACLES	7.0	X	100%	7.0
RECEPTACLES OVER 10K		X	50%	
MOTORS	4.2	X	100%	4.2
LARGEST MOTOR		X	125%	
KITCHEN		X	100%	
NONCOINCIDENT		X	0%	
REMAINDER	40.0	X	100%	40.0

TOTAL LOAD	KVA	AMPS
CONNECTED	**54.4**	**226.6**
CALCULATED	**55.2**	**229.9**

REMARKS

REVISED — SINGLE PHASE PANEL SCHEDULE

DRR (R)

VOLTAGE: 240/120 — 3W — RATING: 225 A — MAIN: — LUG

GRID
SECTION 1 OF1
LOCATION: BASEMENT

ENCLOSURE: FLUSH; X SURFACE; X NEMA TYPE 1; NEMA TYPE 3R; NEMA TYPE 12
ACCESSORIES: ISOLATED GROUND; SPD; 200% NEUTRAL; FEED THRU LUGS; DOUBLE LUGS
AIC ASSEMBLY: SERVICE RATED; SERIES RATED; x 10K; 22K; 42K

DESCRIPTION	*	VA	BKR	CKT	A		C	CKT	BKR	VA	*	DESCRIPTION
EMERGENCY GEN RM REC		900	20/1	1	1800			2	20/1	900		BATT ROOM REC
RELAY ROOM REC		900	20/1	3			1620	4	20/1	720		OFFICE LUNCH ROOM REC
MICROWAVE REC		1500	20/1	5	2400			6	20/1	900		RELAY RACK REC
LUNCH RM LIGHTS		400	30/1	7			560	8	20/1	160		BATT ROOM LIGHTS
P.C.S. PANEL		500	20/1	9	660			10	20/1	160		SWITCH ROOM LIGHTS
SPARE			20/1	11			160	12	20/1	160		REST ROOM LIGHTS
BATT RM HEAT		1500	30/2	13	3000			14	30/2	1500		GEN ROOM HEAT
		1500		15			3000	16		1500		
LUNCH ROOM HEAT		1250	20/2	17	6250			18	60/2	5000		RELAY ROOM HEAT
		1250		19			6250	20		5000		
HOT WATER HEATER		2250	30/2	21	3250			22	20/1	1000		OUTSIDE LIGHTS
		2250		23			2570	24	20/1	320		GEN ROOM LIGHTS
REST ROOM HEAT		1500	15/2	25	1750			26	20/1	250		DAMPERS
		1500		27			2163	28	20/1	**663**	2	**ERV-1**
DH-1	1	**1250**	**20/2**	29	1570			30	30/1	320		RELAY ROOM LIGHTS
		1250		31			1570	32	30/1	320		RELAY ROOM LIGHTS
REALY ROOM HEATER		2000	20/2	33	2320			34	20/1	320		RELAY ROOM LIGHTS
		2000		35			2500	36	20/1	500		GEN. BATTERY CHARGER
AC UNIT SERVER ROOM		1976	30/2	37	1976			38				SPACE
		1976		39			1976	40				SPACE
MICROWAVE RM AIR COND.		1200	15/1	41	1200			42				SPACE

<ER CODE: A=AFCI, G=GFCI, N=SWITCHED NEUTRAL, S=SHUNT | 26176 | | 22369 VA PANEL DRR (R)
K=KEYED | | | VA
26176 | 22369 VA SUB-TOTAL

	KVA			KVA
LIGHTING	3.2	X	125%	4.0
RECEPTACLES	7.0	X	100%	7.0
RECEPTACLES OVER 10K		X	50%	
MOTORS	4.2	X	100%	4.2
LARGEST MOTOR		X	125%	
KITCHEN		X	100%	
NONCOINCIDENT		X	0%	
REMAINDER	34.2	X	100%	34.2

TOTAL LOAD	KVA	AMPS
CONNECTED	**48.5**	**202.3**
CALCULATED	**49.3**	**205.6**

REMARKS
1 REPLACE BREAKER WITH NEW
2 NEW LOAD ON EXISTING BREAKER

LIGHT LINE WEIGHT EQUALS EXISTING
HEAVY LINE WEIGHT EQUALS NEW

EXISTING — THREE PHASE PANEL SCHEDULE

DTR

VOLTAGE: 480/277 — 4W — RATING: 800 A — MAIN: — LUG

GRID
SECTION 1 OF1
LOCATION: TRANSFORMER ROOM

ENCLOSURE: FLUSH; X SURFACE; X NEMA TYPE 1; NEMA TYPE 3R; NEMA TYPE 12
ACCESSORIES: ISOLATED GROUND; SPD; 200% NEUTRAL; FEED THRU LUGS; DOUBLE LUGS
AIC ASSEMBLY: SERVICE RATED; SERIES RATED; X 14K; 35K; 65K

DESCRIPTION	*	VA	BKR	CKT	A	B	C	CKT	BKR	VA	*	DESCRIPTION
PANEL DRR & 50KVA XFRM		26176	125/3	1	70496			2	200/3	44320		POWER/HOUSE ATS
				3		44320		4		44320		
		24956		5			69276	6		44320		
PANELS DHM & DSR & 25 KVA XFMR		11520	60/2	7	13620			8	30/3	2100		BATTERY CHARGER #1
		11520		9		13620		10		2100		
PANEL DRW & 30KVA XFMR		10370	60/3	11			12470	12		2100		
		13018		13	15118			14	30/3	2100		BATTERY CHARGER #2
		15852		15			17952	16		2100		
ARIAL TRAM GARAGE		49860	225/3	17			51960	18		2100		
		49860		19	72020			20	100/3	22160		HEAD GATE HOUSE
		49860		21		72020		22		22160		
SURFACE/TRAM		44320	200/3	23			66480	24		22160		
		44320		25	44320			26	200/3			SPARE
		44320		27		44320		28				
SPACE				29			0	30				

BREAKER CODE:
A=AFCI, G=GFCI, N=SWITCHED NEUTRAL, S=SHUNT TRIP
K=KEYED, P=PADLOCK ATTACHMENT

215574	192232	200186	VA PANEL DTR
			VA
			VA
215574	192232	200186	VA SUB-TOTAL

	KVA			KVA
LIGHTING	5.2	X	125%	6.5
RECEPTACLES	10.0	X	100%	10.0
RECEPTACLES OVER 10K	13.3	X	50%	6.7
MOTORS	16.1	X	100%	16.1
LARGEST MOTOR		X	125%	
KITCHEN		X	100%	
NONCOINCIDENT		X	0%	
REMAINDER	560.3	X	100%	560.3
EV CHARGER		X	125%	

TOTAL LOAD	KVA	AMPS
CONNECTED	**604.9**	**727.6**
CALCULATED	**599.5**	**721.1**

* REMARKS

REVISED — THREE PHASE PANEL SCHEDULE

DTR (R)

VOLTAGE: 480/277 — 4W — RATING: 800 A — MAIN: — LUG

GRID
SECTION 1 OF1
LOCATION: TRANSFORMER ROOM

ENCLOSURE: FLUSH; X SURFACE; X NEMA TYPE 1; NEMA TYPE 3R; NEMA TYPE 12
ACCESSORIES: ISOLATED GROUND; SPD; 200% NEUTRAL; FEED THRU LUGS; DOUBLE LUGS
AIC ASSEMBLY: SERVICE RATED; SERIES RATED; X 14K; 35K; 65K

DESCRIPTION	*	VA	BKR	CKT	A	B	C	CKT	BKR	VA	*	DESCRIPTION
PANEL DRR & 50KVA XFRM		**26176**	125/3	1	70496			2	200/3	44320		POWER/HOUSE ATS
				3		44320		4		44320		
		22369		5			66689	6		44320		
PANELS DHM & DSR & 25 KVA XFMR		11520	60/2	7	13620			8	30/3	2100		BATTERY CHARGER #1
		11520		9		13620		10		2100		
PANEL DRW & 30KVA XFMR		8946	60/3	11			11046	12		2100		
		12290		13	14390			14	30/3	2100		BATTERY CHARGER #2
		15852		15			17952	16		2100		
ARIAL TRAM GARAGE		49860	225/3	17			51960	18		2100		
		49860		19	72020			20	100/3	22160		HEAD GATE HOUSE
		49860		21		72020		22		22160		
SURFACE/TRAM		44320	200/3	23			66480	24		22160		
		44320		25	49860			26	**40/3**	**5540**	1	**HP-1**
		44320		27		49860		28		**5540**		
SPACE				29			5540	30		**5540**		

BREAKER CODE:
A=AFCI, G=GFCI, N=SWITCHED NEUTRAL, S=SHUNT TRIP
K=KEYED, P=PADLOCK ATTACHMENT

220386	197772	201715	VA PANEL DTR (R)
			VA
			VA
220386	197772	201715	VA SUB-TOTAL

	KVA			KVA
LIGHTING	5.2	X	125%	6.5
RECEPTACLES	10.0	X	100%	10.0
RECEPTACLES OVER 10K	13.3	X	50%	6.7
MOTORS	13.9	X	100%	13.9
LARGEST MOTOR		X	125%	
KITCHEN		X	100%	
NONCOINCIDENT		X	0%	
REMAINDER	576.9	X	100%	576.9
EV CHARGER		X	125%	

TOTAL LOAD	KVA	AMPS
CONNECTED	**619.3**	**745.0**
CALCULATED	**614.0**	**738.5**

* REMARKS
1 REPLACE BREAKER WITH NEW

LIGHT LINE WEIGHT EQUALS EXISTING
HEAVY LINE WEIGHT EQUALS NEW

HULTZ BHU engineers inc
1111 Fawcett Ave Suite 100 Tacoma, WA 98402
Phone: (253) 383-3257 Fax: (253) 383-3283
general@hultzbhu.com Job Number: 24-149

WARNING
0 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

REVISION NO. 0

THOMAS URQUHART — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

SIGNED 01-20-2025

BID SET 01-20-25

CITY OF TACOMA
DEPARTMENT OF PUBLIC UTILITIES
LIGHT DIVISION

CUSHMAN DAM–SERVICE HOUSE
HVAC UPGRADES

ELECTRICAL DISTRIBUTION PANEL SCHEDULES

SUBMITTED	DRAWN	STAMPED
	JM	TU
APPROVED	DATE 01/20/25	
	DRAWING NO. E5.02	

APPENDIX B – Submittal Package

Signature Page

Price Proposal Form

Certification of Compliance With Wage Payment Statutes

State Responsibility and Reciprocal Bid Preference Information

SIGNATURE PAGE

CITY OF TACOMA
POWER SHARED SERVICES

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 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. PS24-0284N
Wynoochee Office HVAC

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

_____
Address

_____
City, State, Zip

_____
Authorized Signatory E-Mail Address

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

_____
E-Mail Address for Communications

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

_____
Printed Name and Title

_____
(Area Code) Telephone Number / Fax Number

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

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

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

THIS PAGE MUST BE SIGNED AND RETURNED WITH SUBMITTAL.

_____
Name of Bidder

	PROPOSAL BID QUANTITY	UNIT	UNIT COST	TOTAL COST
ITEM 1				
MOBILIZATION/DEMOBILIZATION	1	LS	$_____	$_____
ITEM 2				
HVAC SYSTEM INSTALLATION	1	LS	$_____	$_____
ITEM 3				
ELECTRICAL SYSTEM INSTALLATION	1	LS	$_____	$_____
ITEM 4				
FORCE ACCOUNT, PER LUMP SUM	1	LS	$ 30,000	$ _____

*Bidders shall include the $30,000 figure as part of their overall bid.

TOTAL ITEMS 1 - 4	$_____
**Sales Tax @ _____	$_____
TOTAL AMOUNT	$_____

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 (2/12/2025), 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.*

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 for 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

Revised: 07/20/2007, 04/12/2012, 06/21/2019

APPENDIX C – Samples Documents

Sample Contract

Sample Payment Bond

Sample Performance Bond

Sample General Release Form

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:	CONTRACTOR:
Signature:	Signature:
Name:	Name:
Title:	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 forcompliance 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

<table>
<tr><td colspan="2">(i) Agency Name (must match the name associated with its unique entity identifier)</td><td>(ii) Unique Entity Identifier
(i.e., DUNS)</td><td>City of Tacoma Number for This Agreement</td></tr>
<tr><td>(iii) Federal Award Identification Number (FAIN)</td><td>(iv) Federal Award Date</td><td>(v) Federal Period of Performance Start and End Date</td><td>(vi) Federal Budget Period Start and End Date</td></tr>
<tr><td>(vii) Amount of Federal Funds Obligated to the agency by this action:
$</td><td colspan="2">(viii) Total Amount of Federal Funds <i>Obligated</i> to the agency</td><td>(ix) Total Amount of the Federal Award <i>Committed</i> to the agency
$</td></tr>
<tr><td colspan="4">(x) Federal Award Project Description:

CORONAVIRUS STATE AND LOCAL FISCAL RECOVERY FUNDS– City of Tacoma</td></tr>
<tr><td>(xi) Federal Awarding Agency:
DEPARTMENT OF THE TREASURY</td><td>Pass-Through Entity:
City of Tacoma</td><td colspan="2">Awarding Official Name and Contact Information:</td></tr>
<tr><td colspan="3">(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)</td><td>(xiii) Identification of Whether the Award is R&D</td></tr>
<tr><td>(xiv) Indirect Cost Rate for the Federal Award</td><td colspan="2">Award Payment Method (lump sum payment or reimbursement)
REIMBURSEMENT</td><td></td></tr>
</table>

[

PAYMENT BOND
TO THE CITY OF TACOMA

Resolution No. [Enter Reso # Here]

Bond No.

That we, the undersigned, [Supplier name]

as principal, and _____

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

$[dollar value], plus any applicable taxes , 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. [Enter Spec # Here]

Specification Title: [Enter Spec Title Here]

Contract No. [Enter Contract # Here]

(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 waivers 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.

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: [Supplier name]

_____

By: _____

Surety:

_____

By: _____

Agent's Name: _____

Agent's Address: _____

PERFORMANCE BOND
TO THE CITY OF TACOMA

Resolution No. [Enter Reso # Here]
Bond No.

That we, the undersigned, [Supplier Name]

as principal, and _____

as a surety, are jointly and severally held and firmly bound to the CITY OF TACOMA, in the penal sum of $[dollar value], plus any applicable tax , 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. [Enter Spec # Here]

Specification Title: [Enter Spec Title Here]

Contract No. [Enter Contract # Here]

(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 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: [Supplier 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 Contract Name and Number between Supplier Name and the City of Tacoma, Invoice Number dated Invoice Date, 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 amount of held retainage, excluding sales tax.

Signed at _____, Washington this _____ day of _____, 2010.

_____
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 _____

APPENDIX D – Insurance Forms and Provisions

City of Tacoma Insurance Requirements

City of Tacoma General Provisions

CITY OF TACOMA
INSURANCE REQUIREMENTS FOR CONTRACTS

This Insurance Requirements shall serve as an attachment and/or exhibit form to the Contract. The Agency entering a Contract with City of Tacoma, whether designated as a Supplier, Contractor, Vendor, Proposer, Bidder, Respondent, Seller, Merchant, Service Provider, or otherwise referred to as "Contractor".

1. GENERAL REQUIREMENTS

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

1.1. Contractor shall not begin work under the Contract until the required insurance has been obtained and approved by the City of Tacoma.

1.2. Contractor shall keep in force during the entire term of the Contract, at no expense to the City of Tacoma, the insurance coverage and limits of liability listed below and for Thirty (30) calendar days after completion of all work required by the Contract, unless otherwise provided herein.

1.3. Liability insurance policies, except for Professional Liability and Workers' Compensation, shall:

- 1.3.1. Name the City of Tacoma and its officers, elected officials, employees, and agents as **additional insured**
- 1.3.2. Be considered primary and non-contributory for all claims with any insurance or self-insurance or limits of liability maintained by the City of Tacoma
- 1.3.3. Contain a "Waiver of Subrogation" clause in favor of City of Tacoma
- 1.3.4. Include a "Separation of Insureds" clause that applies coverage separately to each insured and additional insured
- 1.3.5. Name the "City of Tacoma" on certificates of insurance and endorsements and not a specific person or department
- 1.3.6. Be for both ongoing and completed operations using Insurance Services Office (ISO) form CG 20 10 04 13 and CG 20 37 04 13 or the equivalent
- 1.3.7. Be satisfied by a single primary limit or by a combination of a primary policy and a separate excess umbrella

1.4. A notation of coverage enhancements on the Certificate of Insurance shall not satisfy these requirements below. Verification of coverage shall include:

- 1.4.1. An ACORD certificate or equivalent
- 1.4.2. Copies of requested endorsements

1.5. Contractor shall provide to City of Tacoma Procurement & Payable Division, prior to the execution of the Contract, Certificate(s) of Insurance and endorsements from the insurer certifying the coverage of all insurance required herein. Contract or Permit number and the City of Tacoma Department must be shown on the Certificate of Insurance.

1.6. A renewal Certificate of Insurance shall be provided electronically prior to coverage

expiration via email sent annually to coi@cityoftacoma.org.

1.7. Contractor shall send a notice of cancellation or non-renewal of this required insurance within Thirty (30) calendar days to coi@cityoftacoma.org.

1.8. “Claims-Made” coverages, except for pollution coverage, shall be maintained for a minimum of three years following the expiration or earlier termination of the Contract. Pollution coverage shall be maintained for six years following the expiration of the Contract. The retroactive date shall be prior to or coincident with the effective date of the Contract.

1.9. Each insurance policy must be written by companies licensed or authorized (or issued as surplus line by Washington surplus line broker) in the State of Washington pursuant to RCW 48 with an (A-) VII or higher in the A.M. Best key rating guide.

1.10. Contractor shall not allow any insurance to be cancelled, voided, suspended, or reduced in coverage/limits, or lapse during any term of this Contract. Otherwise, it shall constitute a material breach of the Contract.

1.11. 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.

1.12. 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 changes.

1.13. All costs for insurance are included in the initial Contract and no additional payment will be made by City of Tacoma to Contractor.

1.14. 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).

1.15. Failure by City of Tacoma to identify a deficiency in the insurance documentation or to verify coverage or compliance by Contractor with these insurance requirements shall not be construed as a waiver of Contractor’s obligation to maintain such insurance.

1.16. If Contractor is a government agency or self-insured for any of the above insurance requirements, Contractor shall be liable for any self-insured retention or deductible portion of any claim for which insurance is required. A certification of self-insurance shall be attached and incorporated by reference and shall constitute compliance with this Section.

2. SUBCONTRACTORS

It is Contractor's responsibility to ensure that each subcontractor obtain and maintain adequate liability insurance coverage that applies to the service provided. Contractor shall provide evidence of such insurance upon City of Tacoma's request. Failure of any subcontractor to comply with insurance requirements does not limit Contractor's liability or responsibility.

3. 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.

3.1 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. This policy shall be written on ISO form CG 00 01 04 13 or its equivalent and shall include product liability especially when a Contract is solely for purchasing supplies. It includes Products and Completed Operations for three years following the completion of work related to performing construction services. It shall be endorsed to include: A per project aggregate policy limit (using ISO form CG 25 03 05 09 or equivalent endorsement)

3.2 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 MCS 90 and CA 99 48 endorsements or equivalent if "Pollutants" are to be transported unless in-transit Pollution coverage is covered under required Contractor's Pollution Liability Insurance.

3.3 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. Contractor must comply with their domicile State Industrial Insurance laws if it is outside the State of Washington.

3.4 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.

3.5 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.

3.6 Builder's Risk Insurance

Contractor shall maintain during the term of the Contract and until final acceptance of the work by the City of Tacoma, a policy of Builder's Risk Insurance providing coverage for all-risk of physical injury to all structures to be constructed according to the Contract. City of Tacoma shall be included as a named insured (not named as additional insured) on the policy. Builder's Risk Insurance policy shall:

3.6.1 Have a deductible of no more than Five Thousand Dollars ($5,000) for each occurrence, the payment of which will be the responsibility of Contractor. Any increased deductibles accepted by City of Tacoma will remain the responsibility of Contractor

3.6.2 Be on an ISO Special Form Causes of Loss or the equivalent and also include coverage for Collapse, Earthquake and Flood. The deductible for Earthquake and Flood may be higher than the $5,000 deductible required in 3.18.1

3.6.3 Include coverage for temporary buildings, debris removal, and damage to materials in transit or stored off-site

3.6.4 Be written in the amount of the completed value of the structures, with no coinsurance provisions exposure on the part of Contractor or City of Tacoma

3.6.5 Contain a Waiver of Subrogation provision whereby each insured waives their subrogation rights to the extent the loss is covered by this insurance

3.6.6 Grant permission to occupy, allowing the building or structure to be partially occupied prior to completion, without detrimental effect to the coverage provided

3.6.7 Include coverage for the testing and startup of the building's operating systems

3.6.8 Include coverage for City of Tacoma's loss of use or business interruption arising out of a covered loss which delays completion

3.6.9 Include resultant damage coverage for loss due to faulty workmanship and defective material

3.6.10 Include coverage for startup and testing

3.6.11 Include coverage for resultant damage coverage for loss due to faulty workmanship and defective material

Contractor and City of Tacoma waive all rights against each other, their respective subcontractors, agents, and representatives for damages caused by fire or other perils to the extent covered by Builder's Risk Insurance or other property insurance applicable to the work. The policies shall provide such waivers by endorsement or otherwise.

3.7 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.

GENERAL PROVISIONS

(Revised October 8, 2024)

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/orservices 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 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 indemnity, 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 I 0 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 I
Martin Luther King's Birthday	3rd Monday in January
Washington's Birthday	3rd Monday in February
Memorial Day	Last Monday in May
Juneteenth	June 19
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 and2 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.