



190 Queen Anne Ave N
PO Box 19028
Seattle, WA 98109-1028

REQUEST FOR BIDS (by Email)

Date: 07/15/2022	To: Potential Bidders for SHA Solicitation #5585 Pinehurst Court ERV Upgrade		
The work described below is subject to the conditions described on Attachment A, version 1 <input type="checkbox"/> version 2 <input checked="" type="checkbox"/>			
SHA Solicitation No.: 5585	(Federal Prevailing Wages) Federal Wage Decision No.: HUD Non-Routine Maintenance with an effective date of 02/01/2021 and expiration date of 12/31/2022	OR	(State Prevailing Wages) Date of State Prevailing Wage Schedule: N/A
Number of Calendar Days to Complete Work: 90 days after issuance of Notice to Proceed	SHA's Contact Name: Diana Peterson Sr. Contract Administrator	Phone No.: (206) 615-3470	E-mail: diana.peterson@seattlehousing.org
	Project Description / Scope of Work: <input checked="" type="checkbox"/> See Scope of Work attached. <input type="checkbox"/> See Scope of Work below. The estimated amount for this project is between \$175,000.00 and \$185,000.00.		
PRE-BID SITE VISITS: Friday, July 22, 2022, at 1:00 PM. Meet at 12702 15th Ave NE., Seattle, WA 98125.			
Site visit will take approximately one hour. No attendance on part of the Bidder shall not relieve the bidder of any responsibility for adherence to any of the provisions of the bid documents or any Addenda.			
DEADLINE FOR QUESTIONS is Tuesday, July 26, 2022 – no later than 4:00 PM. Email your questions to: purchasing@seattlehousing.org			
BID DUE DATE AND TIME: by <u>Monday, August 8th, 2022 at 2:00 PM.</u>			
The bidder is responsible for ensuring that its Bid is received prior to the deadline. Bids received after the deadline will not be considered.			
Bids for Small Works Roster advertised projects will only be accepted from contractors who are listed on Seattle Housing Authority's Small Works Roster at the time bid is due. SHA utilizes the Small Public Works Roster maintained by MRSC to solicit bids from contractors for this solicitation. Register for FREE at www.mrscrosters.org and select Seattle Housing Authority. All companies on the roster must meet the agency's minimum qualifications for licensing bonding, and insurance and not be on any state or federal debarment lists.			
EMAIL YOUR BID TO: purchasing@seattlehousing.org and include the Solicitation number and SHA's contact name above			
BIDDER ACKNOWLEDGES RECEIPT OF ADDENDA(S) NUMBER(S): _____			
BIDDER MUST COMPLETE THE INFORMATION BELOW. In addition, if bidder has never done business with SHA, it must submit a vendor fact sheet with its bid form. Bidder must also submit the required Section 3 forms with its bid form. <input type="checkbox"/> If checked, Bidder must complete the attached Detailed Bid Price Form and provide the total bid price below.			
Basic Bid Price (without Sales Tax)	Sales Tax Materials	Total Bid Price (with Sales Tax)	
Bidder's Business Name:	Telephone No.:	E-Mail Address:	
Address:		City, State, Zip Code:	
Business Classification: <input type="checkbox"/> WBE <input type="checkbox"/> MBE <input type="checkbox"/> MWBE <input type="checkbox"/> Section 3		Contractor Registration No.:	

Signature:	Date:	Printed Name and Title of Person Signing Bid:
<p>By signing above, the Bidder acknowledges receipt of Attachment A and any addenda issued for this project, and proposes to furnish all material and labor and to perform all work described herein for the Bid Price noted above. The Bidder also certifies the following: to have personally and carefully evaluated the Project Description / Scope of Work and Attachment A, and to have a clear understanding of the same, including the requirement to pay prevailing wages.</p>		

Request for Bids #5585 Pinehurst Court ERV Upgrade

ATTACHMENTS

- 1. ATTACHMENT A:** Version A (\$35,000.00 to \$250,000.00)
- 2. ATTACHMENT B:** Description of Work
- 3. ATTACHMENT C:** Technical Specifications
 1. 23 05 93 Testing, Adjusting, and Balancing for HVAC
 2. 23 07 13 Duct Insulation
 3. 23 08 00 Commissioning of HVAC
 4. 23 33 13 Metal Ducts
 5. 23 33 00 Air Duct Accessories
- 4. ATTACHMENT D:** Drawings
 1. M-0.1
 2. M-1.0
 3. M-2.0
- 5. ATTACHMENT E:** Sample Contract
- 6. ATTACHMENT F:** Prevailing Wages - HUD Non-Routine Maintenance
- 7. ATTACHMENT G:** COVID-19 Vaccination Policy for Contractors

- 8. ATTACHMENT H:**
Forms to complete and return with Request for Bid Form:
 1. Representations, Certifications & other Statements of Bidders (HUD 5369A)
 2. Seattle Housing Authority Vendor Fact Sheet
 3. Section 3 Business Concern Certification
 4. Suspension and Debarment Compliance Certificate for Contractor
 5. Suspension and Debarment Compliance Certificate for Subcontractor
 6. For-Profit Subgrantee and Contractor Certifications and Assurances
 7. SSB5301 – Certification of Compliance with Wage Payment Statutes
 8. Non-Collusive Affidavit



Attachment A, Version 2

(\$35,000 to \$250,000)

Request For Bid (by e-mail)

The work described in the Request For Bid (by e-mail) is subject to the following terms and conditions:

Bidder Responsibility: The bidder must meet the mandatory bidder responsibility criteria described below and as specified in RCW 39.04 or 2 CFR 200 in order to be considered a responsible contractor and be eligible for award consideration:

1. At the time of bid submittal, have a current certificate of registration in compliance with chapter 18.27 RCW, which must have been in effect at the time of the bid submittal;
2. Have a current Washington Unified Business Identifier (UBI) number;
3. If applicable:
 - Have Industrial Insurance (workers' compensation) coverage for the bidder's employees working in Washington, as required in Title 51 RCW;
 - Have a Washington Employment Security Department number, as required in Title 50 RCW;
 - Have a Washington Department of Revenue state excise tax registration number, as required in Title 82 RCW;
 - Electrical Contractor License, if required by Chapter 19.28 RCW
 - Elevator Contractor License, if required by Chapter 70.87 RCW
4. Not be disqualified from bidding on any public works contract under RCW 39.06.010 or RCW 39.12.065(3).
5. Has not more than one violation of the off-site, prefabricated, non-standard, project specific items reporting requirements of RCW 39.04.370. (Applicable until December 31, 2013)
6. Has not been debarred, suspended, or otherwise ineligible to contract with SHA and is not included on the Excluded Parties List System (EPLS) on GSA's SAM (System for Award Management) <https://www.sam.gov/portal/public/SAM/> or the Department of Housing and Urban Development's "Limited Denial of Participation" list. This requirement also applies to the Bidder's principals.
7. Have completed training requirements under RCW 39.04.350 and RCW 39.06.020 before bidding on public works projects as determined by the Washington State Department of Industries OR have been in business with an active Unified Business Identifier (UBI) number for 3 or more years AND have performed work on 3 or more public works projects.

Prevailing Wages: The Contractor must pay all workers at least the prevailing wage rate for the type of work performed in accordance with the applicable prevailing wage rate schedule referenced on the Purchase Order or Request for Bid (by e-mail) form and included in these solicitation documents. The type of wage schedule attached i.e., HUD Determined, Davis-Bacon, or the State Prevailing Wage schedule determines the appropriate labor standards that apply to the work as outlined below and contained in the General Conditions for Construction:

- 1) Part 11.13 for projects subject to the HUD-Determined wage rate schedule.
- 2) Part 11.12 for projects subject to Davis-Bacon wage schedule.
- 3) Part 5 for projects subject to the State prevailing wage schedule.

As part of its compliance with the prevailing wage requirements, the Contractor and, if applicable, subcontractor(s) shall comply with the requirement to submit a Statement of Intent to Pay Prevailing Wages and Affidavit of Wages Paid forms approved by the State of Washington's Department of Labor and Industries. The Owner will notify the Contractor of any special filing instructions that may apply for these forms depending on the funding source(s) of the project.

Solicitation #5585 Attachment A

Bid Bond: SHA does not require a bid guarantee for small works roster construction projects estimated to cost \$250,000 or less.

Insurance: Within seven calendar days of award, the Contractor shall submit to SHA, and maintain throughout the contract, at no expense to SHA, the following insurance coverage at the limits noted (refer to Part 2 of SHA's General Conditions for more details):

1. Commercial General Liability Insurance. \$1,000,000 each occurrence, and \$2,000,000 aggregate
2. Additional Insured Endorsement Ongoing Operations: The Owner must be included as an Additional Insured on a primary and non-contributory basis on all Commercial General Liability policies of the Contractor. A policy endorsement form CG2010 or equivalent must be provided to Owner as evidence of additional insured coverage.
3. Additional Insured Endorsement Completed Operations: The Contractor's CGL insurance shall include the Owner as an additional insured for Contractors Completed Operations by providing additional insured status on the CG2037 endorsement, or by an equivalent policy or endorsement provision. The Contractors Completed Operations additional insured status for the Owner shall remain in effect for not less than three (3) years following the Final Acceptance of the Work by the Owner.
4. Employers Liability policy or Washington Stop Gap Liability insurance endorsement: \$1,000,000 each accident
5. Workers Compensation coverage.
6. Commercial Automobile Liability Insurance. \$1,000,000 combined single limit coverage
7. Pollution Liability Insurance: \$1,000,000 combined single limit coverage, if the work involves handling or disposal of asbestos, lead-based paint, contaminated soil, or other hazardous materials.

Performance & Payment Bond Requirements: Within seven calendar days of award, the Contractor shall submit to SHA, in accordance with Section 2.05 of the General Conditions, a Performance and Payment bond. Failure to furnish a Performance and Payment bond within the time specified may render the Contractor ineligible for the contract. The SHA may then either award the contract to the next lowest responsible bidder or solicit new bids.

Retainage Requirements: SHA requires retainage to be withheld for small works roster construction projects costing \$35,000 or more.

Tax Exempt Status of SHA: Pursuant to State law (RCW 35.82.210), SHA is exempt from paying sales tax when it obtains goods and services directly from the Contractor. The Contractor must pay sales tax on materials purchased for this job. SHA does not pay sales tax for labor and services rendered.

Protests: Any protest of award shall be resolved in accordance with SHA's Procurement Policies, which may be reviewed at [SHA website](#).

General Conditions: SHA's General Conditions are hereby incorporated by reference and made a part of this Request for Bid (by e-mail) and any subsequent contract or purchase order executed for this work as if fully included herein. If the event of any discrepancy between the terms of this Attachment A and the General Conditions, the terms of the General Conditions shall apply, except that the types and amounts of insurance specified above, and the waiver of the Contract Bond and withholding of retainage specified above, shall take precedence over the General Conditions. The General Conditions may be viewed by accessing [SHA website](#), or upon request, a copy of the General Conditions may be obtained by calling SHA at (206) 615-3379.

Performance Evaluation: The Contractor's performance on this project will be evaluated in accordance with SHA's Contractor Performance Evaluation Program. A copy of the Program may be obtained by accessing [SHA website](#).

Section 3: Section 3 is a provision of the Housing and Urban Development Act of 1968. The purpose of Section 3 is to ensure that employment and other economic opportunities generated by certain HUD financial assistance shall, to the greatest extent feasible, and consistent with existing Federal, State, and local laws and regulations, be directed to low- and very low-income persons, particularly those who are recipients of government assistance for housing, and to business concerns which provide economic opportunities to low- and very low-income persons. Each bidder is required to submit with its Bid a Section 3 Business Certification form. Failure to complete this form may render a bid non-responsive.

- A. Section 3 Contract Language: The following language regarding Section 3 will be included as part of the contract to be executed based on this solicitation:

Contractor will comply with Section 3 of the Housing and Urban Development Act of 1968, 12 U.S.C. 1701u, and its implementing regulations set forth at 24 CFR 75 (as each of the same has been or may be amended, modified, or replaced from time to time, and including any successor statutes or regulations, collectively, "Section 3"), and with this Section.

1. The work to be performed under this Contract is subject to the requirements of Section 3.
2. Contractor will require its subcontractors to comply with Section 3. As evidenced by its execution of this Contract, Contractor certifies that it is under no contractual or other impediment that would prevent it from complying with Section 3.
3. Contractor will include this Section 3 clause in every subcontract and will take all necessary steps to ensure compliance with Section 3 by its subcontractors. Upon a finding that a subcontractor is in violation of Section 3, Contractor will take appropriate action, as provided in an applicable provision of the subcontract or in this Section 3 clause. Contractor will not subcontract with any subcontractor where the Contractor has notice or knowledge that the subcontractor has been found in violation of Section 3.
4. Contractor will provide certifications in form and substance required by Owner, at such times as Owner may request, certifying (i) Contractor's compliance with Section 3, and (ii) as to such facts and circumstances pertaining to Section 3 as Owner may require or request, including certification with respect to total number of labor hours worked under this Contract, labor hours worked by Section 3 Workers (as defined in Section 3), and labor hours worked by Targeted Section 3 Workers (as defined in Section 3).
5. Contractor's noncompliance with Section 3 may result in sanctions, termination of this Contract for default, and debarment or suspension from future HUD-assisted contracts.
6. Contractor agrees to perform any further acts and execute and deliver any further documents that may be reasonably necessary to carry out the provisions and intent of this Section ___ or otherwise to ensure compliance with Section 3.

Description of Work:

1. Replace existing corridor ventilation unit with energy recovery ventilator.
 - a. Obtain necessary permits from SDCI.
 - b. Provide shop drawings and submittals for engineer's review.
 - c. Demo and remove existing rooftop unit and weather-proof existing penetrations, provide crane service as required.
 - d. Demo and cap garbage chute duct at roof level and weather-proof.
 - e. Remove roof hoods on exhaust outlets from unit exhaust stacks serving unit restrooms.
 - f. Add new duct connections to restroom exhaust terminations, seal duct penetrations, and duct exhaust to energy recovery ventilator.
 - g. Add supports for new ductwork.
 - h. Provide three duct walk-over-stairs for roof access around ducts.
 - i. Add new supports for new energy recovery ventilator and weather-proof.
 - j. Install new energy recovery ventilator, provide crane service as required.
 - k. Remove, cap, and secure existing electrical connections.
 - l. Provide new electrical service and disconnects for energy recovery ventilator.
 - m. Perform start-up, testing, and air balance of ERV and of all connected GRDs and unit exhaust stacks.
 - n. Provide close-out documentation including commissioning forms and operations and maintenance manual.

2. Replace existing kitchen range hoods with new range hoods.
 - a. Demo and remove existing hoods.
 - b. Install new hoods and field connect to existing ducts.
 - c. Seal duct penetrations at roof level with spray foam.
 - d. Start up and test hoods and associated lights.

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Balancing Air Systems:
 - a. Constant-volume air systems.
 - b. Variable-air-volume systems.

1.2 DEFINITIONS

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

1.3 INFORMATIONAL SUBMITTALS

- A. Strategies and Procedures Plan: Within 15 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.
- B. Certified TAB reports.

1.4 QUALITY ASSURANCE

- A. TAB Specialists Qualifications: Certified by AABC NEBB or TABB.
 1. TAB Field Supervisor: Employee of the TAB specialist and certified by AABC NEBB or TABB.
 2. TAB Technician: Employee of the TAB specialist and certified by AABC NEBB or TABB as a TAB technician.
- B. Instrumentation Type, Quantity, Accuracy, and Calibration: Comply with requirements in ASHRAE 111, Section 4, "Instrumentation."

- C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
- D. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.
- B. Examine installed systems for balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.
- F. Examine equipment performance data including fan and pump curves.
 - 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
 - 2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.
- G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- H. Examine test reports specified in individual system and equipment Sections.
- I. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, filters are clean, and equipment with functioning controls is ready for operation.

- J. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.
- K. Examine operating safety interlocks and controls on HVAC equipment.
- L. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

- A. Prepare a TAB plan that includes strategies and step-by-step procedures for balancing the systems.
- B. Perform system-readiness checks of HVAC systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:
 - 1. Airside:
 - a. Duct systems are complete with terminals installed.
 - b. Volume, smoke, and fire dampers are open and functional.
 - c. Clean filters are installed.
 - d. Fans are operating, free of vibration, and rotating in correct direction.
 - e. Variable-frequency controllers' startup is complete and safeties are verified.
 - f. Automatic temperature-control systems are operational.
 - g. Ceilings are installed.
 - h. Windows and doors are installed.
 - i. Suitable access to balancing devices and equipment is provided.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance" ASHRAE 111 NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
 - 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
 - 2. After testing and balancing, install test ports and duct access doors that comply with requirements in Section 233300 "Air Duct Accessories."
 - 3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Section 230713 "Duct Insulation," Section 230716 "HVAC Equipment Insulation," and Section 230719 "HVAC Piping Insulation."

- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Cross-check the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. For variable-air-volume systems, develop a plan to simulate diversity.
- D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.
- F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- G. Verify that motor starters are equipped with properly sized thermal protection.
- H. Check dampers for proper position to achieve desired airflow path.
- I. Check for airflow blockages.
- J. Check condensate drains for proper connections and functioning.
- K. Check for proper sealing of air-handling-unit components.
- L. Verify that air duct system is sealed as specified in Section 233113 "Metal Ducts."

3.5 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

- A. Adjust the variable-air-volume systems as follows:
 - 1. Verify that the system is under static pressure control.
 - 2. Select the terminal unit that is most critical to the supply-fan airflow. Measure inlet static pressure, and adjust system static pressure control set point so the entering static pressure for the critical terminal unit is not less than the sum of the terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.
 - 3. Calibrate and balance each terminal unit for maximum and minimum design airflow as follows:
 - a. Adjust controls so that terminal is calling for maximum airflow. Some controllers require starting with minimum airflow. Verify calibration procedure for specific project.

- b. Measure airflow and adjust calibration factor as required for design maximum airflow. Record calibration factor.
 - c. When maximum airflow is correct, balance the air outlets downstream from terminal units.
 - d. Adjust controls so that terminal is calling for minimum airflow.
 - e. Measure airflow and adjust calibration factor as required for design minimum airflow. Record calibration factor. If no minimum calibration is available, note any deviation from design airflow.
 - f. On constant volume terminals, in critical areas where room pressure is to be maintained, verify that the airflow remains constant over the full range of full cooling to full heating. Note any deviation from design airflow or room pressure.
4. After terminals have been calibrated and balanced, test and adjust system for total airflow. Adjust fans to deliver total design airflows within the maximum allowable fan speed listed by fan manufacturer.
 - a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
 - b. Set terminals for maximum airflow. If system design includes diversity, adjust terminals for maximum and minimum airflow so that connected total matches fan selection and simulates actual load in the building.
 - c. Where duct conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.
 - d. If a reliable Pitot-tube traverse or coil traverse is not possible, measure airflow at terminals and calculate the total airflow.
5. Measure fan static pressures as follows:
 - a. Measure static pressure directly at the fan outlet or through the flexible connection.
 - b. Measure static pressure directly at the fan inlet or through the flexible connection.
 - c. Measure static pressure across each component that makes up the air-handling system.
 - d. Report any artificial loading of filters at the time static pressures are measured.
6. Set final return and outside airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.
 - a. Balance the return-air ducts and inlets the same as described for constant-volume air systems.
 - b. Verify that terminal units are meeting design airflow under system maximum flow.
7. Re-measure the inlet static pressure at the most critical terminal unit and adjust the system static pressure set point to the most energy-efficient set point to maintain the optimum system static pressure. Record set point and give to controls contractor.
8. Verify final system conditions as follows:
 - a. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to match design if necessary.
 - b. Re-measure and confirm that total airflow is within design.
 - c. Re-measure final fan operating data, rpms, volts, amps, and static profile.
 - d. Mark final settings.

- e. Test system in economizer mode. Verify proper operation and adjust if necessary. Measure and record all operating data.
- f. Verify tracking between supply and return fans.

3.6 TOLERANCES

- A. Set HVAC system's airflow rates and water flow rates within the following tolerances:
 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
 2. Air Outlets and Inlets: Plus or minus 10 percent.
- B. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.

3.7 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
 1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
 2. Include a list of instruments used for procedures, along with proof of calibration.
 3. Certify validity and accuracy of field data.
- B. Final Report Contents: In addition to certified field-report data, include the following:
 1. Fan curves.
 2. Manufacturers' test data.
 3. Field test reports prepared by system and equipment installers.
 4. Other information relative to equipment performance; do not include Shop Drawings and Product Data.
- C. General Report Data: In addition to form titles and entries, include the following data:
 1. Title page.
 2. Name and address of the TAB specialist.
 3. Project name.
 4. Project location.
 5. Architect's name and address.
 6. Engineer's name and address.
 7. Contractor's name and address.
 8. Report date.
 9. Signature of TAB supervisor who certifies the report.
 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
 11. Summary of contents including the following:
 - a. Indicated versus final performance.
 - b. Notable characteristics of systems.

- c. Description of system operation sequence if it varies from the Contract Documents.
 12. Nomenclature sheets for each item of equipment.
 13. Data for terminal units, including manufacturer's name, type, size, and fittings.
 14. Notes to explain why certain final data in the body of reports vary from indicated values.
 15. Test conditions for fans and pump performance forms including the following:
 - a. Settings for outdoor-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Fan drive settings including settings and percentage of maximum pitch diameter.
 - d. Settings for supply-air, static-pressure controller.
 - e. Other system operating conditions that affect performance.
- D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of outdoor, supply, return, and exhaust airflows.
 2. Duct, outlet, and inlet sizes.
 3. Terminal units.
 4. Position of balancing devices.
- E. Fan Test Reports: For supply, return, and exhaust fans, include the following:
1. Fan Data:
 - a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and size.
 - e. Manufacturer's serial number.
 - f. Arrangement and class.
 - g. Sheave make, size in inches, and bore.
 - h. Center-to-center dimensions of sheave and amount of adjustments in inches.
 2. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - g. Number, make, and size of belts.
 3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.

- e. Suction static pressure in inches wg.
- F. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
 - 1. Report Data:
 - a. System and air-handling-unit number.
 - b. Location and zone.
 - c. Traverse air temperature in deg F.
 - d. Duct static pressure in inches wg.
 - e. Duct size in inches.
 - f. Duct area in sq. ft..
 - g. Indicated airflow rate in cfm.
 - h. Indicated velocity in fpm.
 - i. Actual airflow rate in cfm.
 - j. Actual average velocity in fpm.
 - k. Barometric pressure in psig.
 - G. Air-Terminal-Device Reports:
 - 1. Unit Data:
 - a. System and air-handling unit identification.
 - b. Location and zone.
 - c. Apparatus used for test.
 - d. Area served.
 - e. Make.
 - f. Number from system diagram.
 - g. Type and model number.
 - h. Size.
 - i. Effective area in sq. ft..
 - 2. Test Data (Indicated and Actual Values):
 - a. Airflow rate in cfm.
 - b. Air velocity in fpm.
 - c. Preliminary airflow rate as needed in cfm.
 - d. Preliminary velocity as needed in fpm.
 - e. Final airflow rate in cfm.
 - f. Final velocity in fpm.
 - g. Space temperature in deg F.

3.8 VERIFICATION OF TAB REPORT

- A. The TAB specialist's test and balance engineer shall conduct the inspection in the presence of Owner and certified commissioning professional.
- B. Owner and certified commissioning professional shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent

of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.

- C. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
- D. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.
- E. If TAB work fails, proceed as follows:
 - 1. TAB specialists shall recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
 - 2. If the second final inspection also fails, Owner may contract the services of another TAB specialist to complete TAB work according to the Contract Documents and deduct the cost of the services from the original TAB specialist's final payment.
 - 3. If the second verification also fails, Owner may contact AABC Headquarters regarding the AABC National Performance Guaranty.
- F. Prepare test and inspection reports.

END OF SECTION 230593

SECTION 230713 - DUCT INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes insulating the following duct services:
 - 1. Outdoor, exposed supply and return.
- B. Related Sections:
 - 1. Section 230716 "HVAC Equipment Insulation."
 - 2. Section 230719 "HVAC Piping Insulation."
 - 3. Section 233113 "Metal Ducts" for duct liners.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
 - 2. Detail insulation application at elbows, fittings, dampers, specialties and flanges for each type of insulation.
 - 3. Detail application of field-applied jackets.
 - 4. Detail application at linkages of control devices.

1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.4 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 - 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule," and "Aboveground, Outdoor Duct and Plenum Insulation Schedule" articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- F. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type II with factory-applied vinyl jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.2 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.
- B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
- C. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
- D. PVC Jacket Adhesive: Compatible with PVC jacket.

2.3 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.
- B. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.
 - 1. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
 - 2. Service Temperature Range: Minus 20 to plus 180 deg F.
 - 3. Solids Content: 60 percent by volume and 66 percent by weight.
 - 4. Color: White.

2.4 SEALANTS

- A. FSK and Metal Jacket Flashing Sealants:
 - 1. Materials shall be compatible with insulation materials, jackets, and substrates.
 - 2. Fire- and water-resistant, flexible, elastomeric sealant.
 - 3. Service Temperature Range: Minus 40 to plus 250 deg F.
 - 4. Color: Aluminum.
- B. ASJ Flashing Sealants, and Vinyl and PVC Jacket Flashing Sealants:
 - 1. Materials shall be compatible with insulation materials, jackets, and substrates.
 - 2. Fire- and water-resistant, flexible, elastomeric sealant.
 - 3. Service Temperature Range: Minus 40 to plus 250 deg F.
 - 4. Color: White.

2.5 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
 - 1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
 - 2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
 - 3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
 - 4. FSP Jacket: Aluminum-foil, fiberglass-reinforced scrim with polyethylene backing; complying with ASTM C 1136, Type II.
 - 5. Vinyl Jacket: White vinyl with a permeance of 1.3 perms when tested according to ASTM E 96/E 96M, Procedure A, and complying with NFPA 90A and NFPA 90B.

2.6 FIELD-APPLIED FABRIC-REINFORCING MESH

- A. Woven Polyester Fabric: Approximately 1 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in., in a Leno weave, for ducts.

2.7 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.
- C. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
 - 1. Adhesive: As recommended by jacket material manufacturer.
 - 2. Color: White.
- D. Aluminum Jacket: Comply with ASTM B 209, Alloy 3003, 3005, 3105, or 5005, Temper H-14.

1. Sheet and roll stock ready for shop or field sizing.
 2. Finish and thickness are indicated in field-applied jacket schedules.
 3. Moisture Barrier for Outdoor Applications: 3-mil-thick, heat-bonded polyethylene and kraft paper.
- E. Self-Adhesive Outdoor Jacket: 60-mil-thick, laminated vapor barrier and waterproofing membrane for installation over insulation located aboveground outdoors; consisting of a rubberized bituminous resin on a crosslaminated polyethylene film covered with white aluminum-foil facing.

2.8 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
1. Width: 3 inches.
 2. Thickness: 11.5 mils.
 3. Adhesion: 90 ounces force/inch in width.
 4. Elongation: 2 percent.
 5. Tensile Strength: 40 lbf/inch in width.
 6. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
1. Width: 3 inches.
 2. Thickness: 6.5 mils.
 3. Adhesion: 90 ounces force/inch in width.
 4. Elongation: 2 percent.
 5. Tensile Strength: 40 lbf/inch in width.
 6. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.
- C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.
1. Width: 2 inches.
 2. Thickness: 6 mils.
 3. Adhesion: 64 ounces force/inch in width.
 4. Elongation: 500 percent.
 5. Tensile Strength: 18 lbf/inch in width.
- D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
1. Width: 2 inches.
 2. Thickness: 3.7 mils.
 3. Adhesion: 100 ounces force/inch in width.
 4. Elongation: 5 percent.
 5. Tensile Strength: 34 lbf/inch in width.

2.9 SECUREMENTS

- A. Aluminum Bands: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with wing seal or closed seal.

B. Insulation Pins and Hangers:

1. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
 - a. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
 - b. Spindle: Stainless steel, fully annealed, 0.106-inch-diameter shank, length to suit depth of insulation indicated.
 - c. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick, stainless-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
 - a. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.

C. Staples: Outward-clinching insulation staples, nominal 3/4-inch-wide, stainless steel or Monel.

D. Wire: 0.080-inch nickel-copper alloy.

2.10 CORNER ANGLES

- A. Aluminum Corner Angles: 0.040 inch thick, minimum 1 by 1 inch, aluminum according to ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.
- B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.

- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Keep insulation materials dry during application and finishing.
- G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- H. Install insulation with least number of joints practical.
- I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 - 1. Install insulation continuously through hangers and around anchor attachments.
 - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
- J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- K. Install insulation with factory-applied jackets as follows:
 - 1. Draw jacket tight and smooth.
 - 2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 - 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches o.c.
 - a. For below ambient services, apply vapor-barrier mastic over staples.
 - 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
 - 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.
- L. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

- N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.3 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
 - 1. Seal penetrations with flashing sealant.
 - 2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 - 3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
 - 4. Seal jacket to roof flashing with flashing sealant.
- B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
 - 1. Seal penetrations with flashing sealant.
 - 2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 - 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
 - 4. Seal jacket to wall flashing with flashing sealant.
- C. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- D. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.
 - 1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.
- E. Insulation Installation at Floor Penetrations:
 - 1. Duct: For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches.
 - 2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.4 INSTALLATION OF MINERAL-FIBER INSULATION

- A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
 2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
 3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
 - b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
 - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - d. Do not overcompress insulation during installation.
 - e. Impale insulation over pins and attach speed washers.
 - f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
 4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
 - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
 - b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.
 5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
 6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
 7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.
- B. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
 - b. On duct sides with dimensions larger than 18 inches, space pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
 - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - d. Do not overcompress insulation during installation.
 - e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
 - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
 - b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.
5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.5 FIELD-APPLIED JACKET INSTALLATION

- A. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

3.6 FINISHES

- A. Do not field paint aluminum or stainless-steel jackets.

3.7 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 - 1. Inspect ductwork, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location(s) for each duct system defined in the "Duct Insulation Schedule, General" Article.
- C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.8 DUCT INSULATION SCHEDULE, GENERAL

- A. Plenums and Ducts Requiring Insulation:
 - 1. Outdoor, exposed supply and return.
- B. Items Not Insulated:
 - 1. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
 - 2. Flexible connectors.
 - 3. Vibration-control devices.
 - 4. Factory-insulated access panels and doors.

3.9 ABOVEGROUND, OUTDOOR DUCT AND PLENUM INSULATION SCHEDULE

- A. Insulation materials and thicknesses are identified below. If more than one material is listed for a duct system, selection from materials listed is Contractor's option.
- B. Exposed, Supply-Air Duct and Plenum Insulation: Mineral-fiber blanket, 3 inches thick and 3-lb/cu. ft. nominal density.
- C. Exposed, Return-Air Duct and Plenum Insulation: Mineral-fiber blanket, 3 inches thick and 3-lb/cu. ft. nominal density.

3.10 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
- B. If more than one material is listed, selection from materials listed is Contractor's option.

- C. Ducts and Plenums, Exposed, up to 48 Inches in Diameter or with Flat Surfaces up to 72 Inches:
 - 1. Aluminum, Corrugated: 0.040 inch thick.

END OF SECTION 230713

SECTION 230800 – COMMISSIONING OF HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Description of the Commissioning process for this project
2. The commissioning process in this section shall be used to comply with Seattle Energy Code, C408, System Commissioning as well as C103.6, Building Documentation and Close out Submittal Requirements.
3. The commissioning professional directs and coordinates all commissioning activities; this section describes some but not all of the commissioning professional's responsibilities.
 - a. The commissioning professional is hired by and reports directly to the Owner.
4. The commissioning process, including acceptance of equipment and systems within the Scope of Commissioning, is to be completed before Final Inspection.

1.2 SCOPE OF COMMISSIONING

1. Building Ventilation System
 - a. Energy Recovery Ventilator
 - b. Energy Recovery Ventilator Controls
 - c. Restroom exhaust fans (existing, not to be modified)
 - d. Range Hoods
 - e. Building Air Balance

1.3 DEFINITIONS

- A. CCP: Certified Commissioning Professional.
- B. TAB: Test, Adjust, and Balance

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Commissioning Scope Meeting: Convene a meeting that includes the equipment installer and the air balance professional.
 1. Review and discuss TAB plan, including strategies and step-by-step procedures to accomplish a full system air balance.
 2. Review the commissioning plan, including the draft functional test procedure.
 3. Review coordination and scheduling required for successful commissioning.

1.5 SUBMITTALS

- A. Make submittals directly to the CCP on a time schedule specified by the CCP.

- B. Follow standard submittal procedures to make corrections, as needed, until the submittal is approved by the CCP.
- C. Submit an electronic copy to the CCP, for review and approval.
- D. Submit the Following:
 - 1. Energy Recovery Ventilator
 - a. Manufacturers' Instructions: Submit copies of manufacturer-provided instructions that are shipped with equipment as soon as the equipment is delivered
 - b. Copies of factory test reports shipped with the unit, if any
 - c. Blank Startup Sheet
 - d. Completed Startup Reports
 - 2. Ductwork
 - a. Written confirmation that cleaning is complete, per contract documents
 - b. pressure test results, per contract documents
 - 3. Test and Balance
 - a. TAB Plan (strategies and step-by-step procedures) specified in 23 05 93
 - b. Draft Test and Balance Report for use with Functional Testing
 - c. Certified Test and Balance Report
 - 4. Operations and Maintenance data

1.6 RESPONSIBILITIES

- A. Include and itemize the cost of commissioning in the contract price.
- B. Follow the commissioning plan to organize and document the following activities:
 - 1. Install components, devices, equipment, and systems in accordance with the Contract Documents and the manufacturer's recommendations and instructions.
 - 2. Perform operational checkout of installed work.
 - 3. Execute functional test procedures in accordance with the Contract Documents and witnessed by the commissioning professional.
 - 4. Educate the owner and their operations personnel on proper system function.
- C. Provide a draft TAB report within two weeks of TAB completion. Submit directly to the CCP. Provide the Commissioning professional with any requested data, gathered, but not shown on the draft reports.
- D. Provide skilled technicians to perform functional testing under the direction of the Commissioning Professional. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.
- E. Correct deficiencies (differences between specified and observed performance) as interpreted by the Commissioning professional, owner, and engineer and retest the equipment.
- F. Coordinate with the Commissioning Professional so they may witness training of the Owner's operating staff.
- G. Warranty Period

1. Execute seasonal or deferred functional testing, witnessed by the Commissioning professional, if required.
2. Work with the commissioning provider to review the condition of outstanding issues related to the original and seasonal commissioning.
3. Assist in correcting areas of concern that are still under warranty.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

- A. Division 23 shall provide all test equipment necessary to fulfill the testing requirements of this Division.

PART 3 - EXECUTION

3.1 COMMISSIONING PLAN

- A. This specification section shall be considered the draft commissioning plan. After discussion during the Commissioning Scope Meeting, the CCP may modify the commissioning plan to match the discussion, and/or meeting outcomes.
- B. Attend meetings called by the commissioning professional for purposes of completing the commissioning process as described in this section.
- C. Require attendance and participation of relevant subcontractors, installers, suppliers, and manufacturer representatives.

3.2 STARTUP

- A. Complete systems and subsystems so they are fully functional, meeting the design objectives of the Contract Documents. The commissioning procedures and functional testing do not relieve or lessen this responsibility or shift that responsibility partially to the commissioning professional or Owner.
- B. Functional testing is intended to begin upon completion of a system. Functional testing may proceed prior to the completion of systems or sub-systems at the discretion of the Commissioning professional and General Contractor. Beginning system testing before full completion does not relieve the Contractor from fully completing the system, including all prefunctional checklists, as soon as possible.

3.3 ACCEPTANCE CRITERIA FOR STARTUP

- A. The following criteria shall be complete prior to the CCP accepting the project startup and initiating functional testing.
 1. Ductwork installation is complete, including manual balance dampers.

2. Ductwork is clean, per Section 23 13 33 paragraph 3.7. A statement or field report documenting duct cleaning is submitted as confirmation.
 3. Ductwork pressure testing is complete and compliant with Section 23 31 13. Presure test results are submitted as confirmation of completion.
 4. Range hoods are installed. Coordinate with the CCP so that they may witness a sample of range hood installation.
 5. ERV start-up report is submitted. The start-up report indicates that the ERV is operational and ready for functional testing.
 6. Draft TAB report is submitted for use during functional testing
- B. Energy Recovery Ventilator start-up report
1. Manufacturer's start-up forms.
 2. Installer's typical start-up form
 3. A written statement or form confirming that the ERV controls, including a duct pressure sensor, are installed, operational, and ready for functional testing.
- C. Field quality control activities are complete, as specified by other sections.
- D. Any Prefunctional checklists provided by the commissioning professional are included in the relevant Start-up Report. Prefunctional checklists, if provided, will include calibration requirements for field-installed sensors, gauges, and valves.

3.4 FUNCTIONAL TESTING

- A. A Functional Test is required for each item of equipment, system, or other assembly listed in paragraph 1.2.
- B. Execute Functional Tests, after completion of Startup Reports and before Final Acceptance.
- C. The commissioning professional is responsible for witnessing and reporting results of Functional Tests, including preparation and completion of forms for that purpose.
- D. Correct deficiencies and re-test at no extra cost to the Owner; if a deficiency is not corrected and re-tested immediately, the commissioning professional will document the deficiency and the Contractor's stated intentions regarding correction.
1. Deficiencies are any condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents or does not perform properly.
 2. When the deficiency has been corrected, notify the commissioning professional in writing. The commissioning professional will reschedule the test and the Contractor shall re-test, as necessary.
 3. Identical or Near-Identical Items: If 10 percent, or three units, whichever is greater, of identical or near-identical items fail to perform due to material or manufacturing defect, all items will be considered defective. In this case, Contractor shall provide a proposal for correction within 2 weeks after notification of defect, including provisions for testing sample installations prior to replacement of all items.
 4. The Contractor shall bear the cost of Owner and commissioning professional personnel time for witnessing re-testing if the test failed due to failure to execute the relevant start-up correctly. If the test failed for reasons that would not have been identified in the start-up process, the Contractor shall bear the cost of the second and subsequent re-tests.

3.5 FUNCTIONAL TEST PREREQUISITES

- A. The following applicable generic prerequisite checklist items are listed on each written functional test form and shall be completed and checked off by Commissioning professional prior to functional testing:
- ___ All related equipment has been started up and start-up reports submitted and approved ready for functional testing
 - ___ All control system functions for this and all interlocking systems are programmed and operable per contract documents, including final setpoints and schedules with sensor calibrations completed.
 - ___ Current A/E punchlist items for this equipment corrected.
 - ___ These functional test procedures reviewed and approved by installing contractor.
 - ___ Test requirements and sequences of operation attached.
 - ___ Schedules and setpoints attached.
 - ___ False loading equipment, system, and procedures ready
 - ___ Sufficient clearance around equipment for servicing.
 - ___ Record of all values for pre-test setpoints changed to accommodate testing has been made and a check box provided to verify return to original values (control parameters, limits, delays, lockouts, schedules, etc.).
 - ___ Other miscellaneous checks of the start-up reports completed successfully.

3.6 FUNCTIONAL TESTING REQUIREMENTS

- A. Detailed functional testing requirements will be developed by the commissioning professional and included in the commissioning plan. The requirements in this section will be common to all functional testing.
- B. List of functional test procedures to be developed and executed by the CCP
1. Building Ventilation System
- C. Parties Responsible to execute Functional Test
1. Mechanical Contractor: assist with testing, correct deficiencies.
 2. CCP: perform and document testing.
 3. Owners Representative: witness
- D. Tested functions and/or modes
1. The following testing requirements are in addition to and do not replace any testing requirements elsewhere in contract documents
 2. Test each sequence in the sequence of operations, and other significant modes and sequences not mentioned including manual modes and power failure. Test functionality of this system in all control strategies or interlocks that it is associated with.
 3. Verify that the duct pressure setpoint is reasonable and appropriate
 4. Function of fire alarm (off, depressurization, etc). If emergency operation is tested separately by fire department, these emergency mode tests will not be repeated by CCP.

5. Verification of the TAB report may be included as a portion of this Functional Test, as determined during the commissioning scope meeting.
- E. Required Monitoring
1. None
- F. Acceptance Criteria
1. The energy recovery ventilator operates appropriately without errors or faults.
 2. The energy recovery ventilator increases speed appropriately to maintain negative pressure.
 3. The building ventilation system maintains negative pressure in every air riser.
 4. With the system fully operational, the temperature at the range hood exhausts indicates that little or no warm air is escaping through range hoods. With all ranges off, the temperature at the hood riser is not more than 5F above ambient roof temperature. This test shall be conducted when the building has a heading load.
- G. Sampling Strategy
1. Exhaust duct risers: verify at least 2 risers, including any “worst case” riser which is both far away from the pressure sensor and from the energy recovery ventilator.
 2. Range hood risers: test 3
- H. Post Occupancy Testing
1. To be determined during Commissioning Scope Meeting

END OF SECTION 230800

SECTION 233113 - METAL DUCTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Rectangular ducts and fittings.
2. Round ducts and fittings.
3. Sheet metal materials.
4. Sealants and gaskets.
5. Hangers and supports.
6. Seismic-restraint devices.
7. Duct liner

B. Related Sections:

1. Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
2. Section 233116 "Nonmetal Ducts" for fibrous-glass ducts, thermoset fiber-reinforced plastic ducts, thermoplastic ducts, PVC ducts, and concrete ducts.
3. Section 233119 "HVAC Casings" for factory- and field-fabricated casings for mechanical equipment.
4. Section 233300 "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements and design criteria indicated in "Duct Schedule" Article.

B. Structural Performance: Duct hangers and supports and seismic restraints shall withstand the effects of gravity and seismic loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and ASCE/SEI 7 and SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems."

1. Seismic Hazard Level A: Seismic force to weight ratio, 0.48.
2. Seismic Hazard Level B: Seismic force to weight ratio, 0.30.
3. Seismic Hazard Level C: Seismic force to weight ratio, 0.15.

C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings:
 - 1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
 - 2. Factory- and shop-fabricated ducts and fittings.
 - 3. Duct layout indicating sizes, configuration, and static-pressure classes.
 - 4. Elevation of top of ducts.
 - 5. Dimensions of main duct runs from building grid lines.
 - 6. Fittings.
 - 7. Reinforcement and spacing.
 - 8. Seam and joint construction.
 - 9. Penetrations through fire-rated and other partitions.
 - 10. Equipment installation based on equipment being used on Project.
 - 11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
 - 12. Hangers and supports, including methods for duct and building attachment, seismic restraints, and vibration isolation.
- C. Delegated-Design Submittal:
 - 1. Sheet metal thicknesses.
 - 2. Joint and seam construction and sealing.
 - 3. Reinforcement details and spacing.
 - 4. Materials, fabrication, assembly, and spacing of hangers and supports.
 - 5. Design Calculations: Calculations, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation for selecting hangers and supports and seismic restraints.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
 - 2. Structural members to which duct will be attached.
 - 3. Penetrations of smoke barriers and fire-rated construction.
- B. Welding certificates.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.
 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports.
 3. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.
- B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-up."
- C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

PART 2 - PRODUCTS

2.1 RECTANGULAR DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.2 ROUND DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.
- B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

- C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 DOUBLE-WALL RECTANGULAR DUCTS AND FITTINGS

- A. Fabricate ducts with indicated dimensions for the inner duct.
- B. Outer Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
- C. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- E. Interstitial Insulation: Fibrous-glass liner complying with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."
 - 1. Maximum Thermal Conductivity: 0.10 Btu x in./h x sq. ft. x deg F at 75 F mean temperature.
 - 2. Install spacers that position the inner duct at uniform distance from outer duct without compressing insulation.
 - 3. Coat insulation with antimicrobial coating.
 - 4. Cover insulation with polyester film complying with UL 181, Class 1.
- F. Inner Duct: Minimum 0.7-mm solid sheet steel.
- G. Formed-on Transverse Joints (Flanges): Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

- H. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.4 SHEET METAL MATERIALS

- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G60.
 - 2. Finishes for Surfaces Exposed to View: Mill phosphatized.
- C. Carbon-Steel Sheets: Comply with ASTM A 1008/A 1008M, with oiled, matte finish for exposed ducts.
- D. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304 or 316, as indicated in the "Duct Schedule" Article; cold rolled, annealed, sheet. Exposed surface finish shall be No. 2B, No. 2D, No. 3, or No. 4 as indicated in the "Duct Schedule" Article.
- E. Aluminum Sheets: Comply with ASTM B 209 Alloy 3003, H14 temper; with mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view.
- F. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
 - 1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.
- G. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.5 SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
- B. Two-Part Tape Sealing System:
 - 1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
 - 2. Tape Width: 4 inches 6 inches.
 - 3. Sealant: Modified styrene acrylic.

4. Water resistant.
5. Mold and mildew resistant.
6. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
7. Service: Indoor and outdoor.
8. Service Temperature: Minus 40 to plus 200 deg F.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.

C. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

D. Flanged Joint Sealant: Comply with ASTM C 920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.

E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

F. Round Duct Joint O-Ring Seals:

1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for 10-inch wg static-pressure class, positive or negative.
2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.
4. Coat insulation with antimicrobial coating.

2.6 HANGERS AND SUPPORTS

- A. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."
- B. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- C. Trapeze and Riser Supports:

1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

2.7 SEISMIC-RESTRAINT DEVICES

- A. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an agency acceptable to authorities having jurisdiction.
 1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.
- B. Channel Support System: Shop- or field-fabricated support assembly made of slotted steel channels rated in tension, compression, and torsion forces and with accessories for attachment to braced component at one end and to building structure at the other end. Include matching components and corrosion-resistant coating.
- C. Restraint Cables: ASTM A 492, stainless-steel cables with end connections made of cadmium-plated steel assemblies with brackets, swivel, and bolts designed for restraining cable service; and with an automatic-locking and clamping device or double-cable clips.
- D. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod.
- E. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.
- B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
- C. Install round ducts in maximum practical lengths.
- D. Install ducts with fewest possible joints.
- E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

- F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
- I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- J. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
- K. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Section 233300 "Air Duct Accessories" for fire and smoke dampers.
- L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

3.2 INSTALLATION OF EXPOSED DUCTWORK

- A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.
- B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.
- C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.
- D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.
- E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 DUCT SEALING

- A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- B. Seal ducts to the following seal classes according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":

1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
2. Outdoor, Supply-Air Ducts: Seal Class A.
3. Outdoor, Exhaust Ducts: Seal Class A.
4. Outdoor, Return-Air Ducts: Seal Class A.

3.4 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
- C. Hanger & Support Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
- D. Support outdoor ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at maximum intervals of 16 feet.
- E. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.5 SEISMIC-RESTRAINT-DEVICE INSTALLATION

- A. Install ducts with hangers and braces designed to support the duct and to restrain against seismic forces required by applicable building codes. Comply with SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems." ASCE/SEI 7.
 1. Space lateral supports a maximum of 40 feet o.c., and longitudinal supports a maximum of 80 feet o.c.
 2. Brace a change of direction longer than 12 feet.
- B. Select seismic-restraint devices with capacities adequate to carry present and future static and seismic loads.
- C. Install cables so they do not bend across edges of adjacent equipment or building structure.
- D. Install cable restraints on ducts that are suspended with vibration isolators.
- E. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction.
- F. Attachment to Structure: If specific attachment is not indicated, anchor bracing and restraints to structure, to flanges of beams, to upper truss chords of bar joists, or to concrete members.
- G. Drilling for and Setting Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcement or embedded items during drilling. Notify the Architect if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
2. Set anchors to manufacturer's recommended torque, using a torque wrench.
3. Install zinc-coated steel anchors for interior applications and stainless-steel anchors for applications exposed to weather.

3.6 CONNECTIONS

- A. Make connections to equipment with flexible connectors complying with Section 233300 "Air Duct Accessories."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.7 DUCT CLEANING

- A. Clean new and existing duct system(s) before testing, adjusting, and balancing.
- B. Use service openings for entry and inspection.
 1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Section 233300 "Air Duct Accessories" for access panels and doors.
- C. Particulate Collection and Odor Control:
 1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
 2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.
- D. Clean the following components by removing surface contaminants and deposits:
 1. Air outlets and inlets (registers, grilles, and diffusers).
 2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
 3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
 4. Coils and related components.
 5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
 6. Supply-air ducts, dampers, actuators, and turning vanes.

7. Dedicated exhaust and ventilation components and makeup air systems.

E. Mechanical Cleaning Methodology:

1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
5. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

3.8 START UP

- A. Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

3.9 DUCT SCHEDULE

A. Supply Ducts:

1. Ducts Connected to Energy Recovery Ventilator:
 - a. Pressure Class: Positive 3-inch wg.
 - b. Minimum SMACNA Seal Class: A.
 - c. SMACNA Leakage Class for Rectangular: 6.
 - d. SMACNA Leakage Class for Round and Flat Oval: 6.

B. Exhaust Ducts:

1. Ducts Connected to Energy Recovery Ventilators
 - a. Pressure Class: Positive or negative 3-inch wg.
 - b. Minimum SMACNA Seal Class: B if negative pressure, and A if positive pressure.
 - c. SMACNA Leakage Class for Rectangular: 6.
 - d. SMACNA Leakage Class for Round and Flat Oval: 6.

C. Intermediate Reinforcement:

1. Galvanized-Steel Ducts: Carbon steel coated with zinc-chromate primer.

D. Elbow Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
 - a. Velocity 1000 fpm or Lower:
 - 1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
 - 2) Mitered Type RE 4 without vanes.
 - b. Velocity 1000 to 1500 fpm:
 - 1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
 - c. Velocity 1500 fpm or Higher:
 - 1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
2. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
 - a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."
 - a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.
 - 1) Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
 - 2) Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
 - 3) Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
 - 4) Radius-to Diameter Ratio: 1.5.

- b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
- c. Round Elbows, 14 Inches and Larger in Diameter: Standing seam.

E. Branch Configuration:

- 1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."
 - a. Rectangular Main to Rectangular Branch: 45-degree entry.
 - b. Rectangular Main to Round Branch: Spin in.
- 2. Round: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.
 - a. Velocity 1000 fpm or Lower: 90-degree tap.
 - b. Velocity 1000 to 1500 fpm: Conical tap.
 - c. Velocity 1500 fpm or Higher: 45-degree lateral.

3.10 FIELD QUALITY CONTROL

A. Tests and Inspections:

- 1. Perform field tests and inspections according to SMACNA's "HVAC Air Duct Leakage Test Manual."
- 2. Test the following systems:
 - a. Systems required by ASHRAE/IESNA 90.1.
 - b. Supply/Exhaust Air: 100 percent of total installed duct area with a pressure class of 2-inch wg or higher.
- 3. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If pressure classes are not indicated, test entire system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure. Give seven days' advance notice for testing.
- 4. Determine leakage from entire system or section of system by relating leakage to surface area of test section. Comply with requirements for leakage classification of ducts connected to casings.
- 5. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.

B. HVAC casings will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 233113

SECTION 233300 - AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Manual volume dampers.
 - 2. Flange connectors.
 - 3. Turning vanes.
 - 4. Duct-mounted access doors.
 - 5. Flexible connectors.
 - 6. Duct accessory hardware.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
 - 1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:
 - a. Special fittings.
 - b. Manual volume damper installations.

1.3 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

2.2 MATERIALS

- A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - 1. Galvanized Coating Designation: G60.
 - 2. Exposed-Surface Finish: Mill phosphatized.
- B. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- C. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.3 MANUAL VOLUME DAMPERS

- A. Standard, Steel, Manual Volume Dampers:
 - 1. Standard leakage rating, with linkage outside airstream.
 - 2. Suitable for horizontal or vertical applications.
 - 3. Frames:
 - a. Frame: Hat-shaped, 0.094-inch-thick, galvanized sheet steel.
 - b. Mitered and welded corners.
 - c. Flanges for attaching to walls and flangeless frames for installing in ducts.
 - 4. Blades:
 - a. Multiple or single blade.
 - b. Parallel- or opposed-blade design.
 - c. Stiffen damper blades for stability.
 - d. Galvanized-steel, 0.064 inch thick.
 - 5. Blade Axles: Galvanized steel.
 - 6. Bearings:
 - a. Oil-impregnated bronze.
 - b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
 - 7. Tie Bars and Brackets: Galvanized steel.
- B. Jackshaft:
 - 1. Size: 0.5-inch diameter.
 - 2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
 - 3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.
- C. Damper Hardware:

1. Zinc-plated, die-cast core with dial and handle made of 3/32-inch-thick zinc-plated steel, and a 3/4-inch hexagon locking nut.
2. Include center hole to suit damper operating-rod size.
3. Include elevated platform for insulated duct mounting.

2.4 FLANGE CONNECTORS

- A. Description: roll-formed, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.
- B. Material: Galvanized steel.
- C. Gage and Shape: Match connecting ductwork.

2.5 DUCT-MOUNTED ACCESS DOORS

- A. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 7-2, "Duct Access Doors and Panels," and 7-3, "Access Doors - Round Duct."
 1. Door:
 - a. Double wall, rectangular.
 - b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
 - c. Vision panel.
 - d. Hinges and Latches: 1-by-1-inchbutt or piano hinge and cam latches.
 - e. Fabricate doors airtight and suitable for duct pressure class.
 2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
 3. Number of Hinges and Locks:
 - a. Access Doors Less Than 12 Inches Square: No hinges and two sash locks.
 - b. Access Doors up to 18 Inches Square: Two hinges and two sash locks.
 - c. Access Doors up to 24 by 48 Inches: Three hinges and two compression latches with outside and inside handles.

2.6 FLEXIBLE CONNECTORS

- A. Materials: Flame-retardant or noncombustible fabrics.
- B. Coatings and Adhesives: Comply with UL 181, Class 1.
- C. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches wide attached to two strips of 2-3/4-inch-wide, 0.028-inch-thick, galvanized sheet steel or 0.032-inch-thick aluminum sheets. Provide metal compatible with connected ducts.
- D. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.

1. Minimum Weight: 24 oz./sq. yd..
2. Tensile Strength: 530 lbf/inch in the warp and 440 lbf/inch in the filling.
3. Service Temperature: Minus 50 to plus 250 deg F.

2.7 DUCT ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.
- B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts.
- B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
- C. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.
 1. Install steel volume dampers in steel ducts.
 2. Install aluminum volume dampers in aluminum ducts.
- D. Set dampers to fully open position before testing, adjusting, and balancing.
- E. Install test holes at fan inlets and outlets and elsewhere as indicated.
- F. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
 1. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
 2. Upstream from turning vanes.
 3. Upstream or downstream from duct silencers.
 4. Control devices requiring inspection.
 5. Elsewhere as indicated.
- G. Install access doors with swing against duct static pressure.
- H. Access Door Sizes:
 1. One-Hand or Inspection Access: 8 by 5 inches.

2. Two-Hand Access: 12 by 6 inches.
3. Head and Hand Access: 18 by 10 inches.
4. Head and Shoulders Access: 21 by 14 inches.
5. Body Access: 25 by 14 inches.
6. Body plus Ladder Access: 25 by 17 inches.

- I. Label access doors to indicate the purpose of access door.
- J. Install flexible connectors to connect ducts to equipment.
- K. Install duct test holes where required for testing and balancing purposes.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Operate dampers to verify full range of movement.
2. Inspect locations of access doors and verify that purpose of access door can be performed.
3. Inspect turning vanes for proper and secure installation.

END OF SECTION 233300

SAMPLE CONTRACT FORM

Contract No. 5585
CONSTRUCTION AND MAINTENANCE SERVICES
for
Pinehurst Court ERV Upgrade

This Contract is made and entered into as of the last signature date below between the Seattle Housing Authority, a public body corporate and politic, hereinafter referred to as "Owner," and ____, hereinafter referred to as the "Contractor." The Contractor and the Owner agree as follows:

SECTION 1: This Contract incorporates by reference and is subject to the following as though fully included herein, whether attached or not attached:

- The Contractor's response to the Request for Bids (attached)
- Attachment A, Version 1 (attached) OR Attachment A, Version 2 (attached)
- Technical scope of work included as part of the Request for Bids
- Owner's General Conditions
- Prevailing wage rates as dated ____ (attached)
- Federal Labor Standards Provisions (attached)

SECTION 2: The Contractor shall perform or cause to be performed all work and shall furnish or cause to be furnished all labor, materials, tools, and equipment necessary to complete the above-referenced project in strict accordance with the Contract Documents and documents described in Section 1 above for the following Contract Sum:

_____ Dollars (\$_____.00)

SECTION 3: The Contractor shall begin the work of the Contract immediately after receipt of a written Notice to Proceed issued by the Owner, and to perform the work regularly and without interruption thereafter (unless the Owner shall otherwise, in writing, specifically direct) with such forces as necessary to complete said work in a manner acceptable to the owner within __ consecutive calendar days from the date of the Notice to Proceed.

The parties have executed this Contract by having their authorized representatives sign below.

Seattle Housing Authority
190 Queen Anne Avenue North
P.O. Box 19028
Seattle, WA 98109-1028

By: _____
Date

By: _____
Date
Deputy Director of Procurement and Contracts

Maintenance Wage Rate Decision	U.S. Department of Housing and Urban Development Office of Labor Relations	HUD FORM 52158 (06/2006)
Agency Name: Seattle Housing Authority 190 Queen Anne North Seattle, WA 98109	LR 2000 Agency ID No: WA002A	Wage Decision Type: <input type="checkbox"/> Routine Maintenance <input checked="" type="checkbox"/> Nonroutine Maintenance
	Effective Date: February 1, 2021	Expiration Date: December 31, 2022
<p>The following wage rate determination is made pursuant to Section 12(a) of the U.S. Housing Act of 1937, as amended, (public housing agencies), or pursuant to Section 104(b) of the Native American Housing Assistance and Self-determination Act of 1996, as amended, (Indian housing agencies). The agency and its contractors may pay to maintenance laborers and mechanics no less than the wage rate(s) indicated for the type of work they actually perform.</p>		
Eugene Hairston, SLRS _____ HUD Labor Relations (Name, Title, Signature)	1-25-2021 _____ Date	
WORK CLASSIFICATION(S)	HOURLY WAGE RATES	
	BASIC WAGE	FRINGE BENEFIT(S) (if any)
Elevator Mechanic	\$58.35	\$24.42
Sheet Metal Worker	\$31.99	\$17.55
Furnace Installer	\$30.87	\$17.26
Roofer	\$31.10	\$17.32
Truck Driver	\$26.04	\$16.00
Laborer	\$24.30	\$17.25
Asphalt Raker	\$19.63	\$14.33
Carpenter	\$31.24	\$19.56
Electrician	\$36.87	\$20.44
Floor Coverer	\$22.08	\$18.23
Glazier	\$39.40	\$19.56
Painter	\$20.95	\$18.23
Low Voltage Technician	\$27.96	\$16.50
Plumber	\$38.92	\$21.70
Tree Arborist	\$30.64	\$17.20
Landscaper	\$18.72	\$15.02
Fence Installer	\$19.68	\$14.34
Power Equipment Operator	\$38.50	\$19.24
Brick Mason	\$40.14	\$19.67
		<input type="checkbox"/> The agency employee benefit program has been determined by HUD to be acceptable for meeting the prevailing fringe benefit requirements. <small>(HUD Labor Relations: If applicable, check box and initial below.)</small> _____ LR Staff Initial
		FOR HUD USE ONLY LR2000: Log in: Log out:

Maintenance Wage Rate Decision	U.S. Department of Housing and Urban Development Office of Labor Relations	HUD FORM 52158 (06/2006)
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<u>Eugene Hairston, SLRS</u> HUD Labor Relations (Name, Title, Signature)		<u>1-25-2021</u> Date
WORK CLASSIFICATION(S)	HOURLY WAGE RATES	
	BASIC WAGE	FRINGE BENEFIT(S) (if any)
continued - Page 2 Pipe Layer Vehicle Mechanic Engineer Pest Control Technician Solid Waste Laborer Solid Waste Vehicle Mechanic Solid Waste Worker, CDL Window cleaner: Scaffold Non-Scaffold	\$35.66 \$24.78 \$43.09 \$25.31 \$29.37 \$30.13 \$26.04 \$17.50 \$17.50	\$18.50 \$18.99 \$20.44 \$18.24 \$17.40 \$19.48 \$19.82 \$13.77 \$13.77
		<input type="checkbox"/> The agency employee benefit program has been determined by HUD to be acceptable for meeting the prevailing fringe benefit requirements. <small>(HUD Labor Relations: If applicable, check box and initial below.)</small> _____ LR Staff Initial
		FOR HUD USE ONLY LR2000: Log in: Log out:

HOUSING AUTHORITY OF THE CITY OF SEATTLE

MANUAL OF OPERATIONS

SUBJECT: COVID-19 Vaccination Policy for Contractors

PURPOSE: The Seattle Housing Authority (“SHA”) is instituting a COVID-19 vaccination requirement for all Contractors that work on SHA property and have prolonged interactions with SHA staff or SHA residents. This policy furthers SHA’s responsibility to provide and maintain a safe workplace, and will help to safeguard the health of SHA’s employees and their families, as well as SHA’s clients, residents, guests, and the community at large. The context for this policy is a surge in the transmission and contraction of COVID-19, especially among the unvaccinated and vulnerable members of the community.

The COVID-19 vaccines have been scientifically proven to be safe and highly effective at reducing serious illness and death within the workplace and the greater community. SHA has a responsibility to ensure a safe work environment for staff and ensure the safety of our residents. SHA serves some of the most vulnerable members of the community and the agency has a responsibility to ensure their safety.

As used in this policy, the term “Contractor” means any person engaged by or for SHA to work as an independent contractor, service provider, volunteer, or through any other formal or informal agreement to provide goods or services, whether compensated or uncompensated, and includes any employees, agents, contractors, subcontractors, licensees, and invitees of any of the foregoing, but does not include a visitor to or patron of SHA property

SCOPE: This policy applies to all Contractors, that work on SHA property and/or have prolonged interactions with SHA staff or SHA residents. The determination of whether work or service provided by a Contractor falls or will likely fall within the scope of this Policy shall be determined by SHA in its sole and absolute discretion. Types of work or services not considered to involve prolonged interactions with staff or residents include, by way of example;

1. New construction projects;
2. Site work that is outdoors and is not on a playground. Examples include sidewalk repairs, parking lot repairs and tree removal
3. Rehabilitation or repairs of vacant units that have no common entry or common areas; and
4. Emergency repairs.

POLICY: As a condition of contracting with SHA, the Contractor must ensure that all individuals who perform on-site work under the Contract by, for, under, or at the direction of the Contractor (including any employees, agents, contractors, subcontractors, licensees, and invitees) must have completed a full vaccination cycle with a U.S. FDA-authorized COVID-19 vaccine and must provide documentation to the Contractor proving their fully vaccinated status. Individuals are

considered fully vaccinated two weeks after the second dose of the Pfizer and Moderna vaccines, or two weeks after the single dose Johnson & Johnson vaccine. This requirement includes keeping up to date with booster vaccinations as recommended by public health agencies, once boosters are available locally, and complying with additional safety measures and protocols in the future as needed.

All Contractors are required to continue to follow all applicable laws and public health guidance, and must continue to adhere to SHA's COVID-19 protocols and policies.

PROCEDURE: The Contractor must develop and implement a vaccine verification plan that includes the following:

1. The Contractor will require any individuals performing work under the applicable contract who come on-site to provide proof of full vaccination against COVID-19 by providing one of the following:
 - CDC COVID-19 Vaccination Record Card or photo of the card; documentation of vaccination from a health care provider or electronic health record; state immunization information system record; or for an individual who was vaccinated outside of the United States, a reasonable equivalent of any of the above.
 - The Contractor will follow the requirements set forth in applicable law for granting a disability or religious exemption from the vaccination requirement and determine an appropriate reasonable accommodation, if available.
2. The Contractor will submit a declaration that will affirm that all individuals performing work under the applicable contract who come on-site have had their vaccine status verified or an appropriate accommodation has been granted for those who have been granted a disability or religious exemption, in accordance with applicable law, understanding that SHA may conduct spot checks of the Contractor's employees/subcontractors and may request a copy of the Contractor's plan or any documentation of compliance with the plan. Regardless, Contractors will be required to comply with all applicable workplace safety protocols (e.g. masking and social distancing). As required under SHA's COVID Safety Protocols, SHA will not permit unvaccinated individuals to perform work that is expected to have any interactions with residents. Accordingly, all Contractor employees having interactions with residents **must** be vaccinated regardless of any applicable religious or medical exemptions.
3. The Contractor will not be required to submit its vaccine verification plan unless specifically request by SHA.

EFFECTIVE: This policy is currently not in effect. SHA will continue to monitor King County Public Health guidance and if circumstances and guidance changes, the agency may resume enforcement of this policy.

**U.S. Department of Housing
and Urban Development**
Office of Public and Indian Housing

**Representations, Certifications,
and Other Statements of Bidders**
Public and Indian Housing Programs

Representations, Certifications, and Other Statements of Bidders

Public and Indian Housing Programs

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1. Certificate of Independent Price Determination

(a) The bidder certifies that--

(1) The prices in this bid have been arrived at independently, without, for the purpose of restricting competition, any consultation, communication, or agreement with any other bidder or competitor relating to (i) those prices, (ii) the intention to submit a bid, or (iii) the methods or factors used to calculate the prices offered;

(2) The prices in this bid have not been and will not be knowingly disclosed by the bidder, directly or indirectly, to any other bidder or competitor before bid opening (in the case of a sealed bid solicitation) or contract award (in the case of a competitive proposal solicitation) unless otherwise required by law; and

(3) No attempt has been made or will be made by the bidder to induce any other concern to submit or not to submit a bid for the purpose of restricting competition.

(b) Each signature on the bid is considered to be a certification by the signatory that the signatory--

(1) Is the person in the bidder's organization responsible for determining the prices being offered in this bid or proposal, and that the signatory has not participated and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) above; or

(2) (i) Has been authorized, in writing, to act as agent for the following principals in certifying that those principals have not participated, and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) above.

_____ [insert full name of person(s) in the bidder's organization responsible for determining the prices offered in this bid or proposal, and the title of his or her position in the bidder's organization];

(ii) As an authorized agent, does certify that the principals named in subdivision (b)(2)(i) above have not participated, and will not participate, in any action contrary to subparagraphs (a)(1) through (a)(3) above; and

(iii) As an agent, has not personally participated, and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) above.

(c) If the bidder deletes or modifies subparagraph (a)2 above, the bidder must furnish with its bid a signed statement setting forth in detail the circumstances of the disclosure.

[] [Contracting Officer check if following paragraph is applicable]

(d) Non-collusive affidavit. (applicable to contracts for construction and equipment exceeding \$50,000)

(1) Each bidder shall execute, in the form provided by the PHA/IHA, an affidavit to the effect that he/she has not colluded with any other person, firm or corporation in regard to any bid submitted in response to this solicitation. If the successful bidder did not submit the affidavit with his/her bid, he/she must submit it within three (3) working days of bid opening. Failure to submit the affidavit by that date may render the bid nonresponsive. No contract award will be made without a properly executed affidavit.

(2) A fully executed "Non-collusive Affidavit" [] is, [] is not included with the bid.

2. Contingent Fee Representation and Agreement

(a) Definitions. As used in this provision:

"Bona fide employee" means a person, employed by a bidder and subject to the bidder's supervision and control as to time, place, and manner of performance, who neither exerts, nor proposes to exert improper influence to solicit or obtain contracts nor holds out as being able to obtain any contract(s) through improper influence.

"Improper influence" means any influence that induces or tends to induce a PHA/IHA employee or officer to give consideration or to act regarding a PHA/IHA contract on any basis other than the merits of the matter.

(b) The bidder represents and certifies as part of its bid that, except for full-time bona fide employees working solely for the bidder, the bidder:

(1) [] has, [] has not employed or retained any person or company to solicit or obtain this contract; and

(2) [] has, [] has not paid or agreed to pay to any person or company employed or retained to solicit or obtain this contract any commission, percentage, brokerage, or other fee contingent upon or resulting from the award of this contract.

(c) If the answer to either (a)(1) or (a)(2) above is affirmative, the bidder shall make an immediate and full written disclosure to the PHA/IHA Contracting Officer.

(d) Any misrepresentation by the bidder shall give the PHA/IHA the right to (1) terminate the contract; (2) at its discretion, deduct from contract payments the amount of any commission, percentage, brokerage, or other contingent fee; or (3) take other remedy pursuant to the contract.

3. Certification and Disclosure Regarding Payments to Influence Certain Federal Transactions (applicable to contracts exceeding \$100,000)

(a) The definitions and prohibitions contained in Section 1352 of title 31, United States Code, are hereby incorporated by reference in paragraph (b) of this certification.

(b) The bidder, by signing its bid, hereby certifies to the best of his or her knowledge and belief as of December 23, 1989 that:

(1) No 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 on his or her behalf in connection with the awarding of a contract resulting from this solicitation;

(2) If any funds other than Federal appropriated funds (including profit or fee received under a covered Federal transaction) 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 on his or her behalf in connection with this solicitation, the bidder shall complete and submit, with its bid, OMB standard form LLL, "Disclosure of Lobbying Activities;" and

(3) He or she will include the language of this certification in all subcontracts at any tier and require that all recipients of subcontract awards in excess of \$100,000 shall certify and disclose accordingly.

(c) Submission of this certification and disclosure is a prerequisite for making or entering into this contract imposed by section 1352, title 31, United States Code. Any person who makes an expenditure prohibited under this provision or who fails to file or amend the disclosure form to be filed or amended by this provision, shall be subject to a civil penalty of not less than \$10,000, and not more than \$100,000, for each such failure.

(d) Indian tribes (except those chartered by States) and Indian organizations as defined in section 4 of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450B) are exempt from the requirements of this provision.

4. Organizational Conflicts of Interest Certification

The bidder certifies that to the best of its knowledge and belief and except as otherwise disclosed, he or she does not have any organizational conflict of interest which is defined as a situation in which the nature of work to be performed under this proposed contract and the bidder's organizational, financial, contractual, or other interests may, without some restriction on future activities:

- (a) Result in an unfair competitive advantage to the bidder; or,
- (b) Impair the bidder's objectivity in performing the contract work.

[] In the absence of any actual or apparent conflict, I hereby certify that to the best of my knowledge and belief, no actual or apparent conflict of interest exists with regard to my possible performance of this procurement.

5. Bidder's Certification of Eligibility

(a) By the submission of this bid, the bidder certifies that to the best of its knowledge and belief, neither it, nor any person or firm which has an interest in the bidder's firm, nor any of the bidder's subcontractors, is ineligible to:

(1) Be awarded contracts by any agency of the United States Government, HUD, or the State in which this contract is to be performed; or,

(2) Participate in HUD programs pursuant to 24 CFR Part 24.

(b) The certification in paragraph (a) above is a material representation of fact upon which reliance was placed when making award. If it is later determined that the bidder knowingly rendered an erroneous certification, the contract may be terminated for default, and the bidder may be debarred or suspended from participation in HUD programs and other Federal contract programs.

6. Minimum Bid Acceptance Period

(a) "Acceptance period," as used in this provision, means the number of calendar days available to the PHA/IHA for awarding a contract from the date specified in this solicitation for receipt of bids.

(b) This provision supersedes any language pertaining to the acceptance period that may appear elsewhere in this solicitation.

(c) The PHA/IHA requires a minimum acceptance period of [Contracting Officer insert time period] calendar days.

(d) In the space provided immediately below, bidders may specify a longer acceptance period than the PHA's/IHA's minimum requirement. The bidder allows the following acceptance period: calendar days.

(e) A bid allowing less than the PHA's/IHA's minimum acceptance period will be rejected.

(f) The bidder agrees to execute all that it has undertaken to do, in compliance with its bid, if that bid is accepted in writing within (1) the acceptance period stated in paragraph (c) above or (2) any longer acceptance period stated in paragraph (d) above.

7. Small, Minority, Women-Owned Business Concern Representation

The bidder represents and certifies as part of its bid/ offer that it --

(a) [] is, [] is not a small business concern. "Small business concern," as used in this provision, means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding, and qualified as a small business under the criteria and size standards in 13 CFR 121.

(b) [] is, [] is not a women-owned business enterprise. "Women-owned business enterprise," as used in this provision, means a business that is at least 51 percent owned by a woman or women who are U.S. citizens and who also control and operate the business.

(c) [] is, [] is not a minority business enterprise. "Minority business enterprise," as used in this provision, means a business which is at least 51 percent owned or controlled by one or more minority group members or, in the case of a publicly owned business, at least 51 percent of its voting stock is owned by one or more minority group members, and whose management and daily operations are controlled by one or more such individuals. For the purpose of this definition, minority group members are:

(Check the block applicable to you)

- [] Black Americans
- [] Asian Pacific Americans
- [] Hispanic Americans
- [] Asian Indian Americans
- [] Native Americans
- [] Hasidic Jewish Americans

8. Indian-Owned Economic Enterprise and Indian Organization Representation (applicable only if this solicitation is for a contract to be performed on a project for an Indian Housing Authority)

The bidder represents and certifies that it:

(a) [] is, [] is not an Indian-owned economic enterprise. "Economic enterprise," as used in this provision, means any commercial, industrial, or business activity established or organized for the purpose of profit, which is at least 51 percent Indian owned. "Indian," as used in this provision, means any person who is a member of any tribe, band, group, pueblo, or community which is recognized by the Federal Government as eligible for services from the Bureau of Indian Affairs and any "Native" as defined in the Alaska Native Claims Settlement Act.

(b) [] is, [] is not an Indian organization. "Indian organization," as used in this provision, means the governing body of any Indian tribe or entity established or recognized by such governing body. Indian "tribe" means any Indian tribe, band, group, pueblo, or

community including Native villages and Native groups (including corporations organized by Kenai, Juneau, Sitka, and Kodiak) as defined in the Alaska Native Claims Settlement Act, which is recognized by the Federal Government as eligible for services from the Bureau of Indian Affairs.

9. Certification of Eligibility Under the Davis-Bacon Act (applicable to construction contracts exceeding \$2,000)

(a) By the submission of this bid, the bidder certifies that neither it nor any person or firm who has an interest in the bidder's firm is a person or firm ineligible to be awarded contracts by the United States Government by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(b) No part of the contract resulting from this solicitation shall be subcontracted to any person or firm ineligible to be awarded contracts by the United States Government by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(c) The penalty for making false statements is prescribed in the U. S. Criminal Code, 18 U.S.C. 1001.

10. Certification of Nonsegregated Facilities (applicable to contracts exceeding \$10,000)

(a) The bidder's attention is called to the clause entitled **Equal Employment Opportunity** of the General Conditions of the Contract for Construction.

(b) "Segregated facilities," as used in this provision, means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees, that are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, or national origin because of habit, local custom, or otherwise.

(c) By the submission of this bid, the bidder certifies that it does not and will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not and will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. The bidder agrees that a breach of this certification is a violation of the Equal Employment Opportunity clause in the contract.

(d) The bidder further agrees that (except where it has obtained identical certifications from proposed subcontractors for specific time periods) prior to entering into subcontracts which exceed \$10,000 and are not exempt from the requirements of the Equal Employment Opportunity clause, it will:

(1) Obtain identical certifications from the proposed subcontractors;

(2) Retain the certifications in its files; and

(3) Forward the following notice to the proposed subcontractors (except if the proposed subcontractors have submitted identical certifications for specific time periods):

Notice to Prospective Subcontractors of Requirement for Certifications of Nonsegregated Facilities

A Certification of Nonsegregated Facilities must be submitted before the award of a subcontract exceeding \$10,000 which is not exempt from the provisions of the Equal Employment Opportunity clause of the prime contract. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually, or annually).

Note: The penalty for making false statements in bids is prescribed in 18 U.S.C. 1001.

11. Clean Air and Water Certification (applicable to contracts exceeding \$100,000)

The bidder certifies that:

(a) Any facility to be used in the performance of this contract [] is, [] is not listed on the Environmental Protection Agency List of Violating Facilities:

(b) The bidder will immediately notify the PHA/IHA Contracting Officer, before award, of the receipt of any communication from the Administrator, or a designee, of the Environmental Protection Agency, indicating that any facility that the bidder proposes to use for the performance of the contract is under consideration to be listed on the EPA List of Violating Facilities; and,

(c) The bidder will include a certification substantially the same as this certification, including this paragraph (c), in every nonexempt subcontract.

12. Previous Participation Certificate (applicable to construction and equipment contracts exceeding \$50,000)

(a) The bidder shall complete and submit with his/her bid the Form HUD-2530, "Previous Participation Certificate." If the successful bidder does not submit the certificate with his/her bid, he/she must submit it within three (3) working days of bid opening. Failure to submit the certificate by that date may render the bid nonresponsive. No contract award will be made without a properly executed certificate.

(b) A fully executed "Previous Participation Certificate" [] is, [] is not included with the bid.

13. Bidder's Signature

The bidder hereby certifies that the information contained in these certifications and representations is accurate, complete, and current.

(Signature and Date)

(Typed or Printed Name)

(Title)

(Company Name)

(Company Address)



VENDOR FACT SHEET

Return this Form TO: Seattle Housing Authority, Purchasing Division,
 ATTN: _____
 190 Queen Anne Ave N, P.O Box 19028, Seattle WA 98109-1028

General Business Information:		<u>For SHA Use Only:</u>	
Name of Business, Organization, or Name of Person (if payment is to an individual):		JDE Vendor No.	Purchasing contracts <input type="checkbox"/>
Mailing Address for Payments:			
City:	State:	Zip Code:	E-Mail Address:
Telephone No.:	Fax No.:	DUNS No.:	
Washington UBI No.:	City of Seattle Business License No.:	Washington Contractor's License No.:	
President/General Manager:	Principal products and/or services offered:		
Type of Organization (check one):			
Individual <input type="checkbox"/>	Sole Proprietor <input type="checkbox"/>	Partnership <input type="checkbox"/>	Corporation <input type="checkbox"/>
Governmental Agency <input type="checkbox"/>		Other _____ <input type="checkbox"/>	
Employee Tax ID No. (TIN) or Social Security No. (if Individual):			

Substitute IRS Form W-9 Certification:	
<p>Under penalties of perjury, I hereby certify that the number shown on this form is my correct taxpayer identification number, and that I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding, and I am a U.S. person (including a U.S. resident alien). <u>Note:</u> The Internal Revenue Service does not require your consent to any provision of this document other than the certifications required to avoid backup withholding.</p>	
SIGN HERE →	Signature of U.S. Person
	Date

Ownership Status (check all that apply):	Racial/Ethnic Status (check one):
<input type="checkbox"/> MBE (Minority-Owned Business Enterprise) <input type="checkbox"/> WBE (Women-Owned Business Enterprise) <input type="checkbox"/> MWBE (Minority / Women-Owned Business Enterprise) <input type="checkbox"/> CBE (Combination Business Enterprise) <input type="checkbox"/> Small Business <input type="checkbox"/> HUD Section 3 Business <input type="checkbox"/> Certified by OMWBE (Washington State Office of Minority and Women's Business Enterprises) <input type="checkbox"/> Self-Identified (SHA may request a signed statement re: self-certification)	<input type="checkbox"/> Caucasian (1) <input type="checkbox"/> African American (2) <input type="checkbox"/> Native American (3) <input type="checkbox"/> Hispanic American (4) <input type="checkbox"/> Asian/Pacific American (5) <input type="checkbox"/> Hasidic Jews (6)

Method of Contract Payments: As outlined on the reverse side of this form, for contracts over one million dollars, SHA's method of contract payments is through an electronic virtual credit card issued by SHA's e-payables vendor, Bank of America. Unless SHA grants a waiver, Vendors will receive an enrollment form from SHA following issuance of a contract.

SIGN BELOW:	
Signature of Authorized Representative of Vendor:	Date:
<p>By signing immediately above, the Vendor hereby represents the following:</p> <p>a) The Vendor certifies that to the best of its knowledge and belief, neither it, nor any person/principal or firm which has an interest in the Vendor's firm, is ineligible to participate in a SHA contract, purchase order, direct pay or other transaction, pursuant to the Certification of Eligibility provision specified in the Vendor Fact Sheet Instructions, or;</p> <p>b) The Vendor will comply with SHA's General Terms and Conditions applicable to Purchase Orders, if the Vendor will be supplying goods and/or services through an SHA Purchase Order.</p> <p>To obtain a copy of the General Terms and Conditions, call (206) 615-3379 or visit our Web site at</p>	

Vendor Fact Sheet Instructions

Thank you for your interest in doing business with the Seattle Housing Authority (SHA). We look forward to doing business with you. If you have any questions about completion of the Vendor Fact Sheet, please call us at (206) 615-3379.

In order for SHA to make payments to you or to procure goods or services from you, we need the information requested on the Vendor Fact Sheet, which also serves as a substitute IRS W-9 Form. The information about you will be entered into our computerized payment system and will allow us to make required reports to the Federal government about our business and payment transactions.

Substitute IRS Form W-9 Certification: In completing the Vendor Fact Sheet, you must sign the "Substitute IRS Form W-9 Certification" or backup withholding will apply. If you are subject to backup withholding and you are merely providing your correct taxpayer identification number to SHA, you must cross out the portion of the certification after the word "and" in line two, through the end of line five, before signing the form. Detailed instructions about IRS Form W-9 are included on the form, which may be obtained by calling our office at (206) 615-3379 or visiting the IRS web site at www.irs.gov.

Certification of Eligibility: In order to do business with SHA, the Vendor must be eligible to:

- 1) Be awarded contracts by any agency of the U.S. Government, HUD, or the State in which this Contract work is to be performed; or,
- 2) Participate in HUD programs pursuant to 24 CFR Part 24.

The websites to verify eligibility of the firm and its principals are: <https://www.sam.gov/portal/SAM> and http://portal.hud.gov/hudportal/HUD?src=/topics/limited_denials_of_participation. By signing the Vendor Fact Sheet, the Vendor understands that the certification of eligibility is a material representation of fact upon which reliance was placed when SHA agreed to enter into the transaction with the Vendor. SHA may require the Vendor to submit such certification on an annual basis depending on the terms of its contract or the frequency of its business transactions with SHA. If the Vendor subcontracts any portion of the work, the Vendor will be required to submit a similar certification of eligibility to SHA for any Vendor subcontracts. Any written contract executed between SHA and the Vendor shall include these provisions, which may also be referred to as Suspension/Debarment provisions.

Contract Payments: Unless SHA grants a waiver, its method of contract payment for contracts of one million or more is through its Bank of America e-payables program. Payments will be made electronically through a virtual Visa credit card. Benefits for using this method include reduced labor costs associated with the processing of checks and enhancing cash flow by eliminating float time associated with the mailing of checks. To learn more about the program, please click here or copy and paste the following URL into your browser: www.bankofamerica.com/epayablesvendors. For new vendors, SHA will automatically send an enrollment form upon contract award. If you have questions about the program, please contact Tran Wong, SHA's Accounts Payable Manager, at 206-615-3483 or twong@seattlehousing.org.

Small Businesses: The Vendor Fact Sheet also requests information about whether your business is owned and controlled by women or minorities, and/or is a small business. The following are definitions of these terms for your use. This information provides valuable information to SHA in its efforts to ensure its contracting program meets its diversity objectives and requirements.

- **WMBE:** Minority and women-owned business enterprises must either be self-identified or certified by, the Washington State Office of Women's and Minority Business Enterprises (OMWBE) to be at least fifty-one percent owned by women and/or minority group members.
- **Small Business:** A small business means a business concern, including its affiliates, that is independently owned and operated, not an affiliate or subsidiary of a business dominant in its field of operation, and qualified as a small business under the criteria and size standards in 13 CFR 121. Furthermore, a business is considered small according to the Small Business Administration's established guidelines provided to such businesses.
- **HUD Section 3 Business:** A business that is owned 51% or more by a Section 3 qualified person, or where 30% or more of the permanent, full-time employees of the business are Section 3 qualified persons, or where the business can provide evidence of a commitment to subcontract in excess of 25% of the amount of all subcontracts to other Section 3 certified businesses. A Section 3 qualified person

must live in the metropolitan statistical areas identified on SHA's Section 3 form and whose income level meets or falls below the stated income limits.

SEATTLE HOUSING AUTHORITY

Section 3 Business Concern Certification for Contracting

Instructions: Enter the following information and select the criteria that applies to certify your business' Section 3 Business Concern status.

Business Information

Name of Business _____

Address of Business _____

Name of Business Owner _____

Phone Number of Business Owner _____

Email Address of Business Owner _____

Preferred Contact Information

Same as above

Name of Preferred Contact _____

Phone Number of Preferred Contact _____

Type of Business (select from the following options):

- Corporation Partnership Sole Proprietorship
 Limited Liability Company Other (*please specify*) _____

Select from *ONE* of the following three options below that applies:

- At least 51 percent of the business is owned and controlled by low- or very low-income persons (Refer to income guidelines on page 3).
- At least 51 percent of the business is owned and controlled by current public housing residents or residents who currently live in Section 8-assisted housing.
- Over 75 percent of the labor hours performed for the business over the prior three-month period are performed by Section 3 workers (Refer to definition on page 3).

Business Concern Affirmation

I affirm that the above statements (on page 1 of this form) are true, complete, and correct to the best of my knowledge and belief. I understand that businesses who misrepresent themselves as Section 3 business concerns and report false information to the Housing Authority of the City of Seattle may have their contracts terminated for default and be barred from ongoing and future considerations for contracting opportunities. I hereby certify, under penalty of law, that the following information is correct to the best of my knowledge.

Print Name: _____

Signature: _____ Date: _____

*Certification expires within six months of the date of signature
Information regarding Section 3 Business Concerns can be found at [24 CFR 75.5](#)

FOR ADMINISTRATIVE USE ONLY

Is the business a Section 3 business concern based upon their certification?

YES NO

EMPLOYERS MUST RETAIN THIS FORM IN THEIR SECTION 3 COMPLIANCE FILE FOR FIVE YEARS.

SEATTLE HOUSING AUTHORITY

SUSPENSION AND DEBARMENT COMPLIANCE CERTIFICATE FOR CONTRACTOR

By signing below, the Contractor certifies that to the best of its knowledge and belief neither its firm nor any of its principals as named below are presently debarred, suspended, or have been declared ineligible or are excluded from participation in this transaction by any federal, state or local government.

Contractor's Firm Name: _____

Address: _____

City, State, Zip: _____

	PRINCIPAL(S) Name(s)	Title(s)
1		
2		
3		
4		
5		

Contractor's Signature	Printed Name	Title	Date

NOTE: This requirement applies to the Contractor's firm as well as its principals. Principal is defined in the regulation (2 CFR 180.995) as follows:

- 1) An officer, director, owner, partner, principal investigator, or other person within a participant with management or supervisory responsibilities related to a covered transaction; or
- 2) A contractor or other person, whether or not employed by the participant or paid with Federal funds, who-
 - a) Is in a position to handle Federal funds;
 - b) Is in a position to influence or control the use of those funds; or,
 - c) Occupies a technical or professional position capable of substantially influencing the development or outcome of an activity require to perform the covered transaction.

The federal websites to verify eligibility include: <https://www.sam.gov/portal/public/SAM/> and http://portal.hud.gov/hudportal/HUD?src=/topics/limited_denials_of_participation.

[Add this section if Suspension and Debarment Compliance Certificate for the Sub-Contractors or Sub-Consultants is needed. DO NOT forget to fill in your contact information below]

SEATTLE HOUSING AUTHORITY

SUSPENSION AND DEBARMENT COMPLIANCE CERTIFICATE FOR SUB-CONTRACTORS

The Prime Contractor may use this form if the Prime can verify that their Sub-Contractors named below, nor any of their principals are debarred, suspended or ineligible from involvement by Federal, State or Local Government. If the Prime is unable to verify this information, the Prime must send the previous SUSPENSION AND DEBARMENT COMPLIANCE CERTIFICATE FOR CONTRACTOR form to each sub- contractor to be completed and returned.

Prime Contractor's Name: _____ certifies that neither any of the sub- contracting firms named below, nor any of its principals are debarred, suspended or ineligible from involvement by Federal, State or Local Government. I understand that the Seattle Housing Authority (SHA) relies on this certification and I understand that I am obligated to submit the following to SHA:

- A certification for any new sub- contractor hired after submission of this certification.
- A renewal certification for every sub- contractor on the anniversary of the Contract execution date if the Contract Time extends beyond one year.

(**Note:** In lieu of this certification, the Prime Contractor may elect to submit a separate certification signed by each sub- contracting firm to SHA as evidence of sub- contractor eligibility. It is the Prime Contractor's responsibility to initiate, obtain, and provide all such individual sub- contractor certifications to SHA.)

Prime Contractor's Signature	Printed Name	Title	Date

Sub- Contractor Firm Listing: (If sub- contractors are not involved in the project, please enter **NONE.**)

If additional pages are necessary, copy this form to ensure signed statement precedes any listing of sub- contractors.

Please contact Diana Peterson at 206-615-3470 or by e-mail at diana.peterson@seattlehousing.org if you have any questions regarding compliance with this requirement.

For-Profit Subgrantee and Contractor Certifications and Assurances

The Department of Housing and Urban Development (HUD) requires that all for-profit Subgrantees and Contractors on HOPE VI projects sign this “Certifications and Assurances” form certifying that they will comply with the specific federal requirements described below.

The parties who must sign a “Certifications and Assurances” form are defined below:

- **Subgrantees:** These are for-profit organizations to which the Housing Authority (Housing Authority or Grantee) has awarded a grant from the HOPE VI grant that the Housing Authority received from HUD. The subgrantee is accountable to the Housing Authority for the use of the funds provided, but the Housing Authority is ultimately accountable to HUD.
- **Contractors:** This includes any for-profit contractor, consultant, service provider, or supplier that the Housing Authority contracts with for goods or services on any HOPE VI project.

.....

Certification and Assurance: The subgrantee or contractor executing this certification hereby assures and certifies that it will comply with all of the applicable requirements of the following, as the same may be amended from time to time, including adding appropriate provisions to all contracts between Grantee and for-profit Subgrantees or Contractors:

- (1) Administrative, contractual, or legal remedies in instances where contractors violate or breach contract terms, and provide for such sanctions and penalties as may be appropriate. (Contracts more than the simplified acquisition threshold)
- (2) Termination for cause and for convenience by the grantee or subgrantee including the manner by which it will be effected and the basis for settlement. (All contracts in excess of \$10,000)
- (3) Compliance with Executive Order 11246 of September 24, 1965, entitled “Equal Employment Opportunity,” as amended by Executive Order 11375 of October 13, 1967, and as supplemented in Department of Labor regulations (41 CFR chapter 60). (All construction contracts awarded in excess of \$10,000 by grantees and their contractors or subgrantees)
- (4) Compliance with the Copeland “Anti-Kickback” Act (18 U.S.C. 874) as supplemented in Department of Labor regulations (29 CFR part 3). (All contracts and subgrants for construction or repair)
- (5) Compliance with the Davis-Bacon Act (40 U.S.C. 276a to 276a-7) as supplemented by Department of Labor regulations (29 CFR part 5). (Construction contracts in excess of \$2000 awarded by grantees and subgrantees when required by Federal grant program legislation)
- (6) Compliance with Sections 103 and 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 327-330) as supplemented by Department of Labor regulations (29 CFR part 5). (Construction contracts awarded by grantees and subgrantees in excess of \$2000, and in excess of \$2500 for other contracts which involve the employment of mechanics or laborers)



Address 190 Queen Anne Ave N
PO Box 19028
Seattle, WA 98109

Telephone 206-615-3300

TTY 1-800-833-6388

Website www.seattlehousing.org

Certification of Compliance with Wage Payment Statutes

The undersigned hereby certifies that the bidder is now, and in the three-year period immediately preceding the date of this bid solicitation (08/08/2022) has been, in compliance with the responsible bidder criteria requirement of RCW 39.04.350(1)(g) and has not been found to have willfully violated any provision of RCW Chapters 49.46, 49.48, or 49.52 in a final determination by the Department of Labor and Industries or any 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's Business Name

Signature of Authorized Official*

Printed Name

Title

Date

City

State

Check One:

Sole Proprietorship Partnership Joint Venture Corporation

State of Incorporation, or if not a corporation, 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.

NON-COLLUSIVE AFFIDAVIT

State of Washington)ss
County of King)

_____ who is a _____
of the firm of _____

_____, being first
duly sworn, on their oath, says that the bid herewith submitted is a genuine and
not a sham or collusive bid, or made in the interest or on behalf of any person not
therein named; and further states that the said bidder has or was not directly or
indirectly induced or solicited by any bidder on the above work or supplies to put
in a sham bid, or any person or corporation to refrain from bidding; and that said
bidder has not in any manner sought by collusion to secure themselves an
advantage over any other bidder or bidders, or to secure any advantage against
the Seattle Housing Authority or any person interested in the proposed contract;
and that all statements in said proposal or bid are true.

BIDDER
(if individual)

PARTNER
(if partnership)

OFFICER
(if corporation)

Subscribed and sworn to before me

this _____ day of _____, 20_____.

Notary Public in and for the State of Washington,
residing at _____.

My commission expires _____, 20_____.