



THE CITY OF WINNIPEG

BID OPPORTUNITY

BID OPPORTUNITY NO. 1106-2016

SUPPLY AND DELIVERY OF MECHANICAL HVAC EQUIPMENT

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 SUPPLY AND DELIVERY OF MECHANICAL HVAC EQUIPMENT

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 4:00 p.m. Winnipeg time, December 29, 2016.

B2.2 Bids determined by the Manager of Materials to have been received later than the Submission Deadline will not be accepted and will be returned upon request.

B2.3 The Contract Administrator or the Manager of Materials may extend the Submission Deadline by issuing an addendum at any time prior to the time and date specified in B2.1.

B3. ENQUIRIES

B3.1 All enquiries shall be directed to the Contract Administrator identified in D3.1.

B3.2 If the Bidder finds errors, discrepancies or omissions in the Bid Opportunity, or is unsure of the meaning or intent of any provision therein, the Bidder shall promptly notify the Contract Administrator of the error, discrepancy or omission at least five (5) Business Days prior to the Submission Deadline.

B3.3 If the Bidder is unsure of the meaning or intent of any provision therein, the Bidder should request clarification as to the meaning or intent prior to the Submission Deadline.

B3.4 Responses to enquiries which, in the sole judgment of the Contract Administrator, require a correction to or a clarification of the Bid Opportunity will be provided by the Contract Administrator to all Bidders by issuing an addendum.

B3.5 Responses to enquiries which, in the sole judgment of the Contract Administrator, do not require a correction to or a clarification of the Bid Opportunity will be provided by the Contract Administrator only to the Bidder who made the enquiry.

B3.6 The Bidder shall not be entitled to rely on any response or interpretation received pursuant to B3 unless that response or interpretation is provided by the Contract Administrator in writing.

B4. CONFIDENTIALITY

B4.1 Information provided to a Bidder by the City or acquired by a Bidder by way of further enquiries or through investigation is confidential. Such information shall not be used or disclosed in any way without the prior written authorization of the Contract Administrator. The use and disclosure of the confidential information shall not apply to information which:

- (a) was known to the Bidder before receipt hereof; or
- (b) becomes publicly known other than through the Bidder; or
- (c) is disclosed pursuant to the requirements of a governmental authority or judicial order.

B4.2 The Bidder shall not make any statement of fact or opinion regarding any aspect of the Bid Opportunity to the media or any member of the public without the prior written authorization of the Contract Administrator.

B5. ADDENDA

B5.1 The Contract Administrator may, at any time prior to the Submission deadline, issue addenda correcting errors, discrepancies or omissions in the Bid Opportunity, or clarifying the meaning or intent of any provision therein.

- B5.2 The Contract Administrator will issue each addendum at least two (2) Business Days prior to the Submission Deadline, or provide at least two (2) Business Days by extending the Submission Deadline.
- B5.2.1 Addenda will be available on the Bid Opportunities page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/bidopp.asp>
- B5.2.2 The Bidder is responsible for ensuring that he/she has received all addenda and is advised to check the Materials Management Division website for addenda regularly and shortly before the Submission Deadline, as may be amended by addendum.
- B5.3 The Bidder shall acknowledge receipt of each addendum in Paragraph 9 of Form A: Bid. Failure to acknowledge receipt of an addendum may render a Bid non-responsive.

B6. SUBSTITUTES

- B6.1 The Work is based on the materials, equipment, methods and products specified in the Bid Opportunity.
- B6.2 Substitutions shall not be allowed unless application has been made to and prior approval has been granted by the Contract Administrator in writing.
- B6.3 Requests for approval of a substitute will not be considered unless received in writing by the Contract Administrator at least seven (7) Business Days prior to the Submission Deadline.
- B6.4 The Bidder shall ensure that any and all requests for approval of a substitute:
- (a) provide sufficient information and details to enable the Contract Administrator to determine the acceptability of the material, equipment, method or product as either an approved equal or alternative;
 - (b) identify any and all changes required in the applicable Work, and all changes to any other Work, which would become necessary to accommodate the substitute;
 - (c) identify any anticipated cost or time savings that may be associated with the substitute;
 - (d) certify that, in the case of a request for approval as an approved equal, the substitute will fully perform the functions called for by the general design, be of equal or superior substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the Contract;
 - (e) certify that, in the case of a request for approval as an approved alternative, the substitute will adequately perform the functions called for by the general design, be similar in substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the Contract.
- B6.5 The Contract Administrator, after assessing the request for approval of a substitute, may in his/her sole discretion grant approval for the use of a substitute as an “approved equal” or as an “approved alternative”, or may refuse to grant approval of the substitute.
- B6.6 The Contract Administrator will provide a response in writing, at least two (2) Business Days prior to the Submission Deadline, to the Bidder who requested approval of the substitute.
- B6.6.1 The Contract Administrator will issue an Addendum, disclosing the approved materials, equipment, methods and products to all potential Bidders. The Bidder requesting and obtaining the approval of a substitute shall be responsible for disseminating information regarding the approval to any person or persons he/she wishes to inform.
- B6.7 If the Contract Administrator approves a substitute as an “approved equal”, any Bidder may use the approved equal in place of the specified item.

- B6.8 If the Contract Administrator approves a substitute as an “approved alternative”, any Bidder bidding that approved alternative may base his/her Total Bid Price upon the specified item but may also indicate an alternative price based upon the approved alternative. Such alternatives will be evaluated in accordance with B15.
- B6.9 No later claim by the Contractor for an addition to the price(s) because of any other changes in the Work necessitated by the use of an approved equal or an approved alternative will be considered.

B7. BID SUBMISSION

- B7.1 The Bid shall consist of the following components:
- (a) Form A: Bid;
 - (b) Form B: Prices;
- B7.2 Further to B7.1, the Bidder should include the written correspondence from the Contract Administrator approving a substitute in accordance with B6.
- B7.3 All components of the Bid shall be fully completed or provided, and submitted by the Bidder no later than the Submission Deadline, with all required entries made clearly and completely, to constitute a responsive Bid.
- B7.4 The Bid Submission may be submitted by mail, courier or personal delivery, or by facsimile transmission.
- B7.5 If the Bid Submission is submitted by mail, courier or personal delivery, it shall be enclosed and sealed in an envelope clearly marked with the Bid Opportunity number and the Bidder's name and address, and shall be submitted to:
- The City of Winnipeg
Corporate Finance Department
Materials Management Division
185 King Street, Main Floor
Winnipeg, MB R3B 1J1
- B7.5.1 Samples or other components of the Bid Submission which cannot reasonably be enclosed in the envelope may be packaged separately, but shall be clearly marked with the Bid Opportunity number, the Bidder's name and address, and an indication that the contents are part of the Bidder's Bid Submission.
- B7.6 Bidders are advised not to include any information/literature except as requested in accordance with B7.1.
- B7.7 Bidders are advised that inclusion of terms and conditions inconsistent with the Bid Opportunity document, including the General Conditions, will be evaluated in accordance with B15.1(a).
- B7.8 If the Bid Submission is submitted by facsimile transmission, it shall be submitted to 204-949-1178.
- B7.8.1 The Bidder is advised that the City cannot take responsibility for the availability of the facsimile machine at any time.
- B7.9 Bids submitted by internet electronic mail (e-mail) will not be accepted.

B8. BID

- B8.1 The Bidder shall complete Form A: Bid, making all required entries.
- B8.2 Paragraph 2 of Form A: Bid shall be completed in accordance with the following requirements:

- (a) if the Bidder is a sole proprietor carrying on business in his/her own name, his/her name shall be inserted;
- (b) if the Bidder is a partnership, the full name of the partnership shall be inserted;
- (c) if the Bidder is a corporation, the full name of the corporation shall be inserted;
- (d) if the Bidder is carrying on business under a name other than his/her own, the business name and the name of every partner or corporation who is the owner of such business name shall be inserted.

B8.2.1 If a Bid is submitted jointly by two or more persons, each and all such persons shall identify themselves in accordance with B8.2.

B8.3 In Paragraph 3 of Form A: Bid, the Bidder shall identify a contact person who is authorized to represent the Bidder for purposes of the Bid.

B8.4 Paragraph 11 of Form A: Bid shall be signed in accordance with the following requirements:

- (a) if the Bidder is a sole proprietor carrying on business in his/her own name, it shall be signed by the Bidder;
- (b) if the Bidder is a partnership, it shall be signed by the partner or partners who have authority to sign for the partnership;
- (c) if the Bidder is a corporation, it shall be signed by its duly authorized officer or officers and the corporate seal, if the corporation has one, should be affixed;
- (d) if the Bidder is carrying on business under a name other than his/her own, it shall be signed by the registered owner of the business name, or by the registered owner's authorized officials if the owner is a partnership or a corporation.

B8.4.1 The name and official capacity of all individuals signing Form A: Bid should be printed below such signatures.

B8.5 If a Bid is submitted jointly by two or more persons, the word "Bidder" shall mean each and all such persons, and the undertakings, covenants and obligations of such joint Bidders in the Bid and the Contract, when awarded, shall be both joint and several.

B9. PRICES

B9.1 The Bidder shall state a price in Canadian funds for each item of the Work identified on Form B: Prices.

B9.1.1 Prices on Form B: Prices shall include:

- (a) duty;
- (b) freight and cartage;
- (c) Provincial and Federal taxes [except the Goods and Services Tax (GST) and Manitoba Retail Sales Tax (MRST, also known as PST), which shall be extra where applicable] and all charges governmental or otherwise paid;
- (d) profit and all compensation which shall be due to the Contractor for the Work and all risks and contingencies connected therewith.

B9.2 The quantities listed on Form B: Prices are to be considered approximate only. The City will use said quantities for the purpose of comparing Bids.

B9.3 The quantities for which payment will be made to the Contractor are to be determined by the Work actually performed and completed by the Contractor, to be measured as specified in the applicable Specifications.

B10. DISCLOSURE

B10.1 Various Persons provided information or services with respect to this Work. In the City's opinion, this relationship or association does not create a conflict of interest because of this full disclosure. Where applicable, additional material available as a result of contact with these Persons is listed below.

B10.2 The Persons are:

- (a) N/A

B11. QUALIFICATION

B11.1 The Bidder shall:

- (a) undertake to be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba, or if the Bidder does not carry on business in Manitoba, in the jurisdiction where the Bidder does carry on business; and
- (b) be financially capable of carrying out the terms of the Contract; and
- (c) have all the necessary experience, capital, organization, and equipment to perform the Work in strict accordance with the terms and provisions of the Contract.

B11.2 The Bidder and any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:

- (a) be responsible and not be suspended, debarred or in default of any obligations to the City. A list of suspended or debarred individuals and companies is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/debar.stm>

B11.3 The Bidder and/or any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:

- (a) have successfully carried out work similar in nature, scope and value to the Work; and
- (b) be fully capable of performing the Work required to be in strict accordance with the terms and provisions of the Contract; and
- (c) have a written workplace safety and health program, if required, pursuant to The Workplace Safety and Health Act (Manitoba);

B11.4 The Bidder shall submit, within three (3) Business Days of a request by the Contract Administrator, proof satisfactory to the Contract Administrator of the qualifications of the Bidder and of any proposed Subcontractor.

B11.5 The Bidder shall provide, on the request of the Contract Administrator, full access to any of the Bidder's equipment and facilities to confirm, to the Contract Administrator's satisfaction, that the Bidder's equipment and facilities are adequate to perform the Work.

B12. OPENING OF BIDS AND RELEASE OF INFORMATION

B12.1 Bids will not be opened publicly.

B12.2 Following the Submission Deadline, the names of the Bidders and their Total Bid Prices (unevaluated, and pending review and verification of conformance with requirements or evaluated prices) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt>

B12.3 After award of Contract, the name(s) of the successful Bidder(s) and the Contract amount(s) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt>

B12.4 The Bidder is advised that any information contained in any Bid may be released if required by City policy or procedures, by The Freedom of Information and Protection of Privacy Act (Manitoba), by other authorities having jurisdiction, or by law.

B13. IRREVOCABLE BID

B13.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 10 of Form A: Bid.

B13.2 The acceptance by the City of any Bid shall not release the Bids of the next two lowest evaluated responsive Bidders and these Bidders shall be bound by their Bids on such Work for the time period specified in Paragraph 10 of Form A: Bid.

B14. WITHDRAWAL OF BIDS

B14.1 A Bidder may withdraw his/her Bid without penalty by giving written notice to the Manager of Materials at any time prior to the Submission Deadline.

B14.1.1 Notwithstanding C21, the time and date of receipt of any notice withdrawing a Bid shall be the time and date of receipt as determined by the Manager of Materials.

B14.1.2 The City will assume that any one of the contact persons named in Paragraph 3 of Form A: Bid or the Bidder's authorized representatives named in Paragraph 11 of Form A: Bid, and only such person, has authority to give notice of withdrawal.

B14.1.3 If a Bidder gives notice of withdrawal prior to the Submission Deadline, the Manager of Materials will:

- (a) retain the Bid until after the Submission Deadline has elapsed;
- (b) open the Bid to identify the contact person named in Paragraph 3 of Form A: Bid and the Bidder's authorized representatives named in Paragraph 11 of Form A: Bid; and
- (c) if the notice has been given by any one of the persons specified in B14.1.3(b), declare the Bid withdrawn.

B14.2 A Bidder who withdraws his/her Bid after the Submission Deadline but before his/her Bid has been released or has lapsed as provided for in B13.2 shall be liable for such damages as are imposed upon the Bidder by law and subject to such sanctions as the Chief Administrative Officer considers appropriate in the circumstances. The City, in such event, shall be entitled to all rights and remedies available to it at law.

B15. EVALUATION OF BIDS

B15.1 Award of the Contract shall be based on the following bid evaluation criteria:

- (a) compliance by the Bidder with the requirements of the Bid Opportunity, or acceptable deviation therefrom (pass/fail);
- (b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B11 (pass/fail);
- (c) Total Bid Price;
- (d) economic analysis of any approved alternative pursuant to B6;
- (e) costs to the City of administering multiple contract

B15.2 Further to B15.1(a), the Award Authority may reject a Bid as being non-responsive if the Bid Submission is incomplete, obscure or conditional, or contains additions, deletions, alterations or

other irregularities. The Award Authority may reject all or any part of any Bid, or waive technical requirements or minor informalities or irregularities if the interests of the City so require.

- B15.3 Further to B15.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his/her Bid or in other information required to be submitted, that he/she is responsible and qualified.
- B15.4 Further to B15.1(c), the Total Bid Price shall be the sum of the quantities multiplied by the unit prices for each item shown on Form B: Prices.
- B15.5 This Contract may be awarded as a whole or separately by item as identified on Form B: Prices.
- B15.5.1 Notwithstanding B9.1, the Bidder may, but is not required to bid on all items.
- B15.5.2 Notwithstanding B16.3, the City shall not be obligated to award any item to the responsible Bidder submitting the lowest evaluated responsive Bid for the item and shall have the right to choose the alternative which is in its best interests. If the Bidder has not bid on all items, he/she shall have no claim against the City if his/her partial Bid is rejected in favour of an award of the Contract as a whole.

B16. AWARD OF CONTRACT

- B16.1 The City will give notice of the award of the Contract or will give notice that no award will be made.
- B16.2 The City will have no obligation to award a Contract to a Bidder, even though one or all of the Bidders are determined to be responsible and qualified, and the Bids are determined to be responsive.
- B16.2.1 Without limiting the generality of B16.2, the City will have no obligation to award a Contract where:
- (a) the prices exceed the available City funds for the Work;
 - (b) the prices are materially in excess of the prices received for similar work in the past;
 - (c) the prices are materially in excess of the City's cost to perform the Work, or a significant portion thereof, with its own forces;
 - (d) only one Bid is received; or
 - (e) in the judgment of the Award Authority, the interests of the City would best be served by not awarding a Contract.
- B16.3 Where an award of Contract is made by the City, the award shall be made to the responsible and qualified Bidder submitting the lowest evaluated responsive Bid, in accordance with B15.
- B16.3.1 Following the award of contract, a Bidder will be provided with information related to the evaluation of his/her Bid upon written request to the Contract Administrator.
- B16.4 Notwithstanding C4 and Paragraph 6 of Form A: Bid, the City may issue a purchase order to the successful Bidder in lieu of the execution of a Contract.
- B16.5 The Contract Documents, as defined in C1.1(n) (ii), in their entirety shall be deemed to be incorporated in and to form a part of the purchase order notwithstanding that they are not necessarily attached to or accompany said purchase order.

PART C - GENERAL CONDITIONS

C0. GENERAL CONDITIONS

- C0.1 The *General Conditions for the Supply of Goods* (Revision 2008 05 26) are applicable to the Work of the Contract.
- C0.1.1 The *General Conditions for the Supply of Goods* are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/gen_cond.stm
- C0.2 A reference in the Bid Opportunity to a section, clause or subclause with the prefix “**C**” designates a section, clause or subclause in the *General Conditions for Supply of Goods*.

PART D - SUPPLEMENTAL CONDITIONS

GENERAL

D1. GENERAL CONDITIONS

D1.1 In addition to the *General Conditions for the Supply of Goods*, these Supplemental Conditions are applicable to the Work of the Contract.

D2. SCOPE OF WORK

D2.1 The Work to be done under the Contract shall consist of supply and delivery of mechanical HVAC equipment.

D2.2 The major components of the Work are as follows:

- (a) Exhaust Fan Unit EF-7N-1R
- (b) Air Handling Unit AHU-31

D3. CONTRACT ADMINISTRATOR

D3.1 The Contract Administrator is KGS Group, represented by:

Devin Windeatt .

Mechanical Engineer, E.I.T

Telephone No.: 204-896-1209

Facsimile No.: 204-896-0754

Email Address: dwindeatt@ksgroup.com

D4. OWNERSHIP OF INFORMATION, CONFIDENTIALITY AND NON DISCLOSURE

D4.1 The Contract, all deliverables produced or developed, and information provided to or acquired by the Contractor are the property of the City and shall not be appropriated for the Contractors own use, or for the use of any third party.

D4.2 The Contractor shall not make any public announcements or press releases regarding the Contract, without the prior written authorization of the Contract Administrator.

D4.3 The following shall be confidential and shall not be disclosed by the Contractor to the media or any member of the public without the prior written authorization of the Contract Administrator;

- (a) information provided to the Contractor by the City or acquired by the Contractor during the course of the Work;
- (b) the Contract, all deliverables produced or developed; and
- (c) any statement of fact or opinion regarding any aspect of the Contract.

D4.4 A Contractor who violates any provision of D4 may be determined to be in breach of Contract.

D5. NOTICES

D5.1 Notwithstanding C21.3, all notices of appeal to the Chief Administrative Officer shall be sent to the attention of the Chief Financial Officer at the following facsimile number:

The City of Winnipeg

Chief Financial Officer

Facsimile No.: 204-949-1174

D5.2 **Bid Submissions must not be submitted to this facsimile number. Bids must be submitted in accordance with B7.**

SUBMISSIONS

D6. AUTHORITY TO CARRY ON BUSINESS

D6.1 The Contractor shall be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba, or if the Contractor does not carry on business in Manitoba, in the jurisdiction where the Contractor does carry on business, throughout the term of the Contract, and shall provide the Contract Administrator with evidence thereof upon request.

D7. INSURANCE

D7.1 The Contractor shall provide and maintain the following insurance coverage:

- (a) commercial general liability insurance, in the amount of at least two million dollars (\$2,000,000.00) inclusive, with The City of Winnipeg added as an additional insured; such liability policy to also contain a cross-liability clause, non-owned automobile liability and products and completed operations cover, to remain in place at all times during the performance of the Work;
- (b) if applicable, Automobile Liability Insurance covering all motor vehicles, owned and operated and used or to be used by the Contractor directly or indirectly in the performance of the Work. The Limit of Liability shall not be less than \$2,000,000 inclusive for loss or damage including personal injuries and death resulting from any one accident or occurrence.

D7.2 Deductibles shall be borne by the Contractor.

D7.3 The Contractor shall provide the Contract Administrator with a certificate(s) of insurance, in a form satisfactory to the City Solicitor, at least two (2) Business Days prior to the commencement of any Work but in no event later than the date specified in C4 for the return of the executed Contract.

D7.4 The Contractor shall not cancel, materially alter, or cause the policy to lapse without providing at least thirty (30) Calendar Days prior written notice to the Contract Administrator.

SCHEDULE OF WORK

D8. COMMENCEMENT

D8.1 The Contractor shall not commence any Work until he/she is in receipt of a notice of award from the City authorizing the commencement of the Work.

D8.2 The Contractor shall not commence any Work until:

- (a) the Contract Administrator has confirmed receipt and approval of:
 - (i) evidence of authority to carry on business specified in D6;
 - (ii) evidence of the workers compensation coverage specified in C6.16;
 - (iii) evidence of the insurance specified in D7;
- (b) the Contractor has attended a meeting with the Contract Administrator, or the Contract Administrator has waived the requirement for a meeting.

D9. DELIVERY

D9.1 Goods shall be delivered within one hundred and twenty (120) Calendar Day(s) of the award of contract, f.o.b. destination, freight prepaid to:

311 Rose Ave Winnipeg City Storage Warehouse The Contractor shall confirm each delivery with the Contract Administrator or his/her designate, at least two (2) Business Days before delivery.

D9.3 Goods shall be delivered between 8:30 a.m. and 4:30 p.m. on Business Days.

D9.4 The Contractor shall off-load goods as directed at the delivery location.

D10. LIQUIDATED DAMAGES

D10.1 If the Contractor fails to achieve delivery of the goods within the time specified in D9.1 Delivery the Contractor shall pay the City one hundred dollars (\$100.00) per Calendar Day for each and every Calendar Day until the goods have been delivered.

D10.2 The amount specified for liquidated damages in D10.1 is based on a genuine pre-estimate of the City's damages in the event that the Contractor does not achieve Delivery by the day fixed herein for same.

D10.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

MEASUREMENT AND PAYMENT

D11. INVOICES

D11.1 Further to C10, the Contractor shall submit an invoice for each order delivered to:

The City of Winnipeg
Corporate Finance - Accounts Payable
4th Floor, Administration Building, 510 Main Street
Winnipeg MB R3B 1B9

Facsimile No.: 204-949-0864

Email: CityWpgAP@winnipeg.ca

D11.2 Invoices must clearly indicate, as a minimum:

- (a) the City's purchase order number;
- (b) date of delivery;
- (c) delivery address;
- (d) type and quantity of goods delivered;
- (e) the amount payable with GST, MRST, and any applicable environmental handling charges/fees identified and shown as separate amounts; and
- (f) the Contractor's GST registration number.

D11.3 The City will bear no responsibility for delays in approval of invoices which are improperly submitted.

D11.4 **Bid Submissions must not be submitted to the above facsimile number. Bids must be submitted in accordance with B7.**

D12. PAYMENT

D12.1 Further to C10, the City may at its option pay the Contractor by direct deposit to the Contractor's banking institution.

D13. PAYMENT SCHEDULE

D13.1 Further to C10, payment shall be in Canadian funds net thirty (30) Calendar Days after receipt and approval of the Contractor's invoice.

WARRANTY

D14. WARRANTY

D14.1 Warranty is as stated in C11.

D14.1 Notwithstanding C11.2, the warranty period shall begin on the date of Total Performance and shall expire one (1) year thereafter, except where longer warranty periods are specified in the respective Specification sections, unless extended pursuant to C11.2 to C11.3, in which case it shall expire when provided for thereunder.

D14.1.1 For the purpose of Performance Security, the warranty period shall be one (1) year.

D14.2 Notwithstanding C11.2, the Contract Administrator may permit the warranty period for a portion or portions of the Work to begin prior to the date of Total Performance if a portion of the Work cannot be completed because of unseasonable weather or other conditions reasonably beyond the control of the Contractor but that portion does not prevent the balance of the Work from being put to its intended use.

D14.2.1 In such case, the date specified by the Contract Administrator for the warranty period to begin shall be substituted for the date specified in C11.2 for the warranty period to begin.

PART E - SPECIFICATIONS

GENERAL

E1. APPLICABLE SPECIFICATIONS AND DRAWINGS

- E1.1 These Specifications shall apply to the Work.
- E1.2 Bidders are reminded that requests for approval of substitutes as an approved equal or an approved alternative shall be made in accordance with B6.

E2. GOODS

- E2.1 The Contractor shall supply and deliver mechanical HVAC equipment in accordance with the requirements hereinafter specified.
- E2.2 Item No. 1 – shall be Exhaust Fan Unit EF-7N-1R.
- E2.3 Item No. 2 – Warranty Extension shall be a separate price for an additional one year extended warranty above the standard 12 month warranty on all parts i.e. (a total of 24 months from the shipping date on all parts).
- E2.4 Item No. 3 – Equipment Off-Loading shall be a separate price to off-load the new equipment upon arrival at site. The Contractor shall coordinate with the Contract Administrator prior to shipping to confirm final delivery details.
- E2.5 Item No. 4 – shall be Air Handling Unit AHU-31.
- E2.6 Item No. 5 – Warranty Extension shall be a separate price for an additional one year extended warranty above the standard 12 month warranty on all parts i.e. (a total of 24 months from the shipping date on all parts)..
- E2.7 Item No. 6 – Equipment Off-Loading shall be a separate price to off-load the new equipment upon arrival at site. The Contractor shall coordinate with the Contract Administrator prior to shipping to confirm final delivery details.
- E2.8 The Contractor shall submit shop drawings to the Contract Administrator for review prior to ordering new equipment. Shop drawings shall include the following at a minimum:
 - (a) Provide dimensional drawings and all relevant equipment product data including but not limited to the following; unit dimensions, weight loading, required clearances, construction details, field connection details, sound data, ratings, filter media, filter performance data, fan performance, finishes of materials, electrical characteristics and connection requirements and installation instructions.
 - (b) Provide fan curves for each fan at the specified operation point with the flow, static pressure and horsepower clearly plotted.
 - (c) All sections, drawing plans, specifications and contract documents. See Appendix for approved Contractor submittal shop drawings.

E3. EXHAUST FAN UNIT EF-7N-1R

- E3.1 These Specifications shall apply to the Work.
- E3.2 PART 1 – GENERAL
 - (a) Equipment Delivery Schedule
 - (i) The equipment delivery date of the new high plume variable volume laboratory exhaust fan shall be no longer than 12 weeks after the equipment purchase date.

Contractor shall indicate if there are any available options for express shipping and the associated additional costs for each option provided.

(b) References

- (i) ANSI/AMCA Standard 99-10, "Standards Handbook"
- (ii) ANSI/AMCA Standard 204-05, "Balance Quality and Vibration Levels for Fans"
- (iii) ANSI/AMCA Standard 210-07, "Laboratory Methods of Testing Fans for Aerodynamic Performance Rating"
- (iv) AMCA Publication 211-05, "Certified Ratings Program - Product Rating Manual for Fan Air Performance"
- (v) ANSI/AMCA Standard 300-08, "Reverberant Room Method for Sound Testing of Fans"
- (vi) AMCA Publication 311-05, "Certified Ratings Program – Product Rating Manual for Fan Sound Performance"
- (vii) AMBA Method of Evaluating Load Ratings of Bearings ANSI-11 (r1999)
- (viii) ANSI/AMCA Standard 500-D-12, "Laboratory Methods of Testing Dampers for Rating"
- (ix) ANSI/AMCA Standard 500-L-12, "Laboratory Methods of Testing Louvers for Rating"
- (x) SMACNA - Medium Pressure Plenum Construction Standard
- (xi) ANSI/AIHA Z9.5-2012 – Laboratory Ventilation
- (xii) ASHRAE - Laboratory Design Guide
- (xiii) OSHA guideline 1910.212 – General requirements for Machine Guarding. (www.osha.gov)
- (xiv) OSHA guideline 1910.219 – General requirements for guarding safe use of mechanical power transmission apparatus. (www.osha.gov)
- (xv) OSHA guideline 1926.300 – General requirements for safe operation and maintenance of hand and power tools. (www.osha.gov)
- (xvi) UL Standard 705, "Power Ventilators"

(c) Quality Assurance

- (i) Performance ratings: Conform to ANSI/AMCA Standards 210 and 300. Fans must be tested in accordance with AMCA Publications 211 and 311 in an AMCA accredited laboratory and certified for air and sound performance. Fans shall be licensed to bear the AMCA ratings seal for air performance (AMCA 210) and sound performance (AMCA 300). Manufacturers that are not licensed to bear the AMCA 210 ratings seal, must provide performance witness testing (at the manufacturer's expense), per paragraph 1.4.D.
- (ii) Classification for Spark Resistant Construction shall conform to ANSI/AMCA Standard 99.
- (iii) Each fan shall be vibration tested before shipping, as an assembly, in accordance with ANSI/AMCA Standard 204. Each assembled fan shall be test run at the factory at the specified fan RPM and vibration signatures shall be taken on each bearing in three planes - horizontal, vertical, and axial. The maximum allowable fan vibration shall be less than 0.10 in. /sec peak velocity; filter-in reading as measured at the fan RPM. This report shall be provided at no charge to the customer upon request.
- (iv) Manufacturers that do not comply with paragraph 1.4.A must also provide, at the City and Contract Administrator's option and manufacturer's expense, witness testing of fan discharge airflow, performed in an AMCA accredited laboratory, in accordance with AMCA 210. This test shall verify the critical and safety related performance of the high plume blower, as stated by the manufacturer.

(d) Submittals

- (i) Provide dimensional drawings and product data on each high-plume laboratory exhaust fan assembly.
- (ii) Provide fan curves for each fan at the specified operation point with the flow, static pressure and horsepower clearly plotted.

- (iii) Provide nozzle velocity of exhaust fan, total exhaust flow, and discharge plume rise at specified wind velocity.
- (iv) Strictly adhere to QUALITY ASSURANCE requirements as stated in section 1.4 of this specification.
- (e) Delivery, Storage, and Handling
 - (i) Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer, material, products included, and location of installation.
 - (ii) Store materials in a dry area indoor, protected from damage, and in accordance with manufacturer's instructions. For long term storage, follow manufacturer's Installation, Operation and Maintenance manual.
 - (iii) Handle and lift fans in accordance with the manufacturer's instructions. Protect materials and finishes during handling and installation to prevent damage. Follow all safety warnings posted by the manufacturer.
- (f) Warranty
 - (i) Submit, for Contract Administrator's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights the City may have under Contract Documents.
 - (ii) The warranty of this equipment is to be free from defects in material and workmanship for a period of 12 months from the shipping date on all parts. Any units or parts which prove defective during the warranty period will be replaced at the manufacturers' option when returned to the manufacturer, transportation prepaid.
 - (iii) Motor Warranty is warranted by the motor manufacturer for a period of one year. Should motors furnished prove defective during this period, they should be returned to the nearest authorized motor service station.

E3.3 PART 2 – EQUIPMENT

- (a) General
 - (i) Base fan performance at standard conditions (density 0.075 Lb. /ft³).
 - (ii) Each fan to be equipped with 316 stainless steel lifting lugs for corrosion resistance.
 - (iii) Fasteners exposed to corrosive exhaust shall be stainless steel.
 - (iv) Curb cap shall be hot rolled steel coated with corrosion resistant coating.
 - (v) Fan assemblies that use flexible connectors that can fail and cause loss of laboratory containment shall not be acceptable.
 - (vi) Fan assembly shall be designed for a minimum of 125 mph wind loading, without the use of guy wires.
 - (vii) Equipment manufacturer data plate shall include all relevant fan information and include the new equipment tag identification indicated for easy identification.
- (b) Corrosion Resistant Coating
 - (i) All fan and system components (fan, nozzle and plenum) shall be corrosion resistant coated with LabCoat™, a two part electrostatically applied and baked, sustainable, corrosion resistant coating system. Standard finish color to be RAL 7023, concrete grey.
 - (ii) All parts shall be cleaned and chemically prepared for coating using a multi-stage wash system which includes acid pickling that removes oxide, increases surface area, and improves coating bond to the substrate.
 - (iii) The first powder coat applied over the prepared surface shall be a zinc rich epoxy primer (no less than 70% zinc) and heated to a gelatinous consistency (partial cure) at which the second powder coat of polyester resin shall be electrostatically applied and simultaneously be cured at a uniform temperature of 400°F.
 - (iv) The coating system, a total thickness of up to 6 mils, is not affected by the UV component of sunlight (does not chalk), and has superior corrosion resistance to

- acid, alkali, and solvents. Coating system shall exceed 4000 hour ASTM B117 Salt Spray Resistance.
- (v) Note that 10-20 mil thick wet coating systems pollute the environment (air and water), and that these manually applied coatings are not uniform over the impeller surface and can cause fan imbalance and vibration.
- (c) Fan Housing and Outlet
- (i) Fan housing to be aerodynamically designed with high-efficiency inlet, engineered to reduce incoming air turbulence.
 - (ii) Fan housing shall be bifurcated, allowing all drive components, including the motor, to be serviced without contact of the contaminated airstream. Must be manufactured of welded steel and meet specification section 2.15 for corrosion resistant coating. No uncoated metal fan parts will be acceptable.
 - (iii) Fan housings that are fabricated of polypropylene or fiberglass that have lower mechanical properties than steel, have rough interior surfaces in which corrosive, hazardous compounds can collect, and / or which chalk and structurally degrade due to the UV component of the sunlight shall not be acceptable.
 - (iv) A high velocity discharge nozzle shall be supplied by the fan manufacturer designed to efficiently handle an outlet velocity of up to 7000 FPM. Discharge stack caps or hinged covers, impeding exhaust flow shall not be permitted.
 - (v) An integral fan housing drain shall be used to drain rainwater when the fan is de-energized.
 - (vi) A bolted & gasketed access door shall be supplied for impeller inspection and service.
 - (vii) Fan assembly shall be AMCA type C spark resistant construction minimum or as noted on the schedule.
- (d) Variable Nozzle
- (i) Factory assembled fan discharge nozzle with variable discharge area capable of maintaining constant discharge velocity at variable fan volumes.
 - (ii) Nozzle housing and adjustable blade to be heavy gauge steel construction. Variable nozzle coating shall meet specification section 2.15 for corrosion resistant coating in the Laboratory Exhaust Fan specification.
 - (iii) Moveable discharge blade to include adjustable blade seals between the blade body and nozzle housing.
 - (iv) The adjustable discharge blade pivot points shall utilize sealed bearings that are located outside of the airstream.
 - (v) The nozzle assembly to include a factory supplied and mounted modulating electrical actuator to adjust nozzle discharge area. Actuator to be enclosed within a weatherproof cover.
 - (vi) Modulating electric actuator is 24V.
- (e) Fan Housing and Bypass Plenum
- (i) Exhaust fan inlet venturi to include factory supplied, non-invasive flow monitoring system with differential pressure transducer.
 - (ii) Exhaust fan and bypass plenum assembly to include isolation damper with airfoil blades. Isolation damper to use a 24V, two-position actuator.
 - (iii) Bypass plenum to include a bypass damper with modulating actuator controlled by building management system.
- (f) Electrical Controls
- (i) Fan manufacturer to include integral nozzle controls.
 - (ii) Fan motor to include shaft grounding protection device to eliminate induced bearing currents.
 - (iii) Serial communication with building management system and/or bypass damper controller to be: BACnet MS/TP EIA 485 (standard communication), analog VDC signal (standard communication)

- (iv) Sequence of operation for the variable nozzle system to be coordinated with the fan manufacturer and system controls provider.
- (g) Fan Impeller
 - (i) Fan impeller shall be mixed flow design with non-stall characteristics. The impeller shall be electronically balanced both statically and dynamically exceeding AMCA Standards.
 - (ii) Fan impeller shall be manufactured of welded and coated steel. Reference specification section 2.15 for corrosion resistant coating.
 - (iii) Fan impellers that are fabricated of polypropylene or fiberglass that have lower mechanical properties than steel, and lower maximum tip speeds are not acceptable.
 - (iv) Vacuum Seal: Fan impeller shall include a secondary fan blade located on the impeller back plate. This secondary impeller shall create a negative pressure at the shaft opening; preventing hazardous or toxic exhaust fumes from escaping through the housing shaft opening. Mechanical shaft seals that wear out and need to be replaced or seal systems that use hoses or tubes that can leak, are not acceptable.
- (h) Bypass Air Plenum
 - (i) For variable volume systems, a bypass air plenum shall be provided as shown on drawings. The plenum shall be provided with bypass air damper for introducing outside air at roof level upstream of the fan, complete with bypass air weatherhood and bird screen.
 - (ii) The plenum shall be constructed of welded and coated steel and meet specification section 2.2 for corrosion resistant coating. Plenums that are fabricated of plastics or resins that are combustible and have mechanical properties less than steel shall not be acceptable.
 - (iii) Fan designs that use inlet flexible connectors that can leak causing loss of lab exhaust shall not be permitted.
 - (iv) Bypass air damper(s) shall be opposed-blade design for airflow control, airfoil design, fabricated of galvanized steel for structural rigidity as standard. Bypass damper(s) shall have plated steel damper rods, stainless steel sleeved bearings, 304 stainless steel jamb seals and the blades shall have polymer edge seals. Damper model shall be equal to or exceed a heavy duty control damper, Greenheck HCD-130. Damper blade drive linkage shall be set by manufacturer and welded to eliminate linkage slippage. All damper access and service (drive actuators) shall be performed outside of the contaminated airstream.
 - (v) If stated in the schedule notes, an optional, integral bypass air packed acoustic attenuator fabricated of galvanized steel shall be provided by the fan manufacturer (if shown on the drawings).
 - (vi) Fan isolation damper, shall be parallel-blade design, airfoil design, fabricated of steel for structural rigidity as standard. Damper shall be coated up to 4 mils of chemically resistant Hi-Pro Polyester resin, electrostatically applied and baked. Isolation damper(s) shall have plated steel damper rods (if specified as 304 stainless steel damper, stainless steel damper rods will be provided), stainless steel sleeved bearings, 304 stainless steel jamb seals and the blades shall have polymer edge seals. Damper model shall be equal to or exceed a heavy duty control damper, Greenheck HCD-130. Damper blade drive linkage shall be set by manufacturer and welded to eliminate linkage slippage. All damper access and service (drive actuators) shall be performed outside of the contaminated airstream.
 - (vii) Isolation damper actuator, if scheduled shall be factory mounted and shall be wired to a step-down transformer. Actuator and transformer are located in a weatherproof enclosure.
 - (viii) Blower / Plenum vibration isolation shall be limited to neoprene / cork vibration pads.
- (i) Fan Motor and Drive
 - (i) Motors shall be premium efficiency, standard NEMA frame, 1800 or 3600 RPM, TEFC with a 1.15 service factor. A factory-mounted NEMA 3R disconnect switch shall be provided for each fan.

- (ii) Motor maintenance shall be accomplished without fan or fan impeller removal, or requiring maintenance personnel to access the contaminated exhaust components.
- (iii) Motor mounting shall be foot mount.
- (iv) Drive arrangement shall be AMCA arrangement 9. Non-bifurcated belt drive arrangement 9 or direct drive arrangement 4 requiring access and handling of hazardous and contaminated fan components are not acceptable.
- (v) Fan shaft to be turned and polished of 1040 steel material as standard, coated with corrosion resistant coating.
- (vi) Fan shaft bearing shall be Air Handling Quality, ball or roller pillow block type, and sized for an L-10 life of no less than 200,000 hours.
- (vii) All shaft bearings and non-permanently lubricated motors shall have nylon extended lube lines with zerk fittings.
- (viii) Motor, coupling, and bearing shall all be outside the contaminated exhaust, and be capable of replacement without disassembling fan and accessing hazardous and contaminated fan components.
- (ix) Fan motor to include shaft grounding protection device to eliminate induced bearing currents.

E3.4 PART 3 - PERFORMANCE:

- (a) The new laboratory exhaust fan EF-7N-1R shall meet the following performance characteristics:

| Design Conditions | |
|------------------------------|--------|
| Number of Systems | 1 |
| Fans per system | 1 |
| Fans on Standby | No |
| Max Lab Exhaust Volume (CFM) | 13,000 |
| Min Lab Exhaust Volume (CFM) | 2,000 |
| Outlet Velocity | 4,000 |
| Wind Speed (MPH) | 10.0 |

| Fan Selection Criteria | |
|------------------------------------|--------|
| Full Operating Volume (CFM) | 13,000 |
| Min. Op. Volume (CFM) | 5,584 |
| Bypass Air at Min (CFM) | 3,584 |
| External Static Pressure (in. w.g) | 4 |
| Internal Static Pressure (in. w.g) | 0.15 |
| Total Static Pressure (in. w.g) | 4.15 |
| Air Stream Temp (F) | 70 |
| Elevation (ft) | 784 |
| Drive Loss (%) | 3.4 |

| Fan Performance | |
|----------------------------|-------|
| Full Operating Fan RPM | 2012 |
| Full Operating Power (BHP) | 17.02 |
| Min Operating Fan RPM | 1479 |
| Min Operating Power (BHP) | 7.46 |
| Max Fan RPM | 2300 |
| Min Operating Frequency | 44 |

| Discharge Performance | |
|--|---------------|
| Full Operating Efficiency Plume Height (ft.) | 43 |
| Min. Operating Efficiency Plume Height (ft.) | 34 |
| Nozzle Turn Down % | 57 |
| Calculation Method | Momentum Flux |

| Fan Construction | |
|-------------------------|---------|
| Material Type | Spark C |
| Drive Type | Belt |
| Arrangement | 9 |

| Plenum Configuration | |
|-----------------------------|--------|
| Bypass Air Plenum | Yes |
| Plenum Arrangement | Inline |

| Motor Specifications | |
|-----------------------------|------------|
| Motor Size (HP) | 25 |
| RPM | 1725 |
| Voltage/Frequency/Phase | 575/60/3 |
| Motor Duty | Industrial |
| Motor Design | NEMA |

| | |
|----------------------|----------|
| Insulation Class | F |
| Motor Frame Size | 284T |
| VFD Rated | Yes |
| CSA Motor | Yes |
| Shaft Grounding | Yes |
| Drives | Multiple |
| Drive Service Factor | 2 |

| Weights | |
|--------------------------|-------|
| Fan (LMD) (lb) | 1,143 |
| Motor/Drive (lb) | 428 |
| Accessories (lb) | 1,261 |
| Total System Weight (lb) | 2,832 |

- (b) The new laboratory exhaust fan shall be provided with the following options and accessories:
- (i) NEMA Premium Efficient Motor – Meeting NEMA Table 12-12
 - (ii) Motor VFD Rated with Shaft Grounding Protection
 - (iii) Motor with CSA Approval
 - (iv) Motor with Class F or Greater Insulation
 - (v) Motor Duty- Industrial
 - (vi) Motor with greaseable bearings
 - (vii) Bypass Air Plenum – Double Wall, Steel, Bottom Exhaust Intake Coated with LabCoat, Concrete Gray-RAL 7023, Entire Unit
 - (viii) Switch – NEMA-3R, Toggle, Suitable for Indoor or Outdoor Use, Mounted and Wired
 - (ix) UL/cUL-705 – “Power Ventilators”
 - (x) Shaft Material – Turned and Polished 316 Stainless Steel
 - (xi) Fan Panel Material – Coated Steel
 - (xii) Bypass Damper – HCD-130-LE, Galvaneal, Coated, 20”x20” (QTY: 1)
 - (xiii) Bypass Damper Actuator – Electric, Modulating, w/o Transformer, 24 VAC, Belimo Model: AFB24-MFT (QTY: 1)
 - (xiv) Isolation Damper – HCD-130-LE, 304 Stainless Steel, Coated, 42”x40”, Parallel Blades, mounted in BAP, one per fan
 - (xv) Isolation Damper Act. – Electric, 24 VAC, 2 pos., SR, w/End Switch, w/Transformer, Belimo Model: AFBUP-S (QTY: 1)
 - (xvi) Sure-Aire Flow Station (with transducer), 24VAC/24VDC, (QTY: 1)
 - (xvii) Factory Vibration Test, 0.10 in/sec, peak, filter-in as measured at the fan RPM
 - (xviii) Extruded Lube Lines – Nylon
 - (xix) Motor Cover – with Hinged Removable Access Panel
 - (xx) Weatherhood over bypass damper with inlet screen
 - (xxi) Nozzle Controller
 - (xxii) Unit Warranty: 1 Year (Standard)
- (c) Sure-Aire Flow Monitoring selected shall include the following:
- (i) Flow monitoring station shall monitor the pressure difference between the fan inlet and the smallest diameter of the inlet cone.
 - (ii) Volumetric flow to be calculated from empirically derived formulas based on testing by the fan manufacturer.
 - (iii) Flow monitoring station shall not use air restricting flow devices that reduce fan performance or create additional fan sound.

- (iv) Four (4) equidistantly spaced sensor orifices to be drilled in the smallest diameter of the inlet cone venturi. Flow tubes from each venturi sensor shall be extended to a termination plate mounted on the fan housing.
- (v) High-pressure flow port(s) shall be mounted in low velocity fan inlet. Flow ports from the high-pressure sensor shall extend to a termination plate mounted on the fan housing.
- (vi) Termination plate shall include a low-pressure connection, a high-pressure connection and a listing of the empirically determined flow rate coefficient.
- (vii) Flow monitoring station shall accurately measure the pressure differential to within +/- 3%.
- (viii) Flow monitoring station to be installed by the fan manufacturer as part of the standard fan assembly.
- (ix) Flow monitoring station to be supplied with electronics package that includes pressure transmitter and LCD digital readout.

E3.5 PART 4 - ACCEPTABLE MANUFACTURERS

- (a) Greenheck Model Vektor-MS-24-9-70, Belt Drive High Plume Blower or Approved Equal.

E4. AIR HANDLING UNIT AHU-31

E4.1 These Specifications shall apply to the Work.

E4.2 PART 1 – GENERAL

(a) Equipment Delivery Schedule

- (i) The equipment delivery date of the new air handling unit shall be no longer than 6 weeks after the equipment purchase date. Contractor shall indicate if there are any available options for express shipping and the associated additional costs for each option provided.

(b) References

- (i) AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
- (ii) AMCA 99 - Standards Handbook.
- (iii) AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes.
- (iv) AMCA 300 - Test Code for Sound Rating Air Moving Devices.
- (v) AMCA 500 - Test Methods for Louver, Dampers, and Shutters.
- (vi) AHRI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils.
- (vii) AHRI 430 - Central-Station Air-Handling Units.
- (viii) AHRI 435 - Application of Central-Station Air-Handling Units.
- (ix) ASTM B117 - Standard Practice for Operating Salt Spray Apparatus.
- (x) NEMA MG1 - Motors and Generators.
- (xi) NFPA 70 - National Electrical Code.
- (xii) SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- (xiii) UL 723 - Test for Surface Burning Characteristics of Building Materials.
- (xiv) UL 900 - Test Performance of Air Filter Units.
- (xv) UL 1995 - Standard for Heating and Cooling Equipment.
- (xvi) UL 94 - Test for Flammability of Plastic Materials for Parts in Devices and Appliances.
- (xvii) IBC 2000, 2003 - International Building Code.
- (xviii) NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.
- (xix) NFPA 5000 - Building Construction and Safety Code.
- (xx) ASHRAE 90.1 Energy Code.

- (xxi) AHRI Standard 1060 - Rating Air-to-Air Heat Exchangers for Energy Recovery Ventilation Equipment.
- (xxii) GSA 2003 Facilities Standard - 5.9 HVAC Systems and Components.
- (c) Qualifications
 - (i) Manufacturer: Company specializing in manufacturing Air Handler products specified in this section must show a minimum five years documented experience and complete catalog data on total product.
- (d) Safety Agency Listed & Certification
 - (i) Air Handling units shall be cETLus safety listed to conform with UL Standard 1995 and CAN/CSA Standard C22.2 No. 236.
 - (ii) Air handler furnished with double width, double inlet (DWDI) fans and/or plenum fans where applicable, shall be certified in accordance with the central station air handling units certification program, which is based on AHRI Standard 430. (NOTE: Above does not apply to fan array)
 - (iii) Air handling unit water heating & cooling coils shall be certified in accordance with the forced circulation air cooling and air heating coils certification program, which is based on AHRI Standard 410.
- (e) Delivery, Storage, and Handling
 - (i) Deliver, store, protect and handle products to site.
 - (ii) Accept products on site on factory-furnished shipping skids. Inspect for damage.
 - (iii) Store in clean dry place and protect from construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.
- (f) Warranty
 - (i) Submit, for Contract Administrator's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights the City may have under Contract Documents.
 - (ii) The warranty of this equipment is to be free from defects in material and workmanship for a period of 12 months from the purchase date on all parts. Any units or parts which prove defective during the warranty period will be replaced at the manufacturers' option when returned to the manufacturer, transportation prepaid.

E4.3 PART 2 – EQUIPMENT

- (a) General
 - (i) Configuration: Unit shall be an inline horizontal unit. The end of the unit shall have a mixing box with top (vertical) outdoor air and end (horizontal) return air. Supply air ductwork connection shall be (horizontal). Access panels shall be on the left hand side when looking at the unit from the rear end (mixing box section).
 - (ii) Performance: Conform to AHRI 430. See unit schedule in part 4.
 - (iii) Acoustics: Sound power levels (dB) for the unit shall not exceed the specified levels shown on the unit schedule. The manufacturer shall provide the necessary sound treatment to meet these levels if required.
 - (iv) Equipment manufacturer data plate shall include all relevant fan information and include the new equipment tag identification indicated for easy identification.
- (b) Unit Construction
 - (i) Fabricate unit with heavy gauge channel posts and panels secured with mechanical fasteners. All panels, access doors, and ship sections shall be sealed with permanently applied bulb-type gasket. Shipped loose gasketing is not allowed.
 - (ii) Panels and access doors shall be constructed as a 2-inch nominal thick; thermal broke double wall assembly, injected with foam insulation with an R-value of not less than R-13.
 - (iii) The inner liner shall be constructed of G90 galvanized steel.

- (iv) The outer panel shall be constructed of G90 galvanized steel.
 - (v) The floor plate shall be constructed as specified for the inner liner.
 - (vi) Unit will be furnished with solid inner liners.
 - (vii) Panel deflection shall not exceed L/240 ratio at 125% of design static pressure, maximum 5 inches of positive or 6 inches of negative static pressure. Deflection shall be measured at the panel midpoint.
 - (viii) The casing leakage rate shall not exceed .5 cfm per square foot of cabinet area at 5 inches of positive static pressure or 6 inches of negative static pressure (.0025 m3/s per square meter of cabinet area at 1.24 kPa static pressure).
 - (ix) Module to module field assembly shall be accomplished with an overlapping, full perimeter internal splice joint that is sealed with bulb type gasketing on both mating modules to minimize on-site labor and meet indoor air quality standards.
 - (x) Access doors shall be flush mounted to cabinetry, with minimum of two six inch long stainless steel piano-type hinges, latch and full size handle assembly. Access doors shall swing outward for unit sections under negative pressure. Access doors on positive pressure sections, shall have a secondary latch to relieve pressure and prevent injury upon access.
 - (xi) A 4-inch formed G60 galvanized steel base rail shall be provided by the unit manufacturer for structural rigidity and condensate trapping. The base rail shall be constructed with 12-gauge nominal for unit sizes 003 - 035 and 10-gauge nominal for unit sizes 040 - 090. The following calculation shall determine the required height of the baserail to allow for adequate drainage. Use the largest pressure to determine base rail height. $[(\text{Negative})(\text{Positive}) \text{ static pressure (in)}] (2) + 4" = \text{required baserail height}$. Should the unit baserail not be factory supplied at this height, the contractor is required to supply a concrete housekeeping pad to make up the difference.
 - (xii) Construct drain pans from stainless steel with cross break and double sloping pitch to drain connection. Provide drain pans under cooling coil section. Drain connection centerline shall be a minimum of 3" above the base rail to aid in proper condensate trapping. Drain connections that protrude from the base rail are not acceptable. There must be a full 2" thickness of insulation under drain pan.
- (c) Fan Assemblies
- (i) Acceptable fan assembly shall be a double width, double inlet, class II, belt-drive type housed airfoil fan dynamically balanced as an assembly, as shown in schedule. Maximum fan RPM shall be below first critical fan speed. Fan assemblies shall be dynamically balanced by the manufacturer on all three planes and at all bearing supports. Copper lubrication lines shall be provided and extend from the bearings and attached with grease fittings to the fan base assembly near access door. If not supplied at the factory, contractor shall mount copper lube lines in the field. Fan and motor shall be mounted internally on a steel base. Provide access to motor, drive, and bearings through hinged access door.
 - (ii) Fan and motor shall be mounted internally on a steel base. Factory mount motor on slide base that can be slid out the side of the unit if removal is required. Provide access to motor, drive, and bearings through hinged access door. Fan and motor assembly shall be mounted on 2" deflection spring vibration type isolators inside cabinetry.
- (d) Bearings, Shafts, and Drives
- (i) Bearings: Basic load rating computed in accordance with AFBMA - ANSI Standards. The bearings shall be designed for service with an L-50 life of 200,000 hours and shall be a heavy duty pillow block, self-aligning, grease-lubricated ball or spherical roller bearing type.
 - (ii) Shafts shall be solid, hot rolled steel, ground and polished, keyed to shaft, and protectively coated with lubricating oil. Hollow shafts are not acceptable.
 - (iii) V-Belt drives shall be cast iron or steel sheaves, dynamically balanced, bored to fit shafts and keyed. Fixed sheaves, matched belts, and drive rated based on motor horsepower. Minimum of 2 belts shall be provided on all fans with 10 HP motors

and above. Standard drive service factor minimum shall be 1.1 S.F. for 1/4 HP – 7.5 HP, 1.3 S.F. for 10 HP and larger, calculated based on fan brake horsepower.

- (e) Electrical
 - (i) Fan motors shall be manufacturer provided and installed, Open Drip Proof, premium efficiency (meets or exceeds EPAct requirements), 1750 RPM, single speed, 575V / 60HZ / 3P. Complete electrical characteristics for each fan motor shall be as shown in schedule.
 - (ii) The air handler(s) shall be ETL and ETL-Canada listed by Intertek Testing Services, Inc. Units shall conform to bi-national standard ANSI/UL Standard 1995/CSA Standard C22.2 No. 236.
 - (iii) Wiring Termination: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclosed terminal lugs in terminal box sized to NFPA 70.
 - (iv) Manufacturer shall provide ASHRAE 90.1 Energy Efficiency equation details for individual equipment to assist Building Engineer for calculating system compliance.
 - (v) Installing contractor shall provide GFI receptacle within 25 feet of unit to satisfy National Electrical Code requirements.
 - (vi) All electrical connection components shall be field provided and mounted as shown on project schedule.
- (f) Cooling Coils
 - (i) Provide cooling coil cavity in new air handling unit for future cooling coil.
 - (ii) Provide access to future coil for service and cleaning. Drain and vent connections shall be provided exterior to unit casing.
- (g) Electric Heating Coil Section
 - (i) Voltage, size KW, steps and control voltage shall be scheduled. Three phase heaters shall have balanced phases.
 - (ii) Heaters shall be UL Listed for zero clearance and shall meet all NEC requirements.
 - (iii) Open coil heating elements shall be 80% nickel and 20% chromium; steps shall be arranged to prevent stratification when operating at less than full capacity. Elements for draw-through air handling units shall be derated to 35 watts per square inch.
 - (iv) Element terminals shall be stainless steel; insulators and bracket bushings shall be nonporous ceramic and securely positioned. Terminals shall be machined crimped to elements.
 - (v) Frame should be constructed of heavy gauge galvanized steel with galvanized steel brackets, stiffening ribs and gussets spot welded to the frame.
 - (vi) Terminal box shall be spot welded construction with solid, hinged cover, totally enclosed, without louvers or grilles per the UL standard.
 - (vii) Airflow direction shall be scheduled. Heater control panel shall be located on same side of unit as drive on fan.
 - (viii) Safety devices: a disc-type automatic reset thermal cutout shall be furnished for primary over temperature protection. All safety devices shall be serviceable through the terminal box without removing the heater from the unit.
 - (ix) Wiring Diagrams: a unique wiring diagram shall be furnished for each heater. Diagram shall include recommended supply wire gauges per NEC and fuse sizes. Typical Wiring Diagrams are not acceptable.
 - (x) Built-in components shall include safety interlocking disconnect switch,
 - (xi) disconnecting break magnetic contactors, transformer with primary fusing per UL, pressure type airflow switch set at .05" WC, supplementary circuit fuses per NEC (one set fuses per 48 amp circuit) , and separate load and terminal blocks to accept conductors as shown on the electrical plan.
 - (xii) Provide SCR Proportional Controller. Signal type to be confirmed.
- (h) Filters

- (i) Furnish combination filter section with 2-inch pleated MERV 8 flat pre-filter with microbial resistant Intersept coating and 12-inch HEPA 99.97% efficient (MERV 17) final filter. Provide front loading and removal of filters.
 - (ii) Filter media shall be UL 900 listed, Class I or Class II.
 - (iii) Filter Magnehelic gauge(s) shall be furnished and mounted by equipment manufacturer.
- (i) Additional Sections
- (i) Access section shall be provided for access between components.
 - (ii) Mixing box section shall be provided with top outside air opening and end return air opening with parallel low leak airfoil damper blades. Dampers shall be hollow core galvanized steel airfoil blades, fully gasketed and have continuous vinyl seals between damper blades in a galvanized steel frame. Dampers shall have stainless steel jamb seals along end of dampers. Linkage and ABS plastic end caps shall be provided when return and outside air dampers sized for full airflow. Return and outside air dampers of different sizes must be driven separately. Damper Leakage: Leakage rate shall be less than two tenths of one percent leakage at 2 inches static pressure differential. Leakage rate tested in accordance with AMCA Standard 500. Acceptable product: Tamco Series 9000 or approved equal.

E4.4 PART 3 – PERFORMANCE

(a) The new air handling unit AHU-31 shall meet the following performance characteristics:

| Design Conditions | |
|---|------------------|
| Number of Air Handling Units | 1 |
| External Dimensions Height/Width/Length (in.)** | 46"x80"x168" |
| Total Unit Weight (lbs) | 3,261 |
| Fans per system | 1 |
| Fan Type | Centrifugal DWDI |
| Blade Type/Class | Airfoil/2 |
| Design Airflow (CFM) | 6,000 |
| External Static Pressure E.S.P (in. WC) | 1.0 |
| Outlet Velocity (ft/min) | 2,083 |
| Motor Power (HP) | 10 |
| Electrical (Voltage/Frequency/Phase) | 575/60/3 |
| Motor Speed (RPM) | 1750 |
| Motor Efficiency/Enclosure | Premium/ODP |
| Motor Full Load Current (Amps) | 10 |
| Motor location | To Side of Fan |
| Fan Break Horsepower (BHP) | 7.34 |
| Fan Operating Speed (RPM) | 3236 |
| Fan Max Operating Speed (RPM) | 3918 |
| Unit Sound Power Radiated at 63 Hz (dB) | 89 |
| Unit Discharge Sound power at 63 Hz (dB) | 99 |
| Unit Return Sound power at 63 Hz (dB) | 89 |

| Filter Section | |
|------------------------------|-----------------|
| Pre-Filter Type | Pleated |
| Pre-Filter Efficiency | MERV 8 |
| Secondary Filter Type | HEPA Bag Filter |
| Secondary Filter Efficiency | MERV 17 |
| Face Velocity (ft/min) | 429 |
| Face Area (ft ²) | 14 |
| Air Volume (CFM) | 6,000 |

| Electric Heating Coil Section | |
|--------------------------------------|-------------|
| Control Type | Vernier SCR |
| Voltage | 575 |
| Temperature Control | No |
| Control Signal (Voltage) | 0-10 |
| Pressure Drop (in W.C) | 0.04 |
| Heating Capacity (kW) | 50 |
| Delta T | 26.3 |

| Future Chilled Water Coil Section | |
|---|--|
| Cooling Coil | Space for future cooling coil (Not Supplied) |
| Coil Air Pressure Drop (in. WC) | 0.6 |
| Finned Height (in.) | 36 |
| Finned Width (in.) | 67 |
| Face Area (ft ²) | 16.75 |
| Face Velocity (ft/min) | 358 ft/min |
| Connection Material | Carbon Steel |
| Cavity dimensions for future cooling coil | 20" x 80" x 46" |

| | |
|-------------------------------|-----------------|
| Width x Length x Height (in.) | |
| Drain Pan Material | Stainless Steel |

- (b) The new air handling unit shall come complete with the required amount of splits for the unit to fit through a standard 36" wide door.

E4.5 Part 4 – Acceptable Manufacturers

- (a) Daikin Applied 'Vision' Air Handler or approved equal.