ST. CATHARINES PUBLIC LIBRARY

54 CHURCH STREET, ST. CATHARINES, ONTARIO L2R 7K2 **Tel. (905) 688-6103**
purchasing@myscpl.ca

REQUEST FOR TENDER

Central Library HVAC Equipment
RFT #21-06

Closing Date & Time:
December 20, 2021 at 10:00:00 A.M.

Sealed Tender Submissions are to be email to:
purchasing@myscpl.ca

For any additional information contact:
St. Catharines Public Library, 54 Church Street
St. Catharines, Ontario L2R 7K2
Email: purchasing@myscpl.ca

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1. Invitation

The St. Catharines Public Library (the 'Library') is inviting tenders for replacement of rooftop mechanical equipment. The purchase of five (5) rooftop multizone units has been arranged and the price will be carried by the successful bidder. Providing the remaining equipment and installing all equipment will be required.

Refer to Specifications and Bid Requirements for detailed information.

Sealed Tenders, on the attached Form of Tender, will be received by the Purchasing by email at purchasing@myscpl.ca **no later than 10:00:00 a.m. local time as determined by the clock of the Library server, December 20, 2021**. Tenders received after this time will remain unopened.

All documents submitted with respect to this Request for Tender (RFT) will be subjected to the Municipal Freedom of Information and Protection of Privacy Act, R.S.O. 1990, C. M56, as amended from time to time.

2. COVID 19

The Library recognizes that this solicitation is being released during uncertain times with respect to the Covid-19 pandemic. The Library seeks to maintain a competitive bidding environment by making clear how the Library assesses each procurement the Library issues based on criticality and nature of the project as well as by providing a clear delineation of responsibilities between respondents and the Library with respect to maintaining the health and safety of a respondent employees and subcontractors as well as residents who may be in the area where the work is being undertaken.

The Library requires that successful respondents be responsible, at respondent's expense, for the health and safety of its employees and sub-contractors and to the extent retained for the a construction project where the respondent is retained to be a constructor pursuant to the *Occupational Health and Safety Act* ("OSHA") to carry out all responsibilities attributed to a constructor pursuant to OHSA. The Library recognizes that the current Covid-19 pandemic and resulting government policies, decrees, by-laws and regulations at various levels (inclusive of Board of Health requirements) may affect the cost of safeguarding the health and safety of a contractors' employees and sub-contractors but considers it a known risk that must be accounted for by respondents when determining their bid price. Additional monies will not be paid by the Library with respect to health and safety measures imposed upon the respondent during the term of their engagement by the Library.

The Library notes that as part of the Province of Ontario's exercise of its emergency powers, the Province has been restricting the operations of certain businesses and/or types of activities. The rules change over time as the Province of Ontario evaluates the status of the community's efforts to stem the spread of Covid 19.

The Library and respondent, through respondent's submission, acknowledge and agree that each respondent must determine whether the respondent is able to apply on a particular project and further that because provincial and/or other binding governmental rules may change over time, whether the respondent, if successful, is able to continue to work on the project.

It is the respondent's responsibility to obtain all the information necessary to prepare an application in response to this procurement and to determine respondent's ability to comply with the Library's requirements while also complying with all current applicable laws. By submitting a tender, the

respondent agrees that it is relying on its own investigations and evaluation, and that of its own legal advisors and not upon statements or information provided by the Library.

The respondent, if chosen to enter into a contract with the *Library*, will have an ongoing obligation to ensure its compliance with all applicable laws including but not restricted to government regulations related to Covid 19.

3. Definitions

a) "Tender" means any bid, tender or proposal submitted by a Bidder pursuant to the Instruction to Bidders.
b) "Owner" The persons with whom the Contractor has entered into a contractual agreement with and for whom the services will be provided.
c) "Contractor" Means the person or corporation whose Tender has been accepted by the Owner and who is deemed to have entered into a Contract with the Owner. "Contract" is the agreement between the Owner and the Contractor as detailed in the Contract Documents.
d) "Contract Documents" include the General Condition, Instruction to Bidders, Form of Tender, Specifications, Details etc.
e) "Contract Price" is the total price the Owner has agreed to pay the Contractor under the Contract for the work included in the Contract Documents.
f) "Consultant" is a third party the Owner has hired to perform such services as required. May include contract administration, design, and preparation of specifications or quality assurance.
g) "Business day" means any day expect Saturday, Sunday or statutory holiday. "Completion" The contract shall be deemed to be completed and services or materials shall be deemed to be last supplied to the improvement when the price of completion, correction of known defect or last supply is not more than the lesser of, 1 percent of the contract price and $1000. (Construction Lien Act 1983)
h) "Base Bid Price" is the lump sum fixed price quoted on the Tender Submission form with is based on the Contract Documents and does not include any alternates or separate prices.
i) "Work" means everything the Contractor is required to supply in order to carry out the terms and conditions of the Contract and Contract Documents.

4. Bid Form

Tenders must be submitted on the attached Bid Form and emailed to purchasing@myscpl.ca.

The tender submission must be legible. Tenders containing changes, erasures, overwriting, white-outs, cross-outs, or strike-outs which are not initialed by the Bidder may not be accepted. The Form of Tender must contain a digital signature in the specified place by an authorized signing officer. No part of the Form of Tender included shall be altered or deleted.

All unit prices must be clearly indicated and all extensions written in figures. The bid must not be restricted by a statement added to the Form of Tender or by covering letter, or by alterations to the Form of Tender as supplied by the Library unless otherwise provided herein. Bidders will be allowed to attach descriptive literature with the sole purpose of amplifying the bid.

The Bid Form must be dated and properly signed in the spaces provided on the form, with the signature of the Bidder or responsible official of the firm bidding. Signatures on behalf of a non-

incorporated entity or by individuals shall be witnessed. If a joint bid is submitted, it must be signed and addressed on behalf of each of the Bidders.

5. Submission of Tenders

Submissions shall not be made by facsimile. Adjustment by e-mail, facsimile, letter or otherwise to a Tender already submitted shall not be accepted or considered. Bidders will be permitted to withdraw their Tender submission unopened after they have been deposited, if such requests are received in writing to the contact listed on the front page of this document prior to the time specified for the closing of Tenders.

More than one quote from an individual firm, partnership, corporation, or association under the same or different names will not be considered. Within a quote submission, Bidders may bid on one or more models providing they all meet or exceed the specifications.

Collusion between Bidders will be sufficient cause for rejection of all Tenders so affected.

6. Clarification, Omissions, Discrepancies

It will be the Bidder's responsibility to clarify any details in question with the contact listed on the front page of this document before submitting the quote. All official correspondence in regards to the specifications should be directed to and will be issued by the Business Administrator of the St. Catharines Public Library. The Library will assume no responsibility for oral instruction or suggestion.

7. Addenda / Addendum

The Library will not be responsible for any verbal (spoken) information from any Library staff or from any Consultant firms retained by the Library, or from any other person or persons who may have an interest in this bid opportunity. Adjustments or changes to this RFT prior to the closing date and time stated herein will be by written addendum(s) only and said addendum(s) will be issued by the Business Administrator of the St. Catharines Public Library. Addendums will be posted on the Library's web site http://www.myscpl.ca and on Biddingo.

It is the Bidder's sole responsibility to check this website often to be informed of any posted addendum. The Library makes no promise or guarantee that addendums will be delivered by any means to any Bidder.

By submitting a quote in response to this RFT, the Bidder acknowledges and agrees that addendums shall only be posted on the Library's website and it is the sole responsibility of the bidder to check this website for said addendums. Failure to include signed copies of the addenda with the submitted quote may result in a non-compliant quote.

8. Interpretation of Estimates

The quantities shown on the Form of Tender are estimates only and shall be used as a basis for calculation upon which the award of the contract will be made. These quantities are not guaranteed to be accurate and are furnished without any liability of the Library whether decreased or increased.

9. Errors and Corrections

Library staff may clarify any aspect of a Tender submission with the Bidder at any time after the Tender has been opened. Any such clarification will not alter the submitted Tender and will not be constituted as a negotiation or renegotiation of the quote. The Library is not required to clarify any

part of a Tender. Any clarification of a Tender by a Bidder shall not be effective until confirmation has been delivered in writing.

The Library may exercise its discretion to correct all mathematical errors evident on the face of the bid; however, unit prices will not be adjusted.

10. Pricing and Terms of Payment

All prices quoted must be in Canadian Funds, all appropriate taxes extra. The prices will include all costs related to the supply and delivery of the goods or services required, such as delivery, customs charges, brokerage fees, etc.

All prices quoted are to be net and to be firm for ninety (90) days after the closing of this quote. However, if Bidders are unable to quote firm prices, they must complete the applicable blanks on the Form of Tender stating the maximum percentage increase for each unit quoted. In this case, invoices must not exceed the total amount of the net price plus the maximum percentage increase.

11. Improper Bids

Bids which are incomplete, conditional, illegible or obscure, or that contain reservations, erasures, alterations or irregularities of any kind, may be rejected as improper. Bids that contain prices which appear to be so unbalanced as likely to affect adversely the interests of the Library, may be rejected.

The Library reserves the right to waive irregularities according to provisions in the Library's Procurement Policy.

12. Conflict of Interest

Bidders must disclose to the Library in their quote any potential conflict of interest, including any which may involve Library employees or Board members who may have a financial interest in a Bidder. If such conflict of interest does exist the Library may, at its discretion, refuse to consider the Tender.

13. Right of Library to Accept or Reject Tenders

The Library reserves the right to accept or reject any or all Tenders for any reason whatever; to award all or a portion of the products described herein to one or more Bidders; or to accept any Tenders if considered to be in the best interest of and for the best value to the St. Catharines Public Library. The lowest or any Quote will not necessarily be accepted. Criteria including best overall value, other than price alone may be considered when evaluating Tenders.

14. Award

The Library intends to award of the contract to the lowest compliant bid without negotiations. Tenders containing all required information will be evaluated on the following criteria.

Award of this Bid shall be as recommended by St. Catharines Public Library, and as approved by the Board (if applicable), and conveyed as a Purchase Order by Library to the successful Bidder or an executed agreement which has been signed by the Library and the successful Bidder.

A representative of the St. Catharines Public Library will issue to the successful Bidder, a Library Purchase Order that will reference all pertinent documents and requirements. The Purchase Order # MUST appear on all correspondence and invoices.

15. Pre-Conditions of Award

WSIB Certificate

Upon selection and prior to award, the selected proponent must provide a current Certificate of Clearance from the Workplace Safety and Insurance Board.

Insurance Certificate

Upon selection and prior to award, the selected proponent must provide a current Certificate of Insurance as per the RFT requirements.

AODA

Upon selection and prior to award, the selected proponent must provide confirmation of completion of AODA training.

16. Procurement Policy and Terms & Conditions

The Library adopts the City of St. Catharines' Procurement Policy. Submissions will be solicited, received, evaluated, accepted and processed in accordance with the City's policy as amended from time to time. In submitting a Tender in response to this solicitation, the proponent agrees and acknowledges that it has read and will be bound by the terms and conditions of the City's Procurement Policy. The Procurement Policy can be viewed on the City's website at https://www.stcatharines.ca/en/resources/Procurement-Policy.pdf

17. Specifications

Bidders are required to submit complete specifications for all products quoted in compliance with the Ontario Occupational Health and Safety Act 1978.

18. Brand Names

All reference to brand name products in this quote unless specified to the contrary is for the sole purpose of identifying the type and quality of product required. When quoting, please state your equivalent product, meeting the specifications of the brand indicated. Bidders may be required to supply samples to aid in the Tender evaluation.

19. Compliance with all Related Laws and Regulations

The Bidder warrants that the service and/or items supplied to the Library conform in all respects to the standards set forth by Federal, Provincial or municipal agencies and failure to comply with this condition will be considered a breach of contract. This will include, but not be limited to the Occupational Health and Safety Act, the Workplace Safety and Insurance Board and any other municipal, regional, provincial or federal laws and regulations.

20. Indemnification

The Successful Bidder hereby agrees to indemnify and hold harmless the Indemnified Parties from and against any and all liability, loss, costs, damages and expenses (including legal, expert and consultant fees), causes of action, actions, claims, demands, lawsuits or other proceedings, (collectively, "Claims"), by whomever made, sustained, incurred, brought or prosecuted, including for third party bodily injury (including death), personal injury and property damage, in any way based upon, occasioned by or attributable to anything done or omitted to be done by the Successful Bidder, its subcontractors or their respective directors, officers, agents, employees, partners, affiliates, volunteers or independent contractors in the course of performance of the Successful Bidder's obligations under, or otherwise in connection with, the Contract. The Successful Bidder

further agrees to indemnify and hold harmless the Indemnified Parties for any incidental, indirect, special or consequential damages, or any loss of use, revenue or profit, by any person, entity or organization, including, without limitation, the Library, claimed or resulting from such Claims. The obligations contained in this paragraph shall survive the termination or expiry of the Contract.

21. Insurance

The Successful Bidder hereby agrees to put in effect and maintain insurance for the Term, at its own cost and expense, with insurers licensed in the Province of Ontario, all the necessary and appropriate insurance that a prudent person in the business of the Supplier would maintain including, but not limited to, the following:

a) Commercial General Liability Insurance

Commercial general liability insurance on an occurrence basis for third party bodily injury, personal injury, and property damage, to an inclusive limit of not less than $2,000,000 per occurrence with an annual aggregate limit of no less than $5,000,000. The policy is to include the following:

- the Indemnified Parties as additional insureds with respect to liability arising in the course of performance of the Bidder's obligations under, or otherwise in connection with, the Contract
- contractual liability coverage, cross liability and severability clauses, and products & completed operations coverage
- employer's liability coverage (or compliance with the paragraph below entitled "Proof of W.S.I.B. Coverage" is required)
- 30 day written notice of cancellation, termination, or material change
- Tenant's legal liability coverage (if applicable and with applicable sub-limits)
- non-owned automobile coverage with blanket contractual coverage for hired automobiles.

b) Automobile Liability Insurance

Ontario Standard Vehicle Liability Insurance (including non-owned automobiles) to a limit of not less than $2,000,000.00 per occurrence for and against claims for bodily injury and/or property damage in respect of motor vehicles both owned or leased vehicles.

c) Crime Coverage or Employment Dishonesty Insurance

Crime Coverage or Employee Dishonesty Insurance Coverage to a limit of not less than $50,000.00 per occurrence with no annual aggregate limit at no additional cost to the Library.

22. General Conditions

a) Assignment of Contract

The Contractor shall not assign any part of the Contract or proceeds without written consent of the Owner.

b) Conditions at Site

i. The Contractor shall have visited the Site prior to bidding and is totally responsible for having ascertained pertinent local conditions such as location, accessibility and general character of the Site, and the character and extent of existing improvements and work within or adjacent to the Site. Claims, which result from the Contractor's failure to do so, will be deemed waived.

ii. If, in the performance of the Contract, hidden physical conditions of a building being modified are exposed revealing unusual or materially different conditions from those ordinarily encountered or inherent in work of this nature, or if subsurface or latent conditions at the Site are found which are materially different from those frequently present in the locality or from those indicated in the

Contract Documents, the Contractor must report such conditions to the Owner and to the Consultant before the conditions are disturbed. Upon such notice, or upon his own observation of such conditions, the Consultant shall promptly propose such changes in the Contract Documents as he finds necessary to conform to the different conditions.

iii. If the Contractor, during the course of the Work, observes the existence of any material, which he knows, should know, or has reason to believe is hazardous to human health, the Contractor shall promptly notify the Owner. The Owner will provide the Contractor with instructions regarding the disposition of the material. The Contractor shall not perform any Work involving the material or any Work causing the material to be less accessible prior to receipt of special instructions from the Owner.

c) Construction Supervision, Method and Procedures

i. The Contractor shall be solely responsible for supervising and directing the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract. The Contractor shall be solely responsible for the means, methods, techniques, sequences and procedures of construction and for coordinating all portions of the Work under the Contract, except where otherwise specified in the Contract Documents. However, the Contractor shall not be responsible for the negligence of others in the design or selection of a specific means, method, technique, sequence or procedure of construction which is indicated in and required by the Contract. The Contractor is solely responsible to the Owner that the finished Work complies with the Contract Documents.

ii. The Contractor shall be solely responsible for health and safety precautions and programs for workers and others in connection with the Work. No inspection by, knowledge on the part of, or acquiescence by the Consultant, the Project Observer, the Owner, the Owner's employees and agents, or any other entity whatever shall relieve the Contractor from its sole responsibility for compliance with the requirements of the Contract or its sole responsibility for health and safety programs and precautions.

iii. The Contractor shall develop and implement a written Fall Protection work plan including each area of the work place where the employees are assigned and where fall hazards greater than 6 feet, or otherwise defined in applicable safety regulations, exist.

iv. If a specific means, method, technique, sequence or procedure of construction is indicated in or required by the Contract Documents, the Contractor may furnish or utilize a substitute means, method, sequence, technique or procedure of construction acceptable to the Consultant, subject to the Owner's right to disapprove.

d) Subcontractors

i. Upon request the Contractor will provide the Owner a list of all subcontractors and their contact information

ii. The Contractor shall be fully responsible to ensure that his subcontractors perform their work in accordance with and subject to the terms and conditions of the Contract Documents.

iii. The Contractor will be fully responsible to the Owner for all acts and omissions of his agents and employees and all succeeding tiers of Subcontractors and Suppliers furnishing any of the Work.

iv. Nothing in the Contract shall create any contractual relationship between any subcontractor and the Owner or the Consultant.

e) Submittals

Before commencement the Contractor will provide:

- Proof of required insurance
- Proof of good standing with the WSIB
- Specimen Copy of proposed warranties
- Required submittals by Specifications

f) Completion Time

The contractor shall complete the work within the time specified on the Bid Form or agreed to with the approved work schedule.

g) Extras

i. If the Contractor claims that any instructions given to him by the Consultant or by the Owner, by drawings or otherwise, involve extra Work which increases the scope of the Contract, then, except in emergencies endangering life or property, he shall give the Consultant and the Owner written notice thereof before proceeding to execute the Work.

ii. A Change Order must be issued before the Contractor is authorized to proceed with any change work. Contractor shall be entitled to no additional compensation for any work performed prior to issuance of a Change Order therefore.

h) Use of Site Facilities

i. It is understood that, except as otherwise specifically stated in the Contract Documents, the Contractor, either directly or through his Subcontractors, shall provide and pay for all material, labor, tools, equipment, water, light, power, telephone and other services or facilities of any nature whatsoever necessary to execute the Work completely and deliver the Work within the Contract Time for Completion or before the Contract Completion Date.

ii. Contractor will provide temporary sanitary facilities and maintain in a sanitary condition. Site facilities shall not be used by the Contractor's forces without approval.

i) Interference

i. The contractor shall make every effort to minimize the effect on normal building operations and inconvenience to residents.

ii. In every case where interruption to service is to occur, the Contractor must make prior arrangements with the Owner.

j) Workmanship

i. All applications shall be by mechanics and electricians skilled in their respective trades and have a minimum of 5 years experience with the work to be done.

k) Prohibition of Alcohol and Other Drugs

The Contractor shall establish, maintain and enforce policies which prohibit the following acts by all Contractor, Subcontractor and Supplier personnel at the Site:

- The manufacture, distribution, dispensation, possession, or use of alcohol or other drugs, except possession and medically prescribed use of prescription drugs; and
- The impairment of judgment or physical abilities due to the use of alcohol or other drugs, including impairment from prescription drugs.
- Smoking shall not be allowed on the work site. A designated smoking area is to be agreed upon at the pre-construction meeting.

l) Material Deliver and Storage

i. Materials must be delivered and stored according to the directions of these specifications, the equipment manufacturers, the directions of the Mechanical Engineer or the Owner’s Representative.

ii. Where possible, materials should be stored on the ground. All materials shall be stored so that the materials are not in contact with the ground.
iii. Where material needs to be stored on the roof, it is the Contractors responsibility to distribute the weight adequately for the structure.
iv. All materials shall be stored so that they are covered sufficiently to be protected from high winds, heavy rain and other environmental contaminants. Manufacturer wrap may not be sufficiently weatherproof to protect materials.
v. All Materials must be delivered and stored undamaged in original containers with Manufacturers markings, labels, and WHMIS markings intact and legible.
vi. All adhesives, caulking, and cements are to be stored protected, and at a temperature above the freezing point.
vii. Any materials that are determined, by the Owner's representative or the Mechanical Engineer, to be damaged or otherwise unsuitable to be installed in the work are to be removed from the job site and replaced immediately at no cost to the Owner.
viii. Care shall be taken of the property of the Owner, including landscaped areas and paved areas. The Contractor is responsible for any and all damage to asphalt paving; concrete walks and sodded areas including, gardens, walkways, sidewalks, lawns etc.

m) Protection

i. Cover walls and adjacent work where materials hoisted or used.
ii. Storage of materials and use of equipment on the roof is at the discretion of the contractor.
iii. Use warning signs and barriers. Maintain in good order until completion of work.
iv. Clean off drips and smears of bituminous material immediately.
v. Dispose of rain water off substrates and away from face of building until drains or hoppers installed and connected.
vi. Protect from traffic and damage. Comply with precautions deemed necessary by Consultant.
vii. Place plywood runways over work to enable movement of material and other traffic.
viii. At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed work and materials out of storage.

n) Protection of Owner’s Property

i. Interior spaces should be reviewed before tearoff. Sensitive equipment including computers, tools machinery, etc. should be given special consideration and adequate measures must be taken to protect from moisture, dust and debris.
ii. If inclement weather requires a stoppage in work, it is the contractors responsibility to assure that the completed work, building structure and contents are adequately protected.

o) Inspection and Testing

i. All work shall be subject to inspection by ARC Engineering Inc., who will act on behalf of the Owner. The Contractor shall afford the Consultant or representative, all facilities required for the inspection and testing of the work and shall immediately act upon any instruction regarding the work given by the Inspector.
ii. Payment for all inspection work is to be by the Owner.
iii. Inspections shall in no way relieve the Contractor from his responsibilities or obligations under the terms of the Contract or the Contract Documents.
iv. The Contractor shall notify the Mechanical Engineer a minimum of 24 hours prior to starting the work, restarts or any other interruption in the work.

v. The inspection company will back charge the Contractor for extra or additional trips necessitated by poor or faulty workmanship.
vi. Upon completion and before acceptance of final invoice, the Contractor will arrange for the inspection company to make a Final Inspection.

p) Correction of Deficient Work

Without restricting any warranty or guarantee implied or imposed by law or contained in the Contract Documents, the Contractor shall, at his own expense, rectify and make good any defects due to faulty materials or workmanship that appears in the work or that comes the attention of the Project Manager or Inspector.

q) Close Out

i. Contractor to arrange final inspection after completion and final clean up.
ii. Provide fully executed warranties.

r) Payment

i. Application for Payment, For the purpose of the Construction Lien Act, R.S.O. 1990, c. C.30, the Payment Certifier shall be the Owner or any person the Owner designates. The payment Certifier shall:
   - Determine and certify substantial Performance. Determine total completion.
   - Determine 10% of the amounts invoiced prior to substantial performance and held back pursuant to the Act, within forty-five (45) days following the date of publication of the certificate of substantial Performance if there are no claims outstanding pursuant to the Act, and the Work and services performed are to the satisfaction of the Payment Certifiers
   - The Owner reserves the right to request further evidence of breakdown or documentation to establish a fair and reasonable evaluation of the application. Should such information be required, the receipt date of application will be adjusted accordingly.
ii. All invoices for payment must be directed to the Owner.
iii. All invoices will be paid after the approval of inspection report and all deficiencies are corrected.
iv. If the inspectors report indicates no deficiencies, payment will be issued the next 30 pay period.

s) Final Payment

Final payment and release of holdback (if applied) shall be released only when the following documentation has been received from the Contractor.

- Workplace Safety and Insurance Board Certificate of Clearance.
- Certificates of Warranties.
- Final inspection report prepared by the Inspector or Project Manager indicates no deficiencies in the Work. 32.2. In the event that the Report indicates deficiencies Payment will not be released until they are corrected. 32.3. The amount payable to the Contractor under the Contract will not be adjusted by reason of any fluctuation in the cost of the Work brought about by any increase or decrease in the cost of plant, equipment, labour, materials or wage rates.

t) Construction Lien Act

The Contractor must comply with the provisions of the Construction Lien Act - latest edition.

23. Environmental Concerns

In order to contribute to waste reduction and to increase the development and awareness of environmentally sound purchasing, the successful proponent will ensure that wherever possible, terms of reference are amended to provide for expanded use of durable products, reusable products

and products (including those used in services) that contain the maximum level of post-consumer waste and/or recyclable content, without significantly affecting the intended use of the products or services. It is recognized that cost analysis is required to ensure that the products are made available at competitive prices.

The City's vision to guide the direction of sustainability states "A sustainable community works together to take on the challenges ahead" and the related policy can be viewed on the City of St. Catharines' website at http://www.stcatharines.ca/en/governin/CorporateSustainability.asp. Where practical, the Library strongly encourages the recycling of or the reuse of any materials removed from the project site and encourages partnerships with "reuse" organizations that may be able to assist with this process.

24. Licenses, Permits, Locates and Approvals

The successful Bidder shall, at their own expense, be responsible for obtaining, maintaining, keeping available for inspection and copying all Provincial, Municipal and any other licenses, building, and other permits, utility locates, or approvals, necessary to permit them, their employees or company to carry out the requirements of this agreement.

25. Accessibility

The Library is committed to the accessibility principles of preventing and removing barriers in accessing goods and services for people with disabilities and is bound by the Standards under the Accessibility for Ontarians with Disabilities Act, 2005 as may be amended from time to time.

Regulations enacted under the Act apply to every designated public sector organization and other third parties that provide goods and services to the members of the public. The Bidder/Contractor, and all sub-contractors hired by the Bidder/Contractor in the completion of its work, will meet or exceed compliance with all applicable regulations under the Accessibility for Ontarians with Disabilities Act, 2005 as may be amended from time to time.

It is the Bidder/Contractors responsibility to ensure they are fully aware of, and meet all requirements under the Act. A Declaration of Accessibility Compliance will be required by the successful Bidder.

26. Municipal Freedom of Information and Protection of Privacy Act (MFIPPA)

In accordance with the Municipal Freedom of Information and Protection of Privacy Act, the information collected in response to the RFT is collected under the authority of the City's Procurement Policy adopted by the St. Catharines Public Library and the Municipal Act, S.O. 2001, c.25, as amended. The information collected will be used solely for the purpose of evaluating the submissions. All bids submitted become the property of the Library. Because of MFIPPA, respondents are reminded to identify in their bid material any specific scientific, technical, commercial, proprietary, or similar confidential information, the disclosure of which could cause them injury. Complete bids are not to be identified as confidential. The Library reserves the right to discuss any and all bids, to request additional information from Bidders and to accept or reject any and all bids. Questions about the collection of information should be directed to the Business Administrator at the St. Catharines Public Library.

27. Bidders Involved in Litigation with the Library

It is a matter of great importance to the Library in the administration of this contract that the Library's relationship with the successful Bidder should be as productive, amicable and harmonious as is reasonably possible. For the purposes of this section:
- "Threatening Litigation" refers to the transmission of a written threat to commence a judicial proceeding; and;
- "Pursuing Litigation" means actually commencing and / or continuing a judicial proceeding.

When a bid is received from a Bidder who is threatening litigation or is pursuing litigation against the Library in relation to previous contracts awarded to that Bidder by the Library; or,
A bid is received from a Bidder, against whom the Library is pursuing litigation, The Library shall be entitled to reject any bid submission by such Bidder, despite the fact that the bid might otherwise have met or exceeded all other conditions for a successful bid. Each Bidder expressly agrees in submitting a bid for this contract that, should its bid be rejected in accordance with the foregoing, it shall have no claim for damages from the Library in consequence of such rejection whether or not the litigation, or threatened litigation with the Library which occasioned the rejection of the bid, has any merits, and whether or not it is successful or unsuccessful.

28. Stated Delivery Time and Dates

Delivery dates (or work completion dates, as applicable) must be stated on the Form of Tender. By specifying dates, the successful Bidder agrees to be bound by those dates. Failure to meet stated delivery time(s) by the successful Bidder may be just cause for the Library to take appropriate action that shall be in the best interest of the Library. The Library shall exercise due diligence and fairness in seeking any remedy and shall take into consideration such factors as delays by the manufacturer and shortages of parts. However, notwithstanding these circumstances, the order may be cancelled at the option of, and without recourse to, the Library.

Pending full and satisfactory supply of all items described in this Tender, a holdback of the value of said deficiencies will be exercised. Failure to comply with all terms specifications, requirement, conditions and general provision of this Tender, to the satisfaction of the Library shall be just cause for the cancellation of the contract award. The Library shall then have the right to award this contract to any other Bidder or to re-issue the Request for Tender. The Library shall assess against the Bidder, any damages whatsoever as a result of the failure to perform. In addition, the Library may, at their discretion, stop the performance of this contract until such time as the Bidder complies with all the provisions of this contract.

29. Specifications and Bid Requirements

LIBRARY BACKGROUND

The St. Catharines Public Library is a mid-sized library serving a population of 133,989. SCPL's 5 locations (Central Library, 3 Branches, and1 locker/kiosk) offer a variety of materials in its digital and physical collections, adult/children's programs, and access to computers and wireless Internet.

The library is governed by a 9 member Board comprising 7 citizens and 2 elected representatives from City Council. The Business Administrator reports to the CEO who leads a team of eight Managers, who oversee the work of almost 80 full and part-time employees. SCPL's current (2021) operating budget is over $6 million. The Library is primarily funded by the City of St. Catharines.

CENTRAL LIBRARY

- The Central Library is a 3 story facility, with basement constructed in 1976.
- The gross floor area is approximately 63,000 ft^2. The basement level sits partially below grade, and encompasses an operational staff area and a parking structure.

- The 1st and 2nd floors level are public library space housing the library collection, offices for staff, meeting rooms and public space.
- The 3rd floor houses the Library Administration area.
- The Atrium has two levels and is a glass and steel structure that faces James Street.
- There are five (5) rooftop multizone units, two (2) air handling units located in the basement with condensing units located on the roof, and a packaged AC unit located on the roof that serve the building.

SPECIFICATIONS

15001	Specification Table of Contents
15005	Bid Form
15006	Separate Prices
15007	Alternate Equipment and Suppliers
15010	Mechanical General Provisions
15050	Basic Mechanical Materials and Methods
15060	Mechanical Demolition
15240	Sound and Vibration Control
15255	Insulation
15484	Natural Gas Piping
15530	Refrigeration Piping
15670	Refrigeration Condensing Units
15775	Rooftop Heating and Cooling Equipment
15790	Air Coils
15885	Air Filters
15890	Sheet Metal
15965	Electronic Controls & Monitoring System
15993	ECMS Inspection and Acceptance
15995	Testing and Balancing
16001	Electrical Requirements
Appendix A	Mechanical Drawings
Appendix B	Rooftop Multizone Unit Prepurchase Shop Drawings
Appendix C	Air Audit Report, dated August 2021
Appendix D	SCPL Vaccination Policy for Contractors

SCHEDULE DESCRIPTION	**DATE**
RFT Publish Date	November 26, 2021
Mandatory Site Visit	December 2, 2021 10:00 AM
Deadline for Questions	December 9, 2021 end of business day
Answers / Addendum Deadline	December 15, 2021 end of business day
RFT Closing Date	December 20, 2021, 10:00 AM

Tender Format
Tender should include the following sections:

General
Provide a list of subcontractors (if any).

Bid Form
The respondent should complete and submit the Bid Form as provided in this document.

Accessibility Declaration

The respondent should complete and submit the Accessibility Declaration as provided in this document. Upon selection and prior to award, the selected proponent must provide confirmation of completion of AODA training.

WSIB Certificate
Upon selection and prior to award, the selected proponent must provide a current Certificate of Clearance from the Workplace Safety and Insurance Board.

Insurance Certificate
Upon selection and prior to award, the selected proponent must provide a current Certificate of Insurance as per the RFT requirements.

Schedule
Provide a project schedule, by task / activity and indicate the approximate timing of key events. Propose dates, milestones and sufficient definition of what tasks need to be completed. The proposed schedule should include the time required in weeks for the tasks.

References
Respondents should provide three (3) references from organizations for which the respondent has provided the same or similar deliverables with the exception of the St. Catharines Public Library (Library), within the past five (5) years. Reference projects shall have a minimum value of $1,000,000 for mechanical services.

The Library, at its sole discretion, may confirm the respondent's experience and/or ability to provide the work required as described in its submission by checking the respondent's references and the provision of the references by the respondent is deemed to be consent to such confirmation/contact with the references.

References at a minimum should include the following:

- Company Name;
- Company Address;
- Contact Name;
- Contact Telephone Number;
- Contact E-Mail Address;
- Date Work Undertaken;
- Nature of Services Provided;
- Value of Services Provided

Accessibility Declaration

Declaration of Accessibility Compliance

Company Name:	
Print name:	
Title:	Dated:

I/we acknowledge that as a Contractor/Consultant of the St. Catharines Public Library we are bound to comply with all accessibility Standards under the Accessibility for Ontarians with Disabilities Act, 2005 as amended from time to time.

I/we declare that I/we have read, understand and will meet or exceed all enacted accessibility Standards as amended from time to time.

I/we further declare that I/we will undertake to ensure all sub-contractors hired by us in completion of our work will also comply with the above Standards.

Authorized Signature: _____

Dated: _____

END OF SECTION

PART 1 - SUPPLEMENTARY MECHANICAL BID FORM

St. Catharines Public Library Central Branch
Rooftop Mechanical Equipment Replacement
St. Catharines, Ontario

TO: St. Catharines Public Library – Central Branch
54 Church Street, St. Catharines, Ontario L2R 7K2
purchasing@myscpl.a

NAME OF MECHANICAL CONTRACTOR: _____

MECHANICAL BID FORM

1 I/We hereby undertake and agree that I/we have carefully examined the site of the proposed works, proposed construction schedule, as well as the Bid Documents, as prepared by ARC Engineering Inc. and hereby accept that if this bid for Mechanical work at the St. Catharines Public Library Central Branch, St. Catharines Ontario is accepted, to execute and enter into a standard CCDC-2 Contract.

2 I/We hereby bid and offer to enter into a formal agreement herein before referred to, to supply and do all that which is set out or called for in the Contract Documents, forming part and parcel of the said agreement on the terms and conditions and under the provisions set out or called for in the said agreement, and will complete all the work relating to the Mechanical work at the St. Catharines Public Library Central Branch, St. Catharines Ontario for the Stipulated Bid Sum of _____ ($_____), including all cash allowances, taxes, assessments, fees and customs duties, except as otherwise provided in the Bid Documents.

3 I/We acknowledge that the Contract Price may be determined on a total of the Stipulated Bid Sum, accepted separate prices, and accepted alternative prices less accepted bidder's suggested deductions.

4 I/We agree that the Bid shall continue to be open to acceptance and be irrevocable from the time fixed for the bid closing until the expiration of 60 days, after the date for bid closing.

5 I/We agree that if the Bid is accepted, a formal agreement shall be executed and delivered within 7 days after notification of acceptance. I/We recognize the right of the Owner to accept any Bid or to reject any or all Bids without explanation.

6 I/We include the cost of hoisting of all equipment and materials in the Contract Price.

7 SUBCONTRACTORS

I/We agree that no changes or additions to the list of proposed Subcontractors in the Bid will be made without prior written approval of the Owner.

We submit herewith, a list of the Subcontractors we propose to use on this Contract.

Responsibility	**Company Name**	**Supervising Personnel**	**Subcontract Amount**
Prime Mechanical Contractor			$
Subcontractors:			
Crane			$
HVAC Plant and Piping			$
Sheet Metal			$
Insulation			$
Controls and Monitoring			$
Electrical			$
Testing and Balancing			$

8 LABOUR RATES

The following labour rates shall be applicable to revisions to the Contract prior to markups for overhead (including supervision) and profit, but including all applicable employees benefits and changes.

Trade	**Present Total Hourly Wage Rate**
Sheet Metal	$
Insulators	$
Controls & Monitoring Personnel	$
Electricians	$

The Bidder, if successful, agrees to provide copies of all its current labour agreements applicable to this project.

9 SEPARATE PRICES

A list of separate prices to be added or deducted from the Stipulated Bid Sum is attached as Section 15006. Submit prices with the Bid Form.

Removal/installation of roof curbs $ _____

Upgrade power wiring for RT-1, RT-2, RT-3, RT-4 $ _____

10 ALTERNATIVE PRICES

A list of alternative prices to be added or deducted from the Stipulated Bid Sum is attached as Section 15007. Submit prices:

.1 with the Bid Form

11 BIDDERS SUGGESTED DEDUCTIONS

The Bidder is invited to study the Contract Documents and submit, with the Bid Form, possible deductions to the Stipulated Bid Sum for alternative methods, materials, financing proposals, etc.
Where modifications to the work of the Other Contractors or Subcontractors is required as a result or part of the alternative offered, the cost of said modifications is included in the deduction offered.

The Stipulated Bid Sum may be adjusted by suggested deductions accepted by the Owner to form the Contract Price.

The Owner may select the Contractor on the basis of the adjusted bid price.

12 UNIT PRICES

Submit requested unit prices within 24 hours after Bid Close.

Requested unit prices are contained in Section 15008.

13 CASH ALLOWANCES

The Stipulated Bid Sum shall include cash allowances as follows:

Pretender Equipment $ 876,500 + HST

Refer to Section 15010 for additional instructions to bidders.

14 ADDENDA INCLUSION

The following addenda form part of the Bid Documents included in the Stipulated Bid Sum.

Addenda No.(s) _____ to _____

15 BONDING

Enclosed are our Agreements to Bond, issued to us by a Surety Company for a Performance Bond and for a Labour and Material Bond. The Owner/Contractor will advise whether Bonding is required.

Our unit prices for bonding are as listed below and are not included in our Stipulated Bid Sum.

.1 50% Performance Bond

$_____/Thousand/Annum

.2 50% Labour & Material Bond

$_____/Thousand/Annum

_____
Signature

_____
Name and Title

_____
Signature

_____
Name and Title

_____ _____
Seal or Witness Name of Company

_____ _____
Date Address

Bids by Limited Companies must be submitted under Corporate Seal. Bids by individuals or partnerships must be witnessed.

END OF SECTION

PART 1 - INSTRUCTIONS TO BIDDERS

.1 Submit requested separate prices with the Bid Form or in accordance with the bid requirements.

.2 Express requested separate prices as an addition to or deduction from the Stipulated Bid Sum or as no change to the Stipulated Bid Sum.

.3 The Stipulated Bid Sum will not include any additions or deductions shown as separate prices.

.4 The Owner reserves the right to accept or reject any separate price offered.

.5 The Stipulated Bid Sum will be adjusted by the addition or deduction of separate prices accepted by Owner to form the Contract Price.

.6 The Owner may select the Contractor on the basis of the adjusted Stipulated Bid Sum.

.7 Provide the following separate prices:

.1 Removal of existing roof curbs and installation of existing roof curbs. (Note that price supply roof curbs is included in pretendered equipment cash allowance).

.2 Upgrade of power wiring for RT-1, RT-2, RT-3, RT-4 to 3C#3+GND from the respective breaker panels to the units.

END OF SECTION

PART 1 - INSTRUCTION TO BIDDERS

.1 The following are our prices for the Alternative Work listed hereunder. Failure to complete and submit this section will indicate that the Contractor has agreed to provide the base bid equipment specified in each specification section, listed in each equipment schedule, and/or shown on the Drawings. Where a choice of '**Other**' equipment is given, indicate selection included in Stipulated Bid Sum by submitting this Section. '**Other**' products may be considered where an appropriate saving is offered.

.2 Express '**Other**' prices as an addition to or deduction from the Stipulated Bid Sum.

.3 Contractor responsible for ensuring alternate equipment meets physical and electrical requirements of existing site conditions to remain and proposed design with respect to but not limited to: size, weight, service access clearances, duct connection arrangement, & air intake clearances.

.4 Contractor responsible for ensuring alternate equipment meets functions and performance specifications specified in schedule and/or shown on Drawings.

.5 The Owner reserves the right to accept or reject any alternative price offered.

.6 The Stipulated Bid Sum will be adjusted by deduction of alternative prices accepted by Owner to form the Contract Price.

.7 Where modifications to the work of Other Trades are required as a result or part of the alternative offered, include the cost of said modifications in the alternative price offered.

.8 Submit the following list of base bid and alternative suppliers in accordance with Bid requirements.

.9 Bidders are to identify which product they will be using as an alternate. (If not used, bar and initial the space below.) These prices do NOT include Value Added Taxes.

Spec. Reference Section	**Equipment**	**Basis of Design Manufacturer or Supplier**	**Alternative Manufacturer or Supplier**	**Other Manufacturer or Supplier**	**Add or Deduct From Base Bid Price for Other**
15255	Thermal Insulation	Fibreglass Canada	( ) Johns Manville ( ) Manson ( ) Knauf ( ) Owens Corning	_____	$_____
15670	Condensing Units	York	( ) Trane ( ) Carrier ( ) Boiler Smith	_____	$_____
15775	Rooftop Packaged Heating and Cooling Equipment	Lennox	( ) Eng Air ( ) Carrier ( ) York ( ) Trane	_____	$_____

Spec. Reference Section	**Equipment**	**Basis of Design Manufacturer or Supplier**	**Alternative Manufacturer or Supplier**	**Other Manufacturer or Supplier**	**Add or Deduct From Base Bid Price for Other**
15790	Air Coils	Aerofin	( ) Trane ( ) Eng. Air ( ) USA Coil	_____	$_____

END OF SECTION

PART 1 - GENERAL

1.1. WORK INCLUDED

.1 These Specifications are an integral part of the Contract Documents. Tendering and Contract Requirements, General Requirements apply to all Specification Sections.

.2 Work in the Specifications is divided into descriptive Sections which are not intended to delegate functions or work to any specific Subcontractor or identify absolute contractual limits between Subcontractors or between the Contractor and his Subcontractor. The requirements of any one Section apply to all Sections. Refer to other Sections to ensure a complete operational product and fully coordinated standard of work.

.3 The direction to 'provide' equipment, materials, products, labour and services shall be interpreted to 'supply, install and test' the work indicated on the Drawings and specified.

.4 Provide mechanical components and normal system accessories not shown on the Drawings or stipulated in the Specifications, but required to ensure complete operational systems acceptable to the Consultant and all authorities having jurisdiction.

1.2. INTENT /PHASING

.1 Mention in the Specifications or Drawings, requires provision of the quality noted, the quantity required, and that systems be complete in every respect.

.2 Consider the Specifications as an integral part of the accompanying Drawings. Any item or subject omitted from one or the other, but which is either mentioned or reasonably implied, shall be considered as properly and sufficiently specified.

.3 Be completely responsible for the acceptable condition and operation of all systems, equipment and components forming part of the installation or directly associated with it. Promptly replace defective materials, equipment and parts of equipment and repair related damages.

.4 Phasing shall be scheduled with the Owner.

1.3. CONTRADICTION AND AMBIGUITY

.1 Where there is apparent contradiction or ambiguity in the documents, or where there are apparent discrepancies in or omissions from the documents, or if there is any doubt as to the intent of the documents, the bidder shall request and obtain written clarification(s) from the Consultant prior to submitting a tender.

.2 Consideration will not be granted for misunderstanding of the intent of the documents or the extent of the work to be performed.

1.4. METRIC PRACTICE

.1 Conform to Canadian Metric Practice Guide CSA CAN3-Z234.1-89.

.2 Provide adapters between metric and imperial installations.

.3 Metric descriptions in this Division are nominal equivalents of Imperial values.

1.5. COORDINATION

.1 Coordinate and schedule work with other work to facilitate mutual progress.

.2 Identify and resolve interference problems prior to prefabrication and installation of equipment. Submit interference drawings for review upon Consultant Request.

.3 Examine the site and all Contract Documents prior to bid submission. No allowance will be made for any difficulties encountered due to any features of the building, methods of construction, site or surrounding public and private property which existed up to the bid close.

1.6. REFERENCE STANDARDS

.1 Provide new materials and equipment of design and quality defined in Section 15007. Provide current models of equipment manufactured in North America, unless specified otherwise, with published ratings certified by recognized North American testing and standards agencies.

.2 Workmanship and installation methods shall conform to best practice. Employ tradesmen to perform work under the direct supervision of qualified personnel.

.3 Install equipment in accordance with manufacturer’s recommendations.

.4 Meet ASHRAE/IES 90.1, 1989 Standards for the supply and installation of all equipment.

.5 Meet the additional selection, sizing and performance criteria specified in this Specification.

1.7. DRAWINGS AND MEASUREMENTS

.1 Drawings show general design and arrangement of mechanical system installation, and are diagrammatic. Obtain further clarification of Drawings or Specifications from Consultant prior to installation.

.2 Drawings do not indicate exact Architectural, Structural or Electrical features. Examine Drawings prior to laying out.

.3 Do not scale Drawings. Take field measurements before ordering and fabricating materials.

.4 Obtain 'roughing-in' requirements of equipment before proceeding.

.5 Leave areas clear as indicated for future equipment and maintenance.

1.8. REGULATORY REQUIREMENTS

.1 Meet the requirements and recommendations of all Municipal, Provincial and Federal Bylaws and Ordinances.

.2 In general, the physical and chemical properties and characteristics of work shall meet the requirements of recognized agencies which shall include;

AMCA	-	Air Moving & Conditioning Association
ADC	-	Air Diffusion Council
ANSI	-	American National Standards Institute
ARI	-	Air Conditioning & Refrigeration Institute
ASHRAE	-	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASME	-	American Society of Mechanical Engineers
ASTM	-	American Society for Testing and Materials
CGA	-	Canadian Gas Association
ESA	-	Electrical Safety Authority
EGC	-	Enbridge Gas Company
CGSB	-	Canadian General Standards Board
CIRI	-	Canadian Industrial Risk Insurers
CSA	-	Canadian Standards Association
IAO	-	Insurers Advisory Organization
MMC	-	Marsh McLennan Insurance Protection Consultants
MTC	-	Ministry of Transportation and Communication
NBCC	-	National Building Code of Canada
NFPA	-	National Fire Protection Association
OBC	-	Ontario Building Code
OFM	-	Local Fire Codes or Standards Ontario Fire Marshall
OH	-	Ontario Hydro Special Inspection Department
OME	-	Ontario Ministry of Environment
OML	-	Ministry of Labour and Workmen's Compensation Requirements
OWRA	-	Ontario Plumbing Code
TBD	-	Local Building Codes City of St. Catharines Buildings Department
TSSA	-	Technical Standards and Safety Authority
UL	-	Underwriter's Laboratories Inc.
ULC	-	Underwriter's Laboratories of Canada

.3 Give all necessary notices, obtain all permits and pay for fees, taxes and other costs in connection with the work. File all necessary forms, Contract Documents and prepare submissions and obtain approvals of regulatory bodies having jurisdiction.

.4 Comply with the requirements of the Model National Energy Code for Buildings or ASHRAE 90.1 in the selection, application and installation of all mechanical equipment and systems.

1.9. CHANGES TO CONTRACT WORK

.1 Do not proceed with changes to Work without written authority from the Owner.

.2 Follow procedures outlined in Tendering and Contract Requirements for administration and execution of Contract revisions.

.3 Quotations for changes to work shall be determined by one of the following methods as selected by the Construction Manager

.1 By estimate and acceptance of a lump sum;

.2 Where unit prices are set out in the Contract documents or subsequently agreed upon, in accordance with such unit prices;

.3 By costs and a percentage fee for overhead and profit.

1.10. PREPURCHASED EQUIPMENT

.1 Where equipment has been prepurchased by the Owner for installation, assume complete responsibility for acceptance, delivery schedule, off loading, storage, rigging, installation, protection, startup and warranty of this equipment, as if the equipment was provided by the installing contractor.

.2 Responsibilities of the equipment supplier are delineated in the pre-purchase documents which are available for Contractor review during the bid period.

.3 The following equipment has been pre-tendered in order to ensure equipment delivery in time to meet the building construction schedule.

.1 Rooftop Multizone Units RT-1 – RT-5 & associated roof curbs

.4 Include in Contract Price, the cost of the following pre-purchased equipment.

.1 Rooftop Multizone Units RT-1 – RT-5 & associated roof curbs

.5 Exclude the cost of other pre-purchased mechanical equipment from the Contract Price.

.6 Request from the Supplier, full details of the equipment and the manufacturer's Shop Drawings. Include related information in the Operating and Maintenance Manual.

.7 Assume extensions of warranties to meet specified times.

1.11. WARRANTY

.1 Meet the requirements of Tendering and Contract Requirements.

.2 Warrant all equipment, material and workmanship for not less than one year from date of Substantial Performance of the Work, or for longer periods when stated elsewhere in the Specifications.

.3 If any equipment or material does not match the manufacturer's published data or rating schedules during performance tests, replace without delay. . Bear all associated costs of replacement. Adjust all components to achieve the specified ratings.

.4 The Owner will give notice of observed defects promptly in writing.

.5 Promptly correct defects and deficiencies which originate during the warranty period. Pay for resulting damage.

1.12. INSTRUCTIONS TO BIDDERS

.1 Submit Supplementary Mechanical Bid Form. Failure to comply with the stated requirements of the Bid Form may nullify the bid.

.2 Pay attention to “Basis of Design”, “Alternative” and “Alternate” manufacturers and supplier defined in Section 15007.

.3 The Bidder is invited to submit additional alternate prices not specifically requested with the Bid.

.4 Alternate prices may be used to establish the lowest Contract Price.

.5 The lowest or any Bid will not necessarily be accepted.

1.13. CASH ALLOWANCES

.1 Include in tender, cash allowances for the following:

.1 Pretender Equipment $ 876,500 + HST

.2 Payment against cash allowances will be made only upon receipted verification of approved statements. Copies of supplier's invoices will be required to substantiate charges against an allowance.

.3 Do not charge labour, administration, overhead and profit from cash allowance. It is deemed to be included in Contract Price.

.4 Remaining portion of cash allowances not authorized for use shall revert to Owner.

1.14. SEPARATE PRICES

.1 Submit separate prices on the Bid Form and express as a credit or an extra to the Stipulated Bid Sum. Do not include Separate prices in the Stipulated Bid Sum

.2 Calculation of the Contract Price will include separate prices consistent with their acceptance or rejection by the Owner.

1.15. ITEMIZED PRICES

.1 Itemized prices shown in Section 15006 shall be included in the Stipulated Bid Sum.

.2 Itemized prices are requested for accounting purposes only, or to delegate certain costs to third parties.

PART 2 - SUBMITTALS

2.1. SHOP DRAWINGS

.1 Submit shop drawings via email in AutoCAD or pdf format only. Provide hard copy reproduction of all shop drawings for manuals, authorities having jurisdiction, the Owner and for coordination among other Trades. Identify Shop Drawing by Specification index reference and project name.

.2 Review all Shop Drawings prior to submittal and clearly certify as 'Correct for Review by Consultant'. Show company name, date and sign all Shop Drawings.

.3 Consultant review of Shop Drawings does not relieve the Contractor of full responsibility for errors, necessity to check Shop Drawings, furnish materials and equipment and perform work required by the Contract Documents.

.4 Clearly identify all components, accessories, including options to be supplied with each item.

.5 Submitted product data shall include sufficient detail to allow a reasonable assessment of the equipment being provided. The data shall include, but not be limited to:

.1 dimensions, including service clearance requirements

.2 design and working pressure ratings of pressure vessels and line components

.3 shipping and operating weight including accessories and working fluids, together with point loadings

.4 performance specifications including pump and fan curves/charts

.5 part load operational capabilities and limitations

.6 sound power levels

.7 materials of construction including exterior and internal finishes

.8 factory test standards rating conformance to recognized and applicable industry standards

.9 extended warranty coverage

.10 electrical requirements, including complete wiring diagrams clearly defining field, internal and factory wiring scope

.11 motor, power or control wiring requirements including rated voltage, phase and cycle, rated power draw, full load current, motor size and speed, motor frame size, type of enclosure and maximum rated temperature rise

.12 product installation, startup and operation manuals

.13 statement of compliance with the Model National Energy Code of Canada, as applicable.

.6 Incomplete submissions will be returned as unacceptable.

.7 Bind one set of reviewed Shop Drawings in each Operating and Maintenance Manual.

.8 Provide shop drawings for specified items as follows:

Section	Title	Equipment
15050	Basic Mechanical Materials and Methods	Strainers Thermometers & Pressure Gauges Expansion Joints & Guides Pipe Riser Anchors Hangers
15070	Motors, Starters, Control Centres & Wiring	Loose Starters VFD Rated Motor Starters

Section	Title	Equipment
		Motor Control Centres
15075	Variable Speed Drives	Variable Speed Drives
15240	Sound and Vibration Controls	Silencers Vibration Isolators
15255	Insulation	Insulation Materials Spec Sheets Insulation Material - Physical Samples
15484	Natural Gas Piping Systems	Pressure Reducing Stations Pressure Relief Stations
15670	Condensers	Condensing Units
15775	Packaged Rooftop Heating and Cooling Equipment	Packaged A.C. Units
15790	Air Coils	Water Coils DX Coils Steam Coils
15855	Packaged Air Handling Units	Air Handling Units
15865	Fans	Fans
15885	Air Filters	Filters Racks and Frames Manometers
15890	Sheet Metal	Access Doors Fire Dampers Smoke Dampers Backdraft Dampers Exhaust Hoods Fire Rated Enclosures Pitot Test Ports
15955	Automatic Controls	Control Systems Sequences Control Schematics Control Valves Control Dampers Thermostats - Data Sheets and Samples Pneumatic P/E and E/P Switches
15965	Electronic Controls	Control Systems Description Control Systems Diagrams DDC Hardware OWS and Accessories
		Sensors and Thermostats

Section	Title	Equipment
15970	BMS Instrumentation	Control Valves and Actuators Control Dampers and Actuators Transmitters Transducers Static Pressure Sensors PE Switches EP Switches Water Flow Measuring Devices Air Flow Measuring Devices BTU Energy Meters
15972	Instrumentation (Point) Schedules	Point Schedules
15995	Balancing	Air Balancing Reports Water Balancing Reports

2.2. ALTERNATIVE MANUFACTURER AND SUPPLIER

.1 Equipment and materials are specifically described for the purpose of indicating standards of quality and workmanship. Base Bid on the items specified in Section 15007 as “Basis of Design” or “Alternative Manufacturer”

.2 Maximize the Canadian content of all equipment and materials used on this project.

.3 Alternate equipment or materials may be submitted with the Bid Form, indicate appropriate cost saving. Supply with each alternative, following bid submission, upon request by Consultant, the following information:

.1 details of manufacture

.2 dimensions including required clearance

.3 performance data

.4 the cost saving for piping, ductwork and electrical changes imposed by the alternative

.5 Canadian content percentage

.4 Where alternates are accepted, there will be no further cost allowances for subsequent changes in work or other Contracts to make the alternates complete and equal to the specified equipment and materials.

.5 If alternate equipment is accepted, prepare when requested, equipment layouts at no extra cost. Show clearly in plan, elevations and sections, all equipment details including dimensional changes. Show location changes to ducts, pipes and wiring and the effect of these changes on the building. Drawings shall match scale of mechanical drawings.

.6 The right is reserved to accept or reject any alternative.

2.3. SAMPLES

.1 Submit samples or provide site mockup of proposed materials upon request of the Consultant, including:

.1 valve tags and equipment identification plates

.2 insulation and adhesives

.3 hangers, pipe supports, inserts and fastening devices

.4 thermostat, cover and guards

.5 air filters

.6 thermometers

.7 pressure gauges

.8 ECMS instrumentation

.9 supervisory switch

.2 Provide site mockup of proposed materials before proceeding.

2.4. COORDINATION DRAWINGS

.1 Installing contractor shall take the lead role in preparation of electronic interference/ coordination drawings. Use all other disciplines electronic drawings as basis for preparation of interference drawings. Position all services to accommodate the work of other divisions.

.2 Prior to commencement of work, submit for Consultant review, pipe, duct and equipment interference and sleeving drawings for each floor level and for all work. Drawings must be coordinated and certified correct for review.

.3 Coordination drawings shall be to a scale sufficient to show the necessary details. Submit for review, using the same procedures as specified for Shop Drawings.

.4 Prepare drawings in conjunction with other Divisions, wherever possible conflict due to the positioning of equipment, piping or ductwork exists.

.5 Dimension proposed location of work with respect to building elevations and established grid lines.

.6 Prepare fully dimensioned detail drawings of all shafts, duct spaces and pipe spaces. Show sleeving, recessed and formed holes required in concrete for work. Include information pertaining to access, clearances, tappings, housekeeping pads, drains and electrical connections.

.7 Base information used to prepare drawings on reviewed Shop Drawings.

.8 Provide field drawings with position of various services when required by Consultant.

.9 Submit a list of access doors and panels showing proposed type, size and location. Coordinate drawings with Architectural detail drawings and reflected ceiling plans prior to submission.

2.5. RECORD DRAWINGS

.1 Suitably store and protect drawings on site and make available at all times for inspection.

.2 Record inverts of underground piping at building entry/exit and below floor slab at each branch, riser base, change in direction as well as at least three points on straight runs.

.3 Show locations of access doors and panels and identify the equipment and components that they serve.

2.6. OPERATING AND MAINTENANCE MANUALS

.1 Submit one copy for review at least two weeks before instructions to Owner are commenced.

.2 Submit two copies of final manuals to the consultant.

.3 Submit one hard copy and one electronic copy of final manuals to the owner.

.4 Ensure that the terminology used in various sections of the manual is consistent.

.5 Each manual shall contain the following information:

.1 description of each system with description of each major component of system

.2 complete sets of page size equipment Shop Drawings

.3 equipment manufacturer’s installation, startup and operation manuals

.4 equipment manufacturer’s recommended spare parts lists

.5 equipment wiring diagrams

.6 lubrication schedule for all equipment

.7 equipment identification list with serial numbers

.8 page size valve tag schedule and flow diagrams

.9 final balancing reports

.10 water treatment procedure and tests

.11 control drawings, sequences of operation

.12 extended warranty documentation if applicable

PART 3 - EXECUTION

3.1. INSPECTION, TESTING AND CERTIFICATES

.1 Periodic inspections of the work in progress will be made to check general conformity of the work to the Contract Documents. Observed deficiencies will be reported. Correct deficiencies immediately.

.2 Meet the requirements of all laws, bylaws, codes, regulations and authorities having jurisdiction.

.3 Where the Contract Documents, instructions or the governing authorities require work to be tested, inspected, or approved, give sufficient notice of its readiness for inspection and schedule the date and time for such inspection.

.4 Uncover work that is covered up without consent, upon Consultant request, for examination and restore at no extra cost to the Owner.

.5 Furnish certificates and evidence that work meets the requirements of authorities having jurisdiction.

.6 Correct deficiencies immediately upon notification.

3.2. TEMPORARY SERVICES

.1 Make connections to temporary power source for use by installing contractor.

.2 Install and maintain temporary fire protection services as required by the authorities having jurisdiction.

.3 When the permanent water service is installed, it shall be used to supply water for the use of Other Contractors.

.4 Perform operations necessary for checking, testing and balancing after written approval is given to start up systems. Ensure that care is taken to protect equipment from damage and to prevent distribution of dust through duct systems.

.5 Do not use permanent plumbing, heating or air conditioning systems for temporary services during construction, except with written permission from Consultant.

3.3. CUTTING AND PATCHING

.1 Give notification of openings required for. Supply accurate details of location and size. When this requirement is not met, bear the cost of cutting and patching.

.2 In existing work, cutting, patching and restoration of finished work to original condition will be carried out at the expense of the installing contractor.

.3 Obtain written Consultant approval before cutting openings through structure.

.4 Where new work connects with existing and where existing work is altered, cut, patch and restore to match existing work.

3.4. PROTECTION

.1 Protect all work from damage. Keep all equipment dry and clean at all times.

.2 Cover openings in equipment, pipes and ducts, with caps or heavy gauge plastic sheeting until final connections are made.

.3 Repair any damage caused by improper storage, handling or installation of equipment and materials.

.4 Protect equipment, pipes and temporary services from weather damage.

3.5. TEMPORARY AND TRIAL USE

.1 Obtain written permission from Consultant to use and test permanent equipment and systems prior to Substantial Performance acceptance by Consultant.

.2 Consultant may use equipment and systems for test purposes prior to acceptance. Provide labour, fuel, material and instruments required for testing. Rectify incomplete work immediately to satisfaction of Consultant.

.3 Protect equipment and system openings from dirt, dust and other foreign materials during temporary usage. Whenever air handling systems are used for temporary services, in addition to other requirements specified, provide minimum {12 mm} [1/2”] thick glass fibre filter media in return air openings, transfer openings and other identified openings.

.4 Clean and renew equipment and systems used prior to acceptance.

.5 Warranty, including duration and commencement date, shall not to be affected by startup date of equipment.

3.6. COMPLETION

.1 Remove all debris from inside systems and equipment.

.2 Rectify deficiencies and complete work before submitting request for Substantial Performance inspection.

.3 Follow manufacturer's written instructions regarding bearing lubrication

.4 Check and align all drives to manufacturer's acceptable tolerances.

.5 Adjust belts for proper tension.

.6 Check and align all pumps to manufacturer's acceptable tolerances.

.7 Remove all temporary protection and covers.

.8 Remove oil and grease from equipment and bases.

.9 Clean all fixtures and equipment. Polish all plated surfaces.

.10 Vacuum clean the inside of all air handling systems, including fans, ducts, coils and terminal units to ensure that they are free from debris and dust.

.11 Change air and water filters.

.12 Remove, clean and reinstall pipeline strainer screens.

.13 Leave work in as new working order.

3.7. INSTRUCTIONS TO OWNER

.1 Submit check lists for each system or piece of equipment, indicating that all components have been checked and are complete prior to instruction period.

.2 Thoroughly instruct the Owner in the safe and efficient operation of the systems and equipment.

.3 Arrange and pay for the services of qualified manufacturer's representatives to instruct Owner on specialized portions of the installation, such as refrigeration machines, boilers, automatic controls and water treatment.

.4 Submit a complete record of instructions given to the Owner. For each instruction period, supply the following data:

.1 Date

.2 Duration

.3 system or equipment involved

.4 names of persons giving instructions

.5 names of persons being instructed

.6 other persons present

.5 Submit receipted verification of completed training to Consultant prior to final release of retentions.

.6 Carry out instructional period during a period of 5 days scheduled at Owner's convenience.

3.8. INTERRUPTION OF EXISTING SERVICES

.1 Arrange, schedule and perform work with minimum disturbance to existing facilities and services.

.2 Submit a complete schedule of service interruptions and changeovers with approximate dates required, durations and times of day, for approval before proceeding.

.3 Notify Owner at least 72 hours in advance of planned interruption to existing services.

.4 Interruption of services must occur at the times and for the duration stipulated by the Owner.

.5 Keep service interruption duration to an absolute minimum. Carry out all preparatory work, measurements, prefabrication, etc., without interruption of existing services.

.6 If service interruptions are required by the Owner during the night or on weekends, etc., premium time shall be included in the Contract Price. No extra charges will be allowed at a later date for failure to include same.

3.9. REMOVAL AND REUSE OF EXISTING MATERIALS

.1 Carry out demolition work in accordance with the Occupational Health and Safety Code.

.2 Remove existing equipment, services and obstacles where required for refinishing or restoring existing surfaces. Replace same as work progresses.

.3 Turn over to the Owner existing material and equipment removed but not identified for reuse on site. Acceptance of removed material and equipment is at discretion of Owner. Remove such items from site when deemed unsuitable.

.4 Execute work with least possible interference or disturbance to Owner and to other work taking place over the same time period.

.5 Use only elevators assigned for Contractor use for moving men and material within buildings. Protect walls of elevators to satisfaction of Owner prior to use and accept liability for damage, safety of equipment and overloading of existing equipment.

3.10. PROTECTION OF OWNER'S PREMISES

.1 Adhere strictly to the Owner's requirements.

.2 Confer with the Owner concerning schedule, dust and noise control prior to commencing work in or adjacent to existing facilities where such work might affect either those facilities or their occupants.

.3 Execute work with least possible interference or disturbance to occupants, public and normal use of premises.

.4 Provide temporary means to maintain security when security has been reduced.

.5 Only elevators, dumbwaiters, conveyors or escalators assigned for Contractor's use may be used for moving men and material within building. Protect walls of passenger elevators, to approval of Owner prior to use. Accept liability for damage, safety of equipment and overloading of existing equipment.

.6 Provide temporary dust screens, barriers, warning signs in locations where renovations and alteration work is adjacent to areas which will be operative during work.

.7 Drawings indicate approximate locations of known existing underground and above ground facilities. Avoid damage to existing services. Bear cost of repairs and replacements.

.8 Immediately advise Consultant when unknown services are encountered and await instructions.

.9 Accept liability for costs incurred by the Owner in repairing and cleaning equipment, etc., resulting from failure to comply with the above requirements.

END OF SECTION

PART 1 - GENERAL

1.1. WORK INCLUDED

.1 Provide all labour, materials, products, equipment and services to supply and install the basic mechanical materials indicated on the Drawings and specified in these Specifications.

1.2. IDENTIFICATION OF MECHANICAL SERVICES

.1 Identify all mechanical services after finish painting is complete.

.2 Use terminology consistent:

.1 with the Drawings and Specifications

.3 Identify lay-in type acoustic ceilings used for access to equipment and components by a method acceptable to Consultant.

.4 Mark valve and equipment identification on Record Drawings.

.5 Provide typewritten master lists for each Equipment Room. Frame under glass. Insert copies in Operating and Maintenance Instruction Manuals.

1.3. PIPE AND DUCTWORK IDENTIFICATION

.1 Provide SMS Wrap-Mark on all pipe coverings, using Wrap-Mark pipe markers with flow arrow and alternating wording. For outside diameters up to {150 mm} [6"], allow marker to completely wrap pipe. For larger outside diameters, secure markers with stainless steel springs. Secure markers on vertical piping and elsewhere where markers could be inadvertently moved.

.2 Use stencils and stencil paint on ductwork or ductwork insulation. Apply solid black capitalized lettering {50 mm} [2"] high and solid black flow arrows {150 mm} [6"] long x {50 mm} [2"] wide.

.3 Locate identification and flow arrows so they can be seen clearly from floor and service platforms

.1 at least once in each room

.2 at each piece of equipment

.3 at each branch close to connection point to main piping and ductwork

.4 at not greater than intervals of {15 metres} [50 ft] on straight runs of exposed piping and ductwork

.5 at entry and leaving point to pipe and duct chases, or other concealed spaces

.6 both sides where piping and ductwork passes through walls, partitions and floors

.7 on vertical pipes and ducts approximately {1800 mm} [6 ft] above floor

.8 behind each access door and panel

.9 at valves, identify piping upstream of valves and identify branch, equipment, building part or building serviced downstream of valve

.4 Colour code pipes to meet code and Owner's requirements.

1.4. VALVE TAGS

.1 Provide {40 mm} [1-1/2"] dia., {1 mm} [0.040"] thick brass tags with {10mm} [3/8"] high die-stamped black letters.

.2 Attach to valves with {100 mm} [4"] long brass chains.

.3 Tag all valves except for small valves isolating a single piece of equipment such as a unit heater, fan coil unit, terminal reheat coil and radiation section.

1.5. EQUIPMENT NAMEPLATES

.1 Identify equipment, starters, and, remote control devices in a manner consistent with the Drawings.

.2 Use solid black capitalized lettering {100 mm} [4"] high.

.3 Where equipment size does not permit stencil identification, use lamacoid labels, engraved white on black, mechanically fastened to the equipment. Minimum lettering size {10 mm} [3/8"].

1.6. CONTROLS IDENTIFICATION

.1 Meet Section 15955 and 15965 requirements.

1.7. FLOW DIAGRAMS

.1 Prepare neat diagrams {1200 mm x 900 mm} [48" x 36"] of piping systems to identify equipment and valves.

.2 Insert legible page size copies into each Operating and Maintenance Manual.

.3 Install diagrams, framed under glass, on Equipment Room walls where directed by Owner.

PART 2 - PRODUCTS

2.1. INSERTS

.1 Submit proposed materials and methods for cast-in-place inserts.

.2 Where inserts must be placed after concrete is poured, use Phillips Red Head Multiset II Anchor system or equivalent Hilti System.

2.2. PIPE HANGERS

.1 Provide pipe hangers and supports for all piping. Provide hangers in accordance with the following requirements. Provide steel supports in accordance with the subsequent article in this specification section. Provide galvanized steel hangers

and supports with galvanized fittings and accessories where exposed to direct contact with water or to possible high humidity conditions where condensation can occur.

.2 Provide manufactured hangers, accessories and supports in accordance with ANSI B31.1 and MSS SP58, SP69, SP89 and SP90 similar to the Grinnell or Myatt figures numbers below.

.3 Select products to ensure adequate safety factors under anticipated loads.

.4 Provide upper attachments as follows:

.1 Standard beam clamp for normal service - Grinnell Fig 133 with Fig 290 or Fig 278 or Myatt Fig 500 with Fig 480 or Fig 440.

.2 Standard side beam clamp for normal service - Grinnell Fig 225 or Myatt Fig 505.

.3 Top beam clamp - Grinnell Fig 92 or Myatt Fig 406.

.4 C clamp - Grinnell Fig 86 or Myatt Fig 586.

.5 Angle clip for light duty side mounting - Grinnell Fig 202 or Myatt Fig 542.

.5 For vertical adjustment of hanger rods, provide forged steel turnbuckle - Grinnell Fig 230 or Myatt Fig 475.

.6 Provide pipe attachments as follows:

.1 Clevis hanger for copper piping up to and including {100 mm} [4"] diameter - Grinnell Fig CT-65 plastic coated or Myatt Fig 56 epoxy coated.

.2 Swivel ring hanger for copper tubing up to and including {25 mm} [1"] diameter - Myatt Fig 43 epoxy coated.

.3 Standard duty clevis hanger for steel piping - Grinnell Fig 260 or Myatt Fig 124.

.4 Standard duty long clevis hanger for steel piping - Grinnell Fig 300 or Myatt Fig 124L.

.7 Provide vertical pipe supports as follows:

.1 Riser clamp for copper pipe - Grinnell Fig CT121C plastic coated or Myatt Fig 186 epoxy coated.

.2 Riser clamp for steel or cast iron pipe - Grinnell Fig 261 or Myatt Fig 182 or Fig 183.

.8 Provide supports for other piping types such as plastic, mechanically fused or packed joint pipe according to the pipe manufacturer’s published recommendations. Support piping continuously where required to prevent sagging.

.9 Provide protection saddles where insulated piping is supported from below.

.1 For high temperature insulated pipe - Grinnell Fig 160 or Fig 165 or Myatt Fig 210 or Fig 240.

.2 For insulated pipe with vapour barrier for low temperature service, insulate pipe with calcium silicate at hangers and provide Grinnell Fig 167 or Myatt Fig 251.

.10 Provide roll type supports where longitudinal movement may occur. Provide single pipe rolls - Grinnell Fig 177 or Myatt Fig 262 where supported from below and Grinnell Fig 171 or Myatt Fig 261 where suspended. Provide spring cushions where slight vertical movement is likely and cushioning required - Grinnell Fig 178 or Myatt Fig 880.

.11 Provide Grinnell or Myatt engineered constant support hangers on piping subject to vertical movement exceeding {40 mm} [1 1/2"] due to vertical pipe expansion.

2.3. SLEEVES, WALL AND FLOOR PLATES

.1 For pipe sleeves, use machine cut and reamed standard weight steel piping.

.2 Concealed perimeter risers and runouts may have sleeves of {1.31 mm} [18 gauge] galvanized steel set around section of insulation to provide freedom of movement of piping. Extend {50 mm} [2"] above finished floor level.

.3 For piping through exterior walls, cooperate with the waterproofing trade at all times, and do not break any waterproofing seal without consent of the waterproofing trade. Provide waterproof link seals as detailed on Drawings.

.4 Provide leak plates where pipe sleeves pass through exterior building walls. Each leak plate shall be a {3.42 mm} [10 gauge] steel plate, welded to the sleeve, {100 mm} [4"] diameter greater than sleeve outside diameter.

.5 Provide {1.31 mm} [18 gauge] galvanized steel duct sleeves. Provide adequate bracing for support of sleeves during concrete and masonry work. For fire rated floors and walls, build fire damper assemblies into structure to attain fire rated construction, in a manner acceptable to the governing authorities.

.6 Cover pipe sleeves in walls and ceilings of finished areas, other than Equipment Rooms, with satin finish stainless steel, or satin finish chrome or nickel plated brass escutcheons, with non-ferrous set screws. Do not use stamped steel split plates. Split cast plates with screw locks, however, may be used.

.7 Cover exposed duct sleeves in finished areas with {1.31 mm} [18 gauge] galvanized steel plates in the form of duct collars. Fix in position with non-ferrous metal screws.

2.4. PROVISION FOR PIPE EXPANSION, CONTRACTION AND BUILDING SHRINKAGE

.1 Where space limitations do not permit the use of expansion loops or offsets, provide Flexonics Expansion Joints properly selected for system operating pressures according to the following:

.1 For piping up to and including {65 mm} [2-1/2"], select ends to suit specified pipe fittings. Pressure ratings for Model H and HB expansion compensated as {1400 kPa} [200 psi] and {1050 kPa} [150 psi].

.2 Steel Piping - Flexonics Model H expansion compensator with two ply stainless steel bellows.

.3 Copper Piping - Flexonics Model HB expansion compensator with two ply bellow, all bronze construction.

.4 For piping {75 mm} [3"] and above, use flanged ends.

.5 Steel Piping - Flexonics controlled, flexing expansion joint with stainless steel pressure carrier, flanged ends.

.6 Copper Piping - Flexonics controlled, flexing expansion joint with monel pressure carrier, and brass flanged ends.

2.5. PIPE GUIDES AND ANCHORS

.1 Pipe reaction and loads imposed on structure are indicated on the drawings. Refer to Architectural and structural drawings for location of embedments and structural beams required to be provided by this Division for the support of pipe risers.

.2 Be responsible for the design and installation of guides and anchors in all vertical and horizontal piping, including piping such as generator exhaust piping, boiler flues, etc.

.3 Submit to Consultant, drawings showing the riser sizes, offsets, location of expansion joints, anchors and guides and other pertinent information. Provide details of the design of riser anchors, guides, attachments and loads imposed on structure. All designs and calculations shall be stamped and sealed by a Professional Engineer Contracted by the installing contractor.

.4 The concrete structure will undergo elastic shortening as it is built. Make due allowance for shrinkage of the building. The exact amount is to be determined by the Structural Engineer, and will be approximately 8 mm per floor. Ensure sleeve openings are adequate to accommodate movement and that sufficient resilient packing is left. Ensure that pipe and duct will not shear as a result of shrinkage.

.5 The Contractor shall review all sleeved penetrations in the core and shall provide a written report testifying that all sleeves and anchorages have provision for shrinkage.

2.6. DRAINS

.1 Provide {40 mm} [1-1/2"] minimum size copper pipe drains from overflows, condensate pans and pump bases to floor drains.

.2 Provide minimum {20 mm} [3/4"] ball valve with hose end adapter, metal cap and chain at all low points of all systems. Locate to allow easy connection of hose.

.3 Provide {40 mm} [1-1/2"] minimum size drains from ductwork connected to intake hoods and wall louvres. Equip drains with deep seal traps. Locate traps in heated areas.

.4 Provide {20 mm} [3/4"] valves with metal caps and chains at the base of all pipe risers. Install hose end ball valve in conjunction with {450 mm} [18"] minimum length full line size dirt leg.

2.7. ACCESS DOORS AND PANELS

.1 Provide access for concealed mechanical equipment and install systems and components to minimize number of access doors and panels. Install equipment and components to be readily accessible through doors and panels.

.2 Supply for installation by Other Contractors, doors, panels and frames.

.3 Select access doors and panels to suit Architectural finishes and large enough to provide adequate access to equipment and components. Where personnel must pass through, provide minimum {600 mm x 450 mm} [24" x 18"] doors and panels. Otherwise, provide minimum {300 mm x 300 mm} [12" x 12"] doors and panels.

.4 Provide access doors and panels with a fire rating matching fire rating of the structure.

.5 In tiled walls, provide {2.78 mm} [12 gauge] Type 304 stainless steel with #4 finish, with recessed frame secured with stainless steel countersunk flush head screws.

.6 For all other surfaces, provide {2.66 mm} [12 gauge] welded steel, flush type with concealed hinges, lock and anchor strap, and factory prime coat finish.

2.8. FLASHING

.1 Flashing shall be by Division 7 for roof curbs shown on the Architectural or Structural Drawings.

.2 Provide flashing for pipe openings or premanufactured roof curbs.

.3 Provide counterflashing for roof mounted mechanical equipment and for pipes and ducts passing through roof. Fit counterflashing over flashing or curb. Pitch pockets are not acceptable.

2.9. CURBS

.1 Provide roof curbs if existing roof curbs are found to be significantly deteriorated when existing rooftop equipment is removed.

.2 All curbs required for work will be provided by installing contractor

.3 Premanufactured curbs for roof mounted mechanical equipment will be supplied by equipment manufacturer and are specified under other Sections.

.4 Provide curbs for roof mounted equipment, around ducts passing through roof and surrounding groups of pipes and/or ducts pass through Equipment Room floors, Kitchens and similar areas

.5 Provide roof curbs at least {300 mm} [12"] above finished roof, unless exceeded by Architectural considerations.

.6 Provide concrete curbs around holes in Equipment Room floors, extending at least {150 mm} [6"] above finished floor. Make watertight connection between curb and floor.

2.10. COVERS

.1 Supply frames for installation.

.2 Provide covers for pits and sumps.

.3 Provide gas tight gaskets for all pits.

.4 Trench gratings will be provided by the installing contractor.

2.11. STEEL

.1 Provide steel required for work. Provide steel for framing, lintels, etc.

.2 Provide steel of adequate strength to support equipment and materials during all operating and test conditions.

.3 Support suspended equipment from the bottom or from manufacturer's designated suspension points. Support tanks and similar equipment with adequate beam strength by saddles with curvature to match the equipment. Continuously support other equipment.

.4 Provide base supports for all pipe risers. Design to distribute operating and static loads.

.5 Fabricate steel supports in contact with water or humidity conditions from materials having approved corrosion resistance or galvanize after fabrication or brush welds clean and apply a prime coat of rust inhibiting paint.

2.12. WELDING AND BRAZING

.1 All welding and brazing shall conform to the following codes and standards:

.1 Building Services Piping Code ANSI/ASME B 31.9 (latest edition)

.2 CSA B51 (latest edition), Boiler, Pressure Vessel and Pressure Piping Code

.3 ASME Boiler Code - Section IX

.4 All requirements of the Technical Standards and Safety Authority (TSSA)

.2 Welding shall conform to a welding procedure which must be in accordance with TSSA requirements and include materials, weld preparation, heat treatment and welding equipment to be used.

.3 Qualify welders according to ASME equivalent testing procedures. Do not use welders, on or off site work who are not qualified for the work. Maintain records for all qualification testing, and provide copies to the Consultant on request.

.4 Identify work in accordance with codes and standards. Welds shall be full penetration, continuous and without defects. After deposition, each layer of weld shall be cleaned to remove slag and scale by wire brushing or grinding, then chipped where necessary to prepare for proper deposition of the next layer. The weld reinforcement shall not be less than {1.6 mm} [1/16"] and not more than {3.2 mm} [1/8"] above the normal surface of the joined sections. The reinforcement shall be crowned at the centre and shall merge into the base material without excessive shoulder or undercut.

.5 Welding shall be made by machine or manual shielded metallic arc process. Direct current shall be used exclusively with the base material on the negative side of the line. Electrodes used shall be an approved all position rod type.

.6 Provide a copy of TSSA registration and include with Maintenance Manuals.

PART 3 - EXECUTION

3.1. PIPE, DUCT AND EQUIPMENT INSTALLATION

.1 Locate distribution systems, equipment and materials for maximum usable space, optimum service clearances and to accommodate current requirements and identified future expansion.

.2 Coordinate services installation above typical floor modular ceilings to allow installation and future relocation of lights and air troffers without interfering with or requiring relocation of mechanical, electrical or other services, or removal of ceiling grid.

.3 Include all pipe and duct offsets required to eliminate interference with the work of other Divisions.

.4 Install equipment and materials to present a neat appearance. Run piping, ducts and conduit parallel to or perpendicular to building planes. Conceal piping, ducts and conduit in finished areas. Install so as to require a minimum amount of furring.

.5 Install pipe, duct and conduit straight, parallel and close to walls and slab or deck underside, with specified pitch.

.6 Use standard fittings for all direction changes. Do not use drilled tees and other field fabricated fittings.

.7 Install eccentric reducers in horizontal piping to permit drainage and eliminate air pockets.

.8 Where pipe sizes differ from connection sizes of equipment, provide reducing fittings between inline components such as valves, strainers and fittings, and equipment. Reducing bushings are not permitted.

.9 Cap open ends of piping during installation.

.10 Lay copper tubing so that it is not in contact with dissimilar metal and will not kink or collapse.

.11 Use non-corrosive lubricant or teflon tape equal to Dow Corning and apply on male thread.

.12 Provide brass adaptors or dielectric couplings wherever dissimilar metals are joined.

.13 No pipe to be laid in water or when, in opinion of Consultant conditions are unsuitable.

.14 Protect buried copper and steel piping with Tapecoat materials using procedures recommended by Tapecoat Company of Canada Limited, or other approved manufacturer.

.15 Ensure that pipe installation does not transmit vibration to the walls and floors through which they pass.

.16 Make provisions for neat insulation finish around equipment and materials. Do not mount equipment within insulation depth.

.17 In electrical rooms and elevator machine rooms, provide drip trays under the entire length of all pipe within the confines of the room. Pipe drip tray to nearest floor drain.

.18 Perform pipe welding to meet ANSI B31.9.

3.2. CONNECTIONS TO EQUIPMENT

.1 Provide unions or flanges at all connections to equipment. Ensure that piping adjacent to equipment is readily removable for servicing and/or removal of equipment without shutting down entire system.

.2 Install unions in piping up to and including {50 mm} [2"] pipe size. Install flanges in piping {65 mm} [2-1/2"] pipe size and larger.

.3 Prevent galvanic corrosion by isolating copper and steel. Use red brass adapters, or completely isolate flanges using full face gaskets with bolts installed through phenolic sleeves with insulating fibre washers. Where the Plumbing Code prohibits the use of red brass adapters, use insulating couplings. Where valves are required, solid brass isolating valves may be used in lieu of adapters or couplings.

.4 Provide metallic code rated continuity link between flanges or unions, where pipes carry flammable fluids or gases.

.5 Make all plumbing and sheet metal connections to equipment provided by the Owner.

3.3. INSERTS

.1 Size and space for the loads to be supported.

.2 Properly locate and firmly secure inserts to forms before concrete is poured.

.3 Place inserts only within main structure and not in any finishing materials.

.4 When inserts are required in precast concrete, supply inserts and location drawings to the precast concrete supplier for casting into material. Otherwise, have precast concrete supplier install inserts at site.

.5 Do not use powder actuated tools.

3.4. HANGERS

.1 Install spring hangers or other special supports specified in Section 15240.

.2 Suspend piping, ductwork and equipment with all necessary hangers and supports for a safe and neat installation. Ensure that pipes are free to expand and contract and are graded properly. Adjust each hanger to take its full share of the weight.

.3 Suspend hanger rods directly from the structure. Do not suspend pipes, ducts or equipment from other pipes, ducts, equipment, or ceilings.

.4 Provide auxiliary structural steel angles, channels and beams where ductwork, piping and equipment is suspended between joists or beams.

.5 Use galvanized rods, steel support angles, channels and beams where exposed to direct contact with water or to possible high humidity conditions where condensation can occur.

.6 Space hangers to ensure that structural steel members are not over stressed. Do not space hangers further apart than indicated in the tables. When requested, submit detailed drawings showing locations and magnitude of ductwork, piping and equipment loads on the structure. Provide calculations when requested by Consultant.

.7 Do not use trapeze type hangers for support of piping, without prior review by Consultant. Where permitted, fabricate from angle or channel frames, and space hangers to suit the smallest pipe size.

.8 Do not use hooks, chains or straps to support equipment and materials.

.9 Ensure that copper materials are completely isolated from ferrous materials. Use plastic or epoxy coated hangers and clamps. Use lead inserts between copper piping and other ferrous materials.

.10 Provide round steel threaded rods meeting ASTM A-36. Provide cadmium plated rod and accessories where exposed to direct contact with water or to possible high humidity conditions where condensation can occur.

.11 The following table establishes minimum standards of rod sizes and hanger spacing for steel and copper piping.

Maximum Horizontal Spacing of Supports			
Pipe Size {mm} [in]	**Rod Size {mm} [in]**	**Steel {m} [ft]**	**Copper {m} [ft]**
{12} [1/2]	{10} [3/8]	{1.5} [05]	{1.5} [05]
{20} [3/4]	{10} [3/8]	{1.8} [06]	{1.8} [06]
{25} [1]	{10} [3/8]	{1.8} [06]	{1.8} [06]
{32} [1-1/4]	{10} [3/8]	{2.4} [08]	{2.1} [07]
{40} [1-1/2]	{10} [3/8]	{2.7} [09]	{2.4} [08]
{50} [2]	{10} [3/8]	{2.7} [09]	{2.7} [09]
{65} [2-1/2]	{12} [2]	{3.0} [10]	{3.0} [10]
{75} [3]	{12} [2]	{3.0} [10]	{3.0} [10]
{90} [3-1/2]	{12} [2]	{3.0} [10]	{3.3} [11]
{100} [4]	{16} [5/8]	{3.0} [10]	{3.7} [12]
{125} [5]	{16} [5/8]	{3.7} [12]	{3.7} [12]
{150} [6]	{20} [3/4]	{3.7} [12]	{3.7} [12]
{200} [8]	{22} [7/8]	{3.7} [12]	
{250} [10]	{22} [7/8]	{3.7} [12]	

Maximum Horizontal Spacing of Supports			
Pipe Size {mm} [in]	**Rod Size {mm} [in]**	**Steel {m} [ft]**	**Copper {m} [ft]**
{300} [12]	{22} [7/8]	{3.7} [12]	
{350} [14]	{25} [1]	{3.7} [12]	
{400} [16]	{25} [1]	{3.7} [12]	
{450} [18]	{29} [1-1/8]	{3.7} [12]	
{500} [20]	{32} [1-1/4]	{3.7} [12]	
{600} [24]	{32} [1-1/4]	{3.7} [12]	

.12 For steel pipe sizes larger than {600 mm} [24"], refer to Drawings.

.13 In addition to these basic requirements, provide hangers in the following location:

.1 to eliminate vibration

.2 at points of vertical and horizontal change of direction of pipe

.3 at valves and strainers

.4 on mains at branch takeoffs

.5 to avoid stress on equipment connections

.14 Support horizontal cast iron soil pipe at each hub. Where groups of fittings occur, support at every three joints.

.15 Refer to applicable articles of the Specification regarding thermal insulation requirements. Unless shown specifically on Drawings, provide the following support methods.

.1 For insulated warm and hot water piping, for condensate piping and for steam piping up to {65 mm} [2-1/2"] diameter, support with hangers directly on piping.

.2 For steam piping {75 mm} [3"] diameter and above, support with hangers under protection saddles.

.3 For chilled water and domestic cold water piping, hangers shall be large enough to fit over specified pipe covering. At each point of support, install specified saddles with sufficient length to prevent crushing of insulation.

.16 Generally, support ducts with {2.7 mm} [12 gauge] by {25 mm} [1"] wide galvanized hangers or with {12 mm} [½"] dia. rods and {40 mm} [1-1/2"] rolled angle saddles to meet SMACNA or ASHRAE Standards.

.17 Support vertical duct risers at each floor with rolled angle collars bearing on building structure.

3.5. SLEEVES, WALL PLATES, FLOOR PLATES

.1 Set sleeves for piping and ductwork in conjunction with erection of floors and walls. Locate sleeves accurately in accordance with submittal drawings, and as follows:

.1 Through interior walls, set sleeves flush with finished surfaces on both sides.

.2 Through exterior walls above grade, set sleeves flush with finished surfaces on inside and to suit flashing on outside.

.3 For floors in Mechanical Equipment Rooms, Janitors Closets, Kitchens and similar areas where a water dam is required, set sleeves flush to underside of structure and extending {50 mm} [2"] above finished floor.

.4 For other floors, set sleeves flush to both finished surfaces. Refer to Room Finish Schedule.

.2 Size sleeves to provide {25 mm} [1"] clearance around insulated piping and ductwork.

.3 Provide continuous insulation runs through fire separations. Ensure piping and ductwork does not touch sleeves or for warm and hot water piping and ductwork terminate insulation cover on each side of sleeve. For chilled water and domestic cold water piping, provide same thickness Manville Thermo-12 pipe insulation with all purpose vapour barrier jacket through fire separation to a point {100 mm} [4"] on each side of fire separation.

.4 Install leak tight seals to meet the manufacturer's requirements. Select inside diameter of wall sleeve opening to fit the pipe and seal leak tight.

.5 Additional sleeving requirements:

.1 Provide sleeves for systems not part of Contract, but identified to be required on Drawings.

.2 Provide sleeves to accommodate compressed air piping and wiring conduits required for work.

.3 Provide sleeves to accommodate future services Include for the cost of drilling and setting sleeves.

.4 Fill unused sleeves through fire separations with firestop material (see Firestopping article). Fill other unused sleeves with suitable noncombustible materials.

3.6. FIRESTOPPING

.1 Ensure that fire ratings of floors and walls are maintained.

.2 Fill spaces between openings, pipes and ducts passing through fire separations and install firestopping systems in accordance with the appropriate ULC system number for the products and type of penetration.

.3 Install firestopping systems using personnel trained or instructed by the product manufacturer.

3.7. PROVISION FOR PIPE EXPANSION, CONTRACTION AND BUILDING SHRINKAGE

.1 Make provision for pipe expansion, contraction and building shrinkage with suitable anchors, offsets or expansion loops.

.2 Install piping to allow freedom of movement in all planes without imposing undue stress on any section of main piping, branch piping, equipment or structure.

.3 Use offsets at takeoffs to radiation, unit heaters, fan coil units, risers and other branch lines.

.4 Select expansion joints for the calculated movement according to the following temperature ranges.

.1 For cold pipes, from minimum operating temperature to {38ºC} [100ºF], plus 25% safety factor.

.2 For warm and hot pipes, from minimum ambient, but not lower than {-5ºC} [23ºF], to maximum operating temperature plus 25% safety factor.

.5 Where ambient temperature during installation is higher than operating temperature, use precompressed expansion joints.

.6 Select expansion joints to withstand system test pressure, as well as operating pressures and temperatures.

.7 Install expansion joints in accordance with manufacturer's published instructions.

.8 During the construction and warranty periods, regularly review provisions for building shrinkage and make necessary adjustments to ensure freedom from binding and stress.

3.8. PIPE GUIDES AND ANCHORS

.1 Install pipe guides for expansion joints according manufacturer's published recommendations. Use at least two guides on each side of expansion joint.

.2 Install manufactured or field fabricated alignment guides to allow movement in axial direction only.

.3 Install vertical risers properly anchored and guided to maintain accurate vertical position of piping. At time of startup, clean and lubricate guides, and adjust to allow free sliding at operating conditions.

.4 For piping up to and including {75 mm} [3"], guide pipes at every floor or every {3900 mm} [13 ft]. Guide larger pipes at every second floor or every {7500 mm} [25 ft].

.5 Fabricate anchors from structural steel channels, plates or angles. Submit detailed shop drawings of anchors

.6 Secure anchors to the structure. Avoid introduction of excessive reactive forces and operating weights into the structure and onto equipment and piping.

.7 Where guides are provided on cold piping, provide thermal break to prevent sweating.

.8 Where mains or branches connect to risers, the first point of support of the main or branch shall be a spring type hanger to allow movement of the riser.

3.9. PAINTING

.1 Paint all ferrous metal work except piping, galvanized and stainless steel ductwork, with one factory prime coat, or paint one prime coat on site.

.2 Clean and steel brush surfaces with welds. Then prime coat all steel supports and brackets.

.3 On uninsulated piping, steel brush and prime coat welds.

.4 Touchup or repaint surfaces damaged during shipment or installation and leave ready for finish painting.

.5 Prime coat material shall conform to Canadian General Standards Board Standard No. 1-GP-48.

.6 Finish painting will be provided by Division 9.

3.10. ADDITION OF NEW CIRCUITS

.1 Before any new system is connected to an existing system, the new system shall be separately cleaned and treated by the specified method. No system may be connected to an existing system unless certified clean by the Contractor and inspected by the Consultant.

3.11. WELDING AND BRAZING INSPECTION

.1 Examine weld preparation and welding on site and off site at various stages of fabrication.

.2 Testing firm shall submit written evaluations of all testing.

.3 Make all radiographic film evidence of tested welds available for examination by the Consultant. Turn over original films for Owner's files.

.4 Failure of any retests by one welder shall result in examination of that welder's qualifications and test work. Further testing will be required in that welder's work without additional cost to the Contract.

.5 Any welds found to be of poor or doubtful quality shall be cut out and replaced with satisfactory welds.

.6 One or more of the following defects shall be cause for rejection of a weld:

.1 failure to meet radiographic requirements or other code tests

.2 welding performed by unqualified personnel

.3 welds not reasonably uniform in appearance

.4 evidence of peeling

.5 cracks

.6 oxidation around welds

.7 lack of fusion

.8 the presence of porosity, slag inclusion or overlaps

.9 undercutting adjacent to completed welds or evidence of undercutting by grinding

.7 Maintain full records of testing and submit copies to Consultant. Show details of each inspection, with the radiograph recording and the name and identification of the welder. Provide the test results within 24 hours of test.

END OF SECTION

PART 1 - GENERAL

1.1. WORK INCLUDED

.1 These Specifications are an integral part of the Contract Documents. Tendering and Contract Requirements and Division 1, General Requirements apply to all Specification Sections.

.2 Provide labour, materials, products, equipment and services required to complete the demolition work specified herein.

.3 Refer to Drawings for extent of demolition work. The drawings indicate the approximate locations of services as far as these are known.

.4 Dispose, off site, of all debris in accordance with the jurisdictional authorities.

.5 Removal and storage of salvageable items will be as directed by this specification section and the Owner or their representative.

.6 Mechanical demolition work associated with this building is indicated on the demolition drawings and generally and consists of the following:

.1 HVAC systems and equipment

1.2. REFERENCE STANDARDS

.1 Meet the requirements and recommendations of all Municipal, Provincial and Federal Bylaws and Ordinances.

.2 Execute this work in accordance with the latest edition of the following codes and standards.

.1 CAN/CSA-S350-M1980 - Code of Practice for Safety in Demolition of Structures.

.2 Ontario Building Code.

.3 Occupational Health and Safety Act.

.4 Regulations for Construction Projects.

.5 Ontario Fire Code.

.6 Regulations under Fire Marshals Act.

1.3. QUALITY ASSURANCE

.1 All work shall be performed by a firm having adequate equipment and skilled labour and being able to provide written evidence of satisfactorily completed work, similar to that specified during the past immediate five (5) years.

.2 Removal from site and disposal of debris shall be carried out in accordance with the requirements of the local jurisdictional authorities.

.3 Arrange and pay for all permits, notices and inspections necessary for the proper execution and completion of the demolition work.

1.4. SUBMITTALS

.1 Submit shop drawings as requested by the consultant, indicating demolition sequence, cutting and patching, bracing and protection of existing services designated to remain.

PART 2 - PRODUCTS

2.1. DISPOSAL OF MATERIALS

.1 All materials which have not been designated for salvage from the demolition shall become the property of the Contractor. Remove all material and debris from the site as quickly as possible and dispose of legally. Burning of debris or selling of materials on the site will not be permitted.

.2 Present to the Owner existing equipment removed but not identified for salvage on site. Acceptance of removed equipment is at the discretion of the Owner. Remove such items from site when deemed unsuitable.

.3 Conform to requirements of municipality's Works Department regarding disposal of waste materials.

.4 Materials prohibited from municipality waste management facilities shall be removed from site and disposed to recycling companies specializing in recyclable materials.

PART 3 - EXECUTION

3.1. GENERAL INSTRUCTIONS

.1 At the end of each work shift, leave work in a safe condition.

.2 Patch fire rated partitions and floors to maintain rating upon removal of mechanical services originally spanning fire rated assembly.

.3 Demolish work into sections of practical size for removal without alteration or damage to existing building.

3.2. STORAGE OF MATERIALS

.1 Store materials only in areas designated by the Owner and as permitted by the local jurisdictional authorities.

.2 Materials and debris shall not be stacked in building to the extent that overloading of any part of the structure will occur.

3.3. PROTECTION OF OWNERS PREMISES

.1 Adhere strictly to the Owner's requirements.

.2 Confer with the Owner concerning schedule, dust and noise control prior to commencing work in or adjacent to existing facilities where such work might affect either those facilities or their occupants.

.3 Execute work with least possible interference or disturbance to occupants, public and normal use of premises.

.4 Provide temporary means to maintain security when security has been reduced.

.5 Only elevators, dumbwaiters, conveyors or escalators assigned for Contractor's use may be used for moving men and material within building. Protect walls of passenger elevators, to approval of Owner prior to use. Accept liability for damage, safety of equipment and overloading of existing equipment.

.6 Provide temporary dust screens, barriers, warning signs in locations where renovations and alternation work is adjacent to areas which will be operative during work.

.7 Protect all mechanical systems, indicated to remain, from damage.

.8 Provide and maintain ready access to fire fighting equipment at all times.

.9 Provide and maintain proper and suitable fire extinguishers throughout the duration of the work.

.10 The drawings indicate the approximate locations of services as far as these are known. Should any mechanical or electrical service line be broken, or disrupted by operations specified under this contract, repair service lines, and make good all damage due to the disruption or break, at no expense to the Owner. Notify the Owner immediately whenever any service line is broken or damaged.

.11 The drawings indicate the approximate locations of services as far as these are known. Immediately advise Consultant in writing when unknown services are encountered.

.12 Accept liability for costs incurred by the Owner in repairing and cleaning equipment, etc., resulting from failure to comply with the above requirements.

3.4. RESTRICTIONS ON USE OF PREMISES

.1 Use only those existing entrances and stairs designated by the Owner for access to and egress from the existing buildings and various floors where work of this contract is to be carried out. No traffic through other areas of the building will be permitted without the prior consent of the Owner.

.2 Keep stairs and corridors clear and open as required by Fire Marshall for exit purposes in case of fire, and as required for use by the Owner's personnel.

.3 Owner will designate which toilet facilities may be used.

3.5. PRE-DEMOLITION AUDIT

.1 The installing contractor shall, in the presence of the Owner and the Consultant, conduct a pre-demolition audit to determine exactly which materials in the existing building are to be included in the demolition work and which materials can be either reused by the Owner or resold by the Contractor. Submit, in writing, to the Owner, findings from the audit.

.2 Items from demolition which will be disposed of shall be so done in accordance with the applicable requirements of the "Build Green Project" in force at the place of work, at the time of this work.

3.6. PREPARATION

.1 Notify the consultant a minimum of **72 hours** prior to commencing this work.

.2 Prior to commencing this work arrange to have the appropriate trades concerned present for the disconnection of all utility services.

.3 Ensure that all existing services designated to remain are adequately protected.

3.7. INTERRUPTION OF EXISTING SERVICES

.1 Arrange, schedule and perform work with minimum disturbance to existing facilities and services.

.2 Submit a complete schedule of service interruptions and changeovers with approximate dates required, durations and times of day, for approval before proceeding.

.3 Notify Owner in writing at least 72 hours in advance of planned interruption to existing services.

.4 Interruption of service must occur at the times and for the duration stipulated by the Owner.

.5 Keep service interruption duration to an absolute minimum. Carry out all preparatory work, measurements, etc., without interruption of existing services.

.6 If service interruptions are required by the Owner during the night or on weekends, etc., premium time shall be included at the Contract Price. No extra charges will be allowed at a later date for failure to include same.

END OF SECTION

PART 1 - GENERAL

1.1. WORK INCLUDED

.1 Comply with Division 1, General Requirements and all documents referred to therein.

.2 Provide all labour, materials, products, equipment and services to supply and install the sound and vibration control devices indicated on the Drawings and specified in this Section of the Specification.

1.2. QUALITY ASSURANCE

.1 Provide vibration isolation and duct attenuators from a single sound and vibration control manufacturer, whose responsibilities shall include, but not be limited to:

.1 supply of all vibration and sound isolation equipment necessary to meet the performance requirements

.2 coordination throughout the project with all provided equipment to ensure adherence to performance criteria

.3 determination of equipment, pipe and duct mounting arrangements

.4 field supervision and inspection to assure proper installation and performance

.5 allowance for expansion and contraction when selecting and applying isolation materials

.6 coordination of any silencer provisions with sound power levels of fans specified elsewhere in this Specification

.2 Ensure the provision of adequate vibration and sound control equipment for all fans, pumps, ducts, pipes, chillers, boilers, cooling towers, air handling units and other mechanical equipment.

.3 Ensure that no ducts and pipe installation transmit vibration to the walls and floors through which they pass.

.4 Provide equipment, pipe and duct mountings non-resonant with equipment operating and building structure natural frequencies.

1.3. SUBMITTAL REQUIREMENTS

.1 Supply to the sound and vibration control manufacturer, a copy of certified Shop Drawings of equipment to be isolated and sound power levels of equipment requiring sound attenuators.

.2 Submit Shop Drawings of sound and vibration control components including all calculations. For each piece of equipment to be isolated, identify on the shop drawings the equipment’s lowest operating speed, it’s weight, band, and the type and location of isolators.

.3 Submit Shop Drawings showing adequate concrete reinforcing steel details and templates for all concrete foundations and supports, all bases including necessary

concrete and steel work and vibration isolation devices, and all required hanger bolts and other appurtenances necessary for proper installation of the equipment.

1.4. VIBRATION ISOLATION PERFORMANCE

.1 For each piece of equipment to be isolated, select the vibration isolation mounts on the basis of 98% vibration isolation efficiency at the lowest operating speed. That is, the natural frequency of each vibration isolation system shall be no higher than 1/10 of the lowest excitation frequency of the rotating machinery, when ever practicable, but in no case greater than 1/7.

.2 Where structural floor deflection will exceed 1/10 of the determined static deflection of the isolator, increase the isolator static deflection to maintain this minimum ratio of the floor to isolator deflection.

.3 Static deflections shown on the drawings, specified or scheduled are a guide only. Actual isolators are to achieve the required static deflection under load, with at least 50% reserve deflection.

PART 2 - PRODUCTS

2.1. BASES

.1 The sound and vibration control manufacturer shall designate before installation, which equipment mounts shall be bolted to the structure.

.2 Steel bases and concrete inertia bases shall clear the sub-bases by at least {25 mm} [1"] and {50 mm} [2"] respectively. Bases shall be blocked and shimmed level so that duct and piping connections can be made to a rigid system at operating level before isolator adjustment.

.3 Refer to the Isolation Schedule to determine which of the following types of bases shall be used:

.1 Type S: Integral steel fan and motor bases, complete with motor slide rails welded in place, shall have minimum vertical sections as follows:

Horsepower	**Vertical Section Size**
Up to {2.25 kW} [3 hp]	{75 mm} [3”]
Up to {5.6 kW} [7 ½ hp]	{100 mm} [4”]
Up to {14.9 kW} [20 hp]	{150 mm} [6”]
Up to {37.0 kW} [50 hp]	{200 mm} [8”]
Over {37.0 kW} [50 hp]	{250 mm} [10”]

.2 Type SS: Slung steel bases of structural members with gusset plates welded to the ends. Construction shall be similar to Type S integral steel fan and motor bases.

.3 Type C: Reinforced concrete inertia bases shall have full depth perimeter structural channel frames, and reinforcing rods welded in place. Spring mounts shall carry load by means of gusseted brackets, welded to the steel channel sides. Concrete strength shall be {17,500 kPa} [2500 psi]. Refer to Schedule for depth of bases.

2.2. ISOLATORS

.1 All spring isolators shall be complete with levelling devices, {6 mm} [1/4"] thick ribbed neoprene sound pads and completely stable, colour coded springs.

.2 Select springs to operate at no greater than 2/3 solid deflection.

.3 Paint all hardware with zinc chromate. For applications subject to outdoor or high humidity conditions, neoprene coat springs, and paint mounts with two coats of rust resisting paint. Use neoprene instead of rubber when pads may be affected by outside weather conditions or oil contamination.

.4 Piping connections to air compressors shall be isolated with FPM Metal Hoses.

.5 Support equipment with one of the following types of isolator, as scheduled:

.1 Type CM: closed spring mounts with top and bottom housing separated with neoprene rubber stabilizers.

.2 Type FS: Open spring mounts having extra stable iso-stiff springs. (Horizontal stiffness shall be equal to vertical stiffness).

.3 Type CSR: Free standing restrained mounts with heavy rigid steel base frame, built-in limit stops and removable spacer plates. Springs shall be iso-stiff with a minimum horizontal to vertical stiffness (Kx/Ky of 1.0). The clearance around the bolt holes must be a minimum {12 mm} [½"] such that a +/-3 degree rotational misalignment may be tolerated. As an alternative, provide rubber sleeve of minimum {3 mm} [1/8"] thick, no more than 60 Durometer hardness for limit stop bolts so that shortening would not be possible.

.4 Type HCS: Similar to Type SH, suitable for horizontal installation to limit horizontal movement of isolated equipment.

.5 Type MD: Elastomer rubber mount with threaded insert and hold down bolt holes.

.6 Type R: Waffle pads shall be 50 durometer natural rubber {14,000 kPa} [2000 psi] tensile, a minimum of {12 mm} [½"] thick and selected for an optimum loading of {420 kPa} [60 psi]. When pads are built into spring isolators or hangers 50 durometer {21,000 kPa} [3000 psi] tensile pads are acceptable with an optimum loading of {630 kPa} [90 psi].

.7 Type N: Waffle pads shall be 30 durometer neoprene, {12,600 kPa} [1800 psi] tensile, minimum of {12 mm} [½"] thick and selected for an operating load of {630 kPa} [90 psi].

.8 Type RSR: Rubber-steel-rubber pads shall consist of two layers of {12 mm} [½"] thick Type R pad, as specified above, bonded to each side of {6 mm}

[1/4"] steel plate. All holes to be sleeved and complete with an isolation washer.

.9 Type NSN (special): Neoprene-steel-neoprene pads shall consist of two layers of {12 mm} [½"] thick Type N pad, as specified above, bonded to each side of {1.6 mm} [1/4"] steel plate. All holes to be sleeved and complete with isolation washers.

.10 Type KIP: Kinetic precompressed moulded fibreglass pads shall be coated with a flexible moisture impervious elastomeric membrane. Glass fibres, produced by the multiple flame attenuation process shall have a diameter not exceeding {.0045 mm} [.00018"].

2.3. SPRING HANGERS

.1 Select springs to operate at not greater than 2/3 solid deflection. Paint all hardware with zinc chromate primer.

.2 Spring hangers shall be Type SH or Type SHR with completely stable, colour coded springs.

.3 The spring and cup washer assembly shall have a single stable position under load.

.4 All hangers must be capable of tolerating a vertical misalignment of +/-15 degrees without loss of stability.

.5 Ensure that there is no physical contact between pipes and sleeves or pipes and structure.

.6 Type SH: Shall have fabricated steel housing with one coat anti-rust paint, and be complete with a colour coded stable spring, retaining cups and acoustic washer.

.7 Type SHR: shall be as for Type SH above, but shall have a {25 mm} [1"] elastomeric element in lieu of acoustic washer.

.8 Attach top of hanger frame rigidly to the structure. However, do not install spring hangers in concealed locations.

.9 Suspend piping connected to isolated equipment with Type SHR spring hangers as follows:

.1 Up to {100 mm} [4"] pipe - at first 3 points of support.

.2 {125 mm to 200 mm} [5" to 8"] - at first 4 points of support.

.3 {250 mm} [10"] and larger - at first 6 points of support.

.10 The first point of support shall have a static deflection of twice the deflection of the isolated equipment.

.11 If, due to space restrictions, it is impossible to use at least two spring hangers, provide rubber hose to provide flexibility. Flexible metal hose may only be used when pressure rated rubber hose is not available. Provide control cables in lieu of control rods where alignment is required.

.12 Ensure that there is no physical contact between pipes and sleeves, or pipes and structure.

2.4. SILENCERS

.1 Completely prefabricate all silencers using incombustible materials. Silencers shall have rounded inlets and tapered diffuser outlets. Equip circular silencers with centre bodies with spun aluminum noses and taped diffuser outlets. Select silencers to attain the specified values of maximum allowable air pressure drop, and minimum allowable duct to reverberant room insertion loss.

.2 Acoustic media shall be inorganic, inert and rot proof. Density of media shall be {40 kg/cubic metre} [2-1/2 lb./cu.ft.] packed under 10% compression and protected from air erosion by {0.89 mm} [22gauge] perforated galvanized metal. In addition, media in silencers with internal air velocities above {23 m/s} [4500 ft/minute] shall be protected with glass fibre cloth.

.3 Factory paint Class II circular silencers with anti rust prime coat.

.4 Equip circular silencers {600 mm} dia. [24"] and larger with lifting lugs.

.5 Rectangular silencers, Type RSS shall be constructed according to either of the following classes. Silencers over {1200 mm} [48"] in any one cross sectional dimension shall be constructed in modules not exceeding {1200 mm} [48"].

.1 Class I: Outer shell shall be minimum {0.89 mm} [22 gauge] galvanized steel with airtight mastic filled seams, and {50 mm} [2"] slip connections each end.

.2 Class II: Outer shell shall be minimum {1.61 mm} [16 gauge] galvanized steel with spot welded and caulked seams.

.3 Class III: The outer casing shall be a minimum of {1.61 mm} [16 gauge] hot rolled steel with all seams continuously welded and steel angle flanges.

.6 Type CCB and CST: Size {300 mm to 900 mm} [12" to 36"] dia. and up to and including {1500 mm} [60"] long shall have an outer casing of a minimum {0.89 mm} [22 gauge] galvanized steel with lock formed airtight mastic filled seams. Sizes over {900 mm} [36"] dia. and {1500 mm} [60"] long shall have an outer casing of a minimum {1.61 mm} [16 gauge] spun aluminum nose cone hot rolled steel with continuous welded seams.

.7 Type ECCB: Sizes {300 mm to 1200 mm} [12" to 48"] dia. and up to and including {1500 mm} [60"] long shall have an outer casing of a minimum {1.52 mm} [16 gauge] hot rolled steel with continuous welded seams. Sizes over {1200 mm} [48"] dia. and {1500 mm} [60"] long shall have an outer casing of a minimum {3.04 mm} [11 gauge] hot rolled steel with continuous welded seams.

.8 Type CTS: Crosstalk silencers shall be constructed of {0.89 mm} [22 gauge] galvanized outer shell, and {0.55 mm} [26 gauge] galvanized perforated metal.

.9 Refer to the Silencer Schedule.

PART 3 - EXECUTION

3.1. FLOOR MOUNTED EQUIPMENT

.1 Erect floor mounted equipment on {100 mm} [4”] high concrete pads over complete floor area of equipment. Mount vibration eliminating devices and concrete inertia blocks on {100 mm} [4"] high housekeeping pads.

3.2. VIBRATION ISOLATION SYSTEMS

.1 Have vibration isolator manufacturer determine mounting sizes. Install in accordance with manufacturer's instructions.

.2 Installed vibration isolation system for each floor or ceiling supported equipment shall have a maximum lateral motion under equipment startup or shut down conditions of {6 mm} [1/4"]. Restrain excess motions by approved mountings.

3.3. MOUNTING SYSTEMS EXPOSED

.1 Protect mounting systems exposed to weather and other corrosive environments with factory corrosion resistant coatings. Hot dip galvanized metal parts of mountings (except springs and hardware). Cadmium plate and neoprene coat springs. Cadmium plate nuts and bolts.

3.4. PACKAGED AIR HANDLING UNITS MOUNTING

.1 Mount packaged air handling units which are not internally isolated directly on stable bare steel spring isolators. Where units to be mounted are furnished with internal structural frames and external lugs (both of suitable strength and rigidity), or without any severe overhangs, no additional structural frame provided beneath unit. Integrally mount motor on slide rails.

3.5. PIPE SUPPORT

.1 Support piping as follows:

.1 Resiliently support all suspended piping connected to isolated equipment.

.2 Provide resilient diagonal mountings or other approved devices to limit piping motion due to equipment startup or shutdown, to a maximum deflection of {3 mm} [1/8"].

3.6. EXPANSION AND CONTRACTION

.1 Allow for expansion and contraction when selecting and applying isolation materials.

3.7. NOISE LEVELS

.1 Isolate equipment to attain acceptable noise criteria (NC) levels in occupied areas, using terms of reference set out by ASHRAE.

.2 After systems have been balanced, take sound measurements throughout the complete range of audible frequencies from 63 Hz through 8000 Hz, in each occupied area above, below and beside each Mechanical Equipment Room and where directed. Plot readings on noise criteria NC curves.

.3 Modify, as required and at no additional cost to the Owner, the fan distribution and other mechanical systems to achieve the specified noise criteria.

.4 Submit a report, including sound curves, to substantiate that equipment has been isolated adequately, and that acceptable noise levels have been attained. Provide a list to indicate equipment in operation at time of readings taken. Certify report by Professional Engineer of Ontario.

.5 Make sound measurements in accordance with the American Standard Method for the Physical Measurement of Sound, ANSI S1.2.

.6 Sound measuring equipment shall be Type 2 Class I in accordance with ANSI Standards S1.4 or S1.11.

END OF SECTION

PART 1 - GENERAL

1.1. WORK INCLUDED

.1 Comply with Division 1, General Requirements.

.2 Provide all labour, materials, products, equipment and services to supply and install thermal insulation, vapour barriers and finishes for mechanical work as indicated on the Drawings and in these Specifications.

.3 Insulation requirements shall comply with Part 5 of the Model National Energy Code of Canada, latest version and insulation thickness shown are the minimum acceptable. Ensure thermal performance of insulating materials meet MNECC requirements.

1.2. SUBMITTALS

.1 Submit samples and specification sheets of insulation materials. Include manufacturer's installation instructions.

1.3. ENVIRONMENTAL REQUIREMENTS

.1 Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics and insulating cements.

.2 Ensure items to be insulated are dry and clean to not promote the growth of moulds.

1.4. QUALITY ASSURANCE

.1 Insulation materials shall be manufactured to meet ISO 9000 quality standards.

PART 2 - PRODUCTS

2.1. MATERIALS – GENERAL

.1 All insulation shall be carried out by one firm specializing in insulation work. Do not mix similar products of multiple manufacturers.

.2 Provide non-combustible insulation, jackets and finishes having a Flame Spread/Smoke Developed rating of 25/50 or less, meeting CAN/ULC S-102-M88 requirements or NFPA 90a, 101 and 255

.3 In high humidity environments (greater than 60% RH average ambient condition) all insulation materials shall be of the closed cell type which shall not permit the growth of molds if the insulation or insulation cover is cut, punctured or damaged.

.4 Attain a complete and continuous vapour barrier over insulation applied to cold and dual temperature piping, sheet metal and equipment. Use Owens Corning Fiberglas "Evolution" paper free All Service Jacket and SSL II adhesive. Apply to piping, fittings, valves and inline components, sheet metal, fittings and equipment. Seal longitudinal and circumferential laps with manufacturers recommended adhesive.

.5 Recover all exposed insulation and insulation finishes with minimum {0.20kg/squaremetre} [6oz.] canvas, and two applications of Childers CP50 or Bakor 120-09 white fire resistant coating. In mechanical rooms where insulation is exposed

cover with PVC jacket and fitting covers installed as per manufacturer's instructions, and conforming to the specified Flame Spread/Smoke Developed Rating.

2.2. PIPE INSULATION

.1 Provide insulation materials with a maximum thermal conductivity of {0.036 W/m.ºC} [0.24 BTU.in/(hr.ft^{2}ºF] at {38ºC} [100ºF] mean temperature.

.2 On hot piping applications, hold insulation in place with flare type staples (outward clinch).

.3 On cold and dual temperature piping applications, apply vapour barrier jacket over insulation and seal longitudinal and circumferential laps with Childers CP82 or Bakelite 230-39 adhesive. Seal all pipe terminations, including fittings, wall penetrations and pipe supports with vapour barrier mastic. For chilled water and brine systems provide vapour seal pipe terminations every four (4) pipe sections.

.4 Apply pipe insulation over {40mm} [1-1/2"] in thickness in two layers with joints staggered.

.5 Insulate fittings with fabricated mitered or preformed sections of specified insulation.

.6 Insulate over flanges and mechanical couplings with specified insulation and thickness, sized to suit flange diameters. Fill spaces between insulation and adjoining pipe insulation with similar material.

.7 Insulate valves and inline components with flexible insulation density {12kg/cubicmetre} [3/4lbs./cu.ft.] compressed not more than 50% of original thickness. Build up to specified thickness with approved asbestos free finishing cement.

.8 Do not insulate terminal unit automatic control valves installed in hot piping. Do not insulate terminal unit automatic control valves which are installed in cold and dual temperature piping and which are located over condensate drain pans.

.9 Provide removable {1.31mm} [18gauge] galvanized sheet metal enclosures lined with Armaflex II sheet insulation {25mm} [1"] thickness on pipeline strainers to facilitate screen access.

.10 Under all hangers used on primary chilled water, domestic chilled water, domestic chilled water recirculation, dual temperature water and domestic cold water, provide an insert between support shield and piping for piping {38 mm} [1½"] or larger. Fabricate using T-12 calcium silicate or other high density insulating material suitable for temperature application. Insulation inserts shall not be less than the following lengths:

Pipe Size	Length
{40 mm - 60 mm} [1½" – 2½"]	{250 mm} [10"]
{75 mm - 150 mm} [3" - 6"]	{300 mm} [12"]
{200 mm - 250 mm} [8" - 10"]	{400 mm} [16"]
{300 mm and over} [12" and over]	{550 mm} [22"]

.11 Provide one of the following pipe insulation types, and as scheduled in the Pipe Insulation Table.

.1 Type P1: Owens Corning 850 Pipe Insulation, Johns Manville Micro-Lok AP-T PLUS Fiberglas Pipe Insulation, Manson Fiberglas Pipe Insulation or Knauf Pipe Insulation with factory applied paper free ASJ vapour barrier jacket where scheduled.

.2 Type P2: Armacell AC Accoflex fiber-free piping insulation, painted with WB Finish where installed outdoors.

.12 Pipe Insulation Table:

No	Duty	Insulation Type	Thickness	Vapour Barrier
1	Horizontal condensate drains except with fan coil unit enclosure all pipe sizes	P-1	{12mm} [1/2"]	Yes
2	Refrigerant piping suction lines {4.4ºC}[40ºF] and above Refrigerant piping suction lines below {4.4ºC} [40ºF] {25 mm} [1”] and smaller	P-2 P-2	{25mm} [1"] {25mm} [1"]	Yes Yes

2.3. SHEET METAL INSULATION

.1 Provide insulation with a minimum thermal resistance of {0.036 W/m.ºC} [0.25 BTU.in/(hr.ft^{2o}F)] at {24ºC} [75ºF] mean temperature.

.2 Prior to finishing of insulation of hot and cold exposed rectangular ductwork, provide corner beads similar to Roll-on Type.

.3 Apply vapour barrier over insulation on cold and dual temperature ducts.

.4 Circular silencers and acoustic plenums need not be externally insulated.

.5 Ductwork and casings lined with acoustic insulation {25mm} [1"] or more in thickness need not be externally insulated. Refer to Section 15890 for Acoustic Insulation.

.6 Distribution ductwork below access floors in under floor air distribution systems (UFAD) need not be insulated.

.7 Insulation of ducts in unconditioned spaces is required where there is a possibility of condensation forming on the either surface of a duct. That is a warm duct in a cool space or a cold duct in a warm space.

.8 Provide one of the following external sheet metal insulation types, and as scheduled in the Sheet Metal Insulation Table.

.1 Type D1: Owens Corning Rigid Duct Insulation, Johns Manville 814 Spin-Glas, Manson 800 Series Spin-Glas Rigid Insulation Board or Knauf Rigid Insulation Board, not less than {48kg/cubicmetre} [3lbs./cu.ft.] density. Impale insulation on mechanically fastened pins located at not greater than {300mm} [12"] centres. Secure insulation with speed washers.

.2 Type D2: Owens Corning Flexible Duct Insulation, Johns Manville Microlite type 75 Duct Wrap, Manson Microlite Duct Wrap or Knauf Duct Wrap, {12kg/cubicmetre} [3/4lbs./cu.ft.] density. Adhere insulation to duct surface with Childers CP82 or Bakelite 230-39 adhesive, which shall be applied in strips {150mm} [6"] wide at not greater than {300mm} [12"] centres. Lap all edges at least {50mm} [2"] and secure insulation with fire resistant tying cord, similar to Fiberglas EC9-4-T. Take care that insulation is not compressed to less than specified thickness. It is recognized that some compression of insulation will take place immediately under tying cord, but in no case shall the thickness of the compressed material be less than 75% of original specified thickness.

.3 Type D3: Owens Corning Rigid Vapour Seal Duct Insulation, Johns Manville 814 Spin-Glas with FSK Facing, Manson Spin-Glas Rigid Insulating Board with reinforced foil facing, or Knauf Rigid Insulation Board with FSK facing. Density shall be not less than {48kg/cubic metre} [3lbs./cu.ft.]. Impale on mechanically fastened pins located at not greater than {300mm} [12"] centres. Secure with speed washers. Butt joints tightly together and seal washers, breaks and joints with self-adhering {100mm} [4"] wide plain aluminum tape, or adhere foil with Childers CP82 or Bakelite 230-39 adhesive.

.4 Type D4: Owens Corning Flexible Duct Insulation, Johns Manville Microlite Type 75 Duct Wrap, Manson Microlite Insulation or Knauf Duct Wrap, {12kg/cubic metre} [3/4lb./cu.ft.] density with factory applied reinforced foil facing. Adhere insulation to duct surface with Childers CP82 or Bakelite 230-39 adhesive, which shall be applied in strips {150mm} [6"] wide at not greater than {300mm} [12"] centres. Butt edges of insulation tightly together, and seal breaks and joints of facing with self-adhering {100mm} [4"] wide aluminum tape or adhere foil with Childers CP82 or Bakelite 230-39 adhesive.

.9 Sheet Metal Insulation Table

No	Duty	Insulation Type	Thickness	Vapour Barrier
1	Panels behind unused portion of louvres	D3	{50mm} [2"]	Yes
2	Exposed rectangular cold and dual temperature supply ducts	D3	{25mm} [1"]	Yes
3	Concealed supply air, (including ducts in shafts)	D4	{25mm} [1"]	Yes

PART 3 - EXECUTION

3.1. PROTECTION

.1 Protect the work of other trades with tarpaulins.

.2 Protect the work of this trade from being defaced by other trades. Make good any damage and leave in perfect condition, ready for final painting.

3.2. INSTALLATION

.1 Apply insulation over clean dry surfaces, firmly butting all sections together.

.2 Apply insulation, vapour barriers and insulation finishes in strict accordance with manufacturer's recommendations.

.3 Do not cover equipment nameplates with insulation.

.4 Coordinate related work with other Divisions.

END OF SECTION

PART 1 - GENERAL

1.1. WORK INCLUDED

.1 Comply with Division 1, General Requirements and all documents referred to therein.

.2 Provide all labour, materials, products, equipment and services to supply and install the natural gas piping system indicated on the Drawings and specified in this Section of the Specifications.

1.2. PERSONNEL QUALIFICATIONS

.1 Install natural gas system only with fitters certified to Ontario Gas Utilization Regulations and CGA requirements.

1.3. GAS SERVICE

.1 Provide all equipment and materials required for the building natural gas distribution systems in accordance with the requirements of the current version of CAS B149.1-05.

.2 In addition to CSA, follow TSSA's Director's Orders as they apply to gas piping and appurtenances.

PART 2 - PRODUCTS

2.1. NATURAL GAS SYSTEM

.1 Provide complete natural gas system.

.2 Provide pressure reducing, regulating and relief valving required for compatibility between equipment and building natural gas distribution system.

2.2. PIPE

.1 Steel pipe to ASTM A53/A53M, schedule 40 seamless

.2 Copper pipe to ASTM B75M

2.3. FITTINGS

.1 Steel pipe fittings, screwed:

.1 Malleable iron, screwed to ANSI B16.3, Class 150 for service pressures up to and including {861 kPa} [125 PSI}

.2 Unions: malleable iron, brass to iron, ground seat, to ASTM A47M

.3 Nipples: schedule 40 to ASTM A53

.2 Copper tube fittings:

.1 Wrought copper and copper alloy, solder type 1 to ANSI/ASME B16.22

2.4. JOINTING MATERIAL

.1 Screwed fittings: pulverized lead paste

.2 Welded fittings: to CSA W47.1

.3 Flange gaskets: non-metallic flat

.4 Brazing: to ASTM B75M

PART 3 - EXECUTION

3.1. INSTALLATION

.1 Install natural gas service to meet CGA, and The Ontario Gas Utilization Regulations, CSA B149.1-05 and TSSA Director's Orders as applicable.

3.2. DISTRIBUTION

.1 Distribute gas within the building at {3.5 kPa} [14 in WC].

.2 Select pressure reducing valves to maintain downstream pressures within ±5% range of setting. Submit sizing data for each valve with Shop Drawings.

.3 Select pressure relief valves for the maximum capacity of the pressure reducing station served plus not less than 25%. Submit sizing data for each valve with Shop Drawings.

.4 Pipe all relief vents individually to outdoors. Size piping for a maximum pressure drop of 10% of the pressure reducing valve setpoint gauge pressure with a 25% capacity safety factor.

.5 Provide upstream and downstream isolating valves and pressure gauges complete with gauge cocks at all pressure reducing stations. Connect relief valves so that they cannot be isolated from the appliances which they serve.

3.3. CONNECTIONS TO EQUIPMENT

.1 Connect gas piping to all gas fired equipment.

3.4. PAINTING

.1 Paint gas service piping to meet code requirements.

END OF SECTION

PART 1 - GENERAL

1.1. WORK INCLUDED

.1 Comply with Division 1, General Requirements and all documents referred to therein.

.2 Provide all labour, materials, products, equipment and services to supply and install refrigerant piping systems as indicated on the Drawings and specified in this Section of the Specifications.

.3 Installation shall be designed and installed by refrigerant piping system specialists.

1.2. SUBMITTAL DATA

.1 Submit Shop Drawings of refrigerant piping systems and control systems for review prior to commencement of installation.

.2 Drawings shall include the following:

.1 An isometric layout of refrigerant piping showing all piping and components required for the satisfactory operation and maintenance of systems, including but not limited to charging valves, isolating valves, sight glasses, strainers, driers, thermostatic expansion valves, solenoid valves, receivers, relief valves, mufflers, traps, oil separators, and water regulating valves.

.2 Control wiring interconnecting air conditioning equipment and refrigerant piping system components.

.3 A description of the sequence of operation of the refrigerant piping system.

1.3. REFERENCE STANDARDS

.1 Meet requirements for wiring methods and materials.

.2 Refrigerant piping design and installation shall conform to the recommendations and requirements of the following:

.1 CSA Standard B52 - Mechanical Refrigeration Code

.2 Ontario Building Code

.3 Air Conditioning and Refrigeration Institute

.4 Air Conditioning Equipment Manufacturer

PART 2 - PRODUCTS

2.1. PIPING, JOINTS AND FITTINGS

.1 Select pipe, fittings and components to suit systems test and operating pressures.

.2 Refrigerant piping shall be factory cleaned and sealed, type ACR seamless copper piping. Use only silver brazed joints.

.3 Use only long radius elbows.

.4 Size refrigerant piping to attain air conditioning equipment manufacturer's listed cooling capacities.

PART 3 - EXECUTION

3.1. PIPING AND WIRING INSTALLATION

.1 Keep piping runs and number of elbows and fittings to a minimum.

.2 Reduce the effect of piping vibration with the use of flexible metal hose.

3.2. DEHYDRATION AND CHARGING

.1 After installation of piping, a minimum test pressure of {2100 kPa} [300 psi] on the high pressure side and {1050 kPa} [150 psi] on the low pressure side shall be placed on the piping system with nitrogen. Pressures shall be maintained without loss for not less than four (4) hours. Repair or replace defective joints.

.2 After joints have been proven tight under test pressures, achieve a vacuum of not less than {95 kPa} [28" Hg] using a separate vacuum pump. Maintain vacuum without change in pressure for at least twelve (12) hours.

.3 System shall then be charged with dry refrigerant.

.4 After charging, recheck all joints with a halide leak detector. Replace any joints found to leak, and repeat the above dehydration testing and charging procedures.

3.3. START UP AND ADJUSTMENT

.1 Provide necessary instruments, gauges and testing equipment required.

.2 Adjust thermostats, valves and controls and demonstrate that design requirements and equipment manufacturer's ratings have been met.

.3 Test and record equipment voltage and amperes and compare with motor nameplate data.

.4 Set and adjust controls to achieve required sequence of operation.

3.4. GUARANTEE

.1 Replace any refrigerant and oil lost during the warranty period.

END OF SECTION

PART 1 - GENERAL

1.1. WORK INCLUDED

.1 Comply with Division 1, General Requirements and all documents referred to therein.

.2 Provide all labour, materials, products, equipment and services to supply and install the air cooled refrigeration condensing units indicated on the drawings and specified in this Section of the Specifications.

1.2. REFERENCE STANDARDS

.1 Units shall meet CSA and UL requirements.

.2 Units shall be ETL or CETL approved.

.3 Meet or exceed ASHRAE 90.1 recommendations.

PART 2 - PRODUCTS

2.1. AIR COOLED REFRIGERATION CONDENSING UNITS

.1 Provide York, YC Series, air cooled refrigeration condensing units as scheduled and shown on the drawings. Condensing unit shall operate down to {10ºC} [50ºF] as standard. Multiple compressor/condenser circuits shall be independent from each other. Extend suction and liquid lines to the outside of the cabinet. Connect service ports fitted with Schraeder fittings to the suction and discharge lines for charging or pressure readings. Provide manual shut off valves on liquid lines. Provide complete with a factory mounted, fused disconnect switch.

.2 Construct cabinets of heavy gauge satin coated galvanized sheet metal. Surfaces shall be cleaned with a degreasing solvent to remove oil and metal oxides. Prime paint all exposed surfaces. Provide an electrostatically applied enamel coat finish over primer. Support cabinets on formed galvanized or structural steel channel supports, designed and welded for low deflections. Provide weatherproof hinged/lift out control and compressor access doors with cam-lock fasteners. Provide integral lifting lugs for hoisting.

.3 Provide fully hermetic scroll or reciprocating type, set on resilient neoprene mounts. Reciprocating compressors shall include crankcase heaters. Provide internal line break motor protection and an internal pressure relief. Compressors shall be high efficiency type and shall be matched with condenser coils.

.4 Provide high efficiency semi-hermetic compressors complete with manual shut off valves, vibrasorbers on suction and discharge lines, compressor spring isolators, reversible oil pump and immersion type crankcase heater. Condensing units shall be designed for a minimum of {8ºC} [15ºF] liquid sub-cooling.

.5 Condenser fans shall be direct driven propeller type arranged for vertical draw through air flow. Motors shall be 575V/3 Phase/60 cycle, high efficiency weather resistant type with integral overload protection and designed specifically for vertical shaft, outdoor condenser fan duty. Mount fans and motor on a formed orifice plate for optimum efficiency with minimum noise level.

.6 Provide Condenser coils with copper tubes mechanically expanded into aluminum fins. Factory test coils with air at {2050 kPa} [300 psig] in an illuminated water tank.

.7 Control package shall include the following:

.1 compressor and condenser fan motor contactors

.2 control circuit transformer

.3 cooling relays

.4 ambient compressor lockout

.5 fuses

.6 manual reset high pressure controls

.7 automatic reset low pressure

.8 head pressure actuated fan cycling controls for multiple condenser fan units

.9 contacts for connection to BMS.

.8 Provide the following optional items:

.1 Five minute anti-cycle timer on lead compressor and interstage time delay relays on subsequent stages.

.2 Factory installed hot gas bypass.

.3 Separate insulated compressor compartment with {25 mm} [1"], {24kg/cu.metre [1.5 lb/cu.ft.] or {50 mm} [2"], {48kg/cu.metre} [3 lb/cu.ft.] density insulation.

.4 Liquid receivers, shipped loose, one per circuit, complete with liquid shut off valves and pressure relief device.

.5 Heresite corrosion protection on condenser coils and refrigeration piping.

.6 Epoxy paint finish on all exposed surfaces (except coils, compressors and motors)

.7 Separate/unit mounted, coaxial/shell and tube condensers for water/glycol heat rejection.

.8 Condenser coil protective screens.

PART 3 - EXECUTION

3.1. INSTALLATION

.1 Mount unit on roof where indicated on drawings. Mount unit on existing sleepers where previous condensing units were located.

.2 Make all required connections. Provide for cost of extra wiring if required by an alternate unit manufacturer.

END OF SECTION

PART 1 - GENERAL

1.1. WORK INCLUDED

.1 Comply with Division 1, General Requirements and all documents referred to therein.

.2 Provide all labour, materials, products, equipment and services to supply and install the packaged rooftop heating and cooling equipment indicated on the Drawings and specified in this Section of the Specifications.

1.2. REFERENCE STANDARDS

.1 Units shall be CSA and UL/ULC approved.

1.3. QUALITY ASSURANCE

.1 Units shall be tested and rated in accordance with ARI and UL Standards.

.2 Units shall be designed to conform to ASHRAE 51.

.3 Units shall be ETL and CETL, Canada tested and certified in accordance with ANSI Z21.47 Standards as a total package.

.4 Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.

.5 Unit casings shall be capable of withstanding 500 hour salt spray exposure per ASTM B117 (scribed specimen).

.6 Unit shall be manufactured in a facility registered to ISO 9002/BS5750, Part 2.

.7 Filters shall meet NFPA 90A air filter requirements.

.8 Prefabricated roof curbs shall conform to the requirements of the National Roofing Contractors Association (NRCA).

1.4. GENERAL

.1 Provide rooftop packages in accordance with these specifications, as shown on the drawings and as scheduled.

.2 All utilities, gas piping, electrical wiring and ductwork shall enter unit within the roof curb.

.3 Provide holes or lifting lugs in the base rails for rigging shackles to facilitate overhead lifting. Provide forklift slots to facilitate manoeuvring.

.4 Provide curb adaptor for installation of new unit. Condenser section shall incorporate a pitched panel for water drain off and a main power electrical opening. Provide a seal strip between unit and curb adaptor.

PART 2 - PRODUCTS

2.1. PACKAGED ELECTRIC COOLING WITH GAS HEATING UNITS (NOMINAL - 3 TO 25 TONS)

.1 General

.1 Provide York Model AV factory assembled, outdoor rooftop mounted, single place heating and cooling units. Each unit shall include cabinet and frame, gas heating section, supply fan, air filters, refrigerant, cooling coil, compressor(s), condenser coil and fans, outside air damper, return damper and gravity relief damper and economizer. Each unit shall include all factory wiring, piping, controls, and refrigerant charge.

.2 Provide insulated panel under compressor section.

.3 Provide unit with vertical discharge capability as shown on drawings.

.2 Cabinet

.1 Construct unit cabinet of galvanized steel, bonderized and coated with a prepainted baked enamel finish.

.2 Insulate interior surfaces of indoor blower cabinet with {15 mm} [2"] thick fibreglass insulation coated on the air side. Provide aluminum foil-faced fibreglass insulation in the gas heat compartment.

.3 Provide factory installed filter access panels to allow filter access.

.4 Provide a factory installed, internal sloped condensate drain pan constructed of a non-corrosive material, complete with a {20 mm} [3/4"] drain connection.

.3 Fans

.1 Indoor blower (evaporator fan) shall be a belt driven, double inlet, forward curved, centrifugal type. Belt drive shall be sized at 150% of motor and include an adjustable pitch motor pulley. Fan shall be constructed of steel with a corrosion resistant finish and shall be dynamically balanced. Fan and motor shall be integrally mounted on an isolation base, separated from the unit casing with flexible connections and spring isolators.

.2 Provide sealed, permanently lubricated ball bearings.

.3 Provide a direct drive, propeller type condenser fan with an upward air discharge. Provide aluminum blades rivetted to corrosion resistant steel spiders. Fan shall be dynamically balanced. Fan motor shall be totally enclosed.

.4 Induced draft blower shall be a direct driven, single inlet, forward curved, centrifugal type constructed from steel with a corrosion resistant finish. Fan shall be dynamically balanced.

.4 Compressors

.1 Compressors shall be fully hermetic, direct drive type with factory installed external spring vibration isolators.

.2 Provide compressors with independent circuits.

.5 Coils

.1 Evaporator and Condenser coils shall have aluminum plate fins mechanically bonded to enhanced copper tubes with brazed joints.

.2 Provide belled tube sheet openings.

.3 Evaporator coil shall be full face active design.

.6 Gas Heating Section

.1 Provide an induced draft combustion section with direct spark ignition system, redundant main gas valve and two stage heating.

.2 The heat exchanger shall be a tubular section type constructed of {0.91 mm} [20 gauge] steel coated with a 1.2 mil aluminum-silicone alloy for corrosion resistence.

.3 Burners shall be in-shot type. Construct burners using aluminum coated steel.

.4 Provide an Integrated Unit Control (IGC) board to provide timed control of evaporator fan functioning and burner ignition. An LED shall provide diagnostic information. The LED shall be visible without removing the control box access panel. The IGC panel shall include anti-cycle protection for gas heat operation.

.7 Refrigerant Components

.1 Refrigerant circuit components shall include:

.1 Automatic feed system /thermostatic expansion valve.

.2 Fixed expansion device with filter driers.

.3 Service valve gauge connections on suction, discharge and liquid lines.

.4 Refrigerant strainer.

.5 Allow for routing of gauge hoses through unit top cover.

.8 Filter Section

.1 Standard filter section shall consist of factory installed, throwaway {50 mm} [2"] thick fibreglass filters.

.9 Controls and Safeties

.1 Unit Controls

.1 Equip all units with a factory assembled integral control panel. Control panels shall be complete with self contained low voltage control circuit protected by a fuse on the 24 V transformer side. Control panel shall contain starters with overloads and all control components necessary for the control of compressors, evaporator fans, condenser fans, induced draft fans and heating section.

.2 Cabinet panels shall be removable for servicing of equipment.

.2 Safeties

.1 Provide a solid state compressor protector which provides anti-cycle reset capability at the space thermostat, should any of the following standard safety devices trip and shut off the compressor:

.1 compressor overtemperature, overcurrent

.2 loss-of-charge/low pressure switch

.3 freeze protection thermostat, evaporator coil

.4 high pressure switch

.2 Provide the following protection for gas fired heating section:

.1 high temperature limit switches

.2 induced draft motor speed sensor

.3 flame rollout switch

.4 flame proving controls

.10 Provide an integrated economizer capable of simultaneous economizer and compressor operation to provide cooling with outdoor air. Provide low leakage parallel blade dampers with neoprene gaskets and synthetic bushings. Dampers shall be capable of introducing up to 100% outside air. Equip with dry bulb temperature control to govern economizer changeover and a mixed air sensor to control the economizer down to {13ºC} [55ºF].

.11 Controls (Economizer)

.1 Provide mixed air controls to:

.1 maintain field adjustable mixed air temperature

.2 lock out compressor at {2ºC} [35ºF] low ambient

.3 restart compressor at {17ºC} [63ºF]

.4 revert dampers to provide minimum (adjustable) outside air above {21ºC} [70ºF]

.2 Provide fully automatic integration between mechanical cooling and economizer.

.12 Thermostats

.1 A low voltage, adjustable room thermostat shall control gas burner operation, sequence heat stages with delay between stages. Compressor and supply fan shall maintain room temperature setting.

.2 Provide a programmable thermostat including system selector switch, automatic changeover (heat/cool/off) and fan control switch. (on/auto).

.3 Thermostat shall be double acting with two stages of heating and two stages of cooling.

.4 Thermostat shall provide signaling to both AHU-2 and RT-6 to match existing configuration.

.13 Fire Alarm Shutdown

.1 Extend control wiring to terminal blocks for connection for fire alarm shutdown.

.14 Direct Digital Communicating Control

.1 Provide a direct digital communicating package as a factory installed option.

.2 DDC package shall actively monitor all modes of operation, evaporator fan status, filter status, indoor air quality, supply air temperature and outdoor air temperature.

.3 Package shall be compatible with specified VAV boxes.

.4 Provide built-in diagnostics for thermostat commands for both staged heating and cooling, evaporator fan operation and economizer operation.

.5 Provide a 5 minute time delay between modes of operation.

2.2. ROOFTOP MULTIZONE UNITS

.1 Rooftop multizone units have been pre-tendered. Refer to drawing schedules and Appendix A for details.

.2 Installing contractor to carry price for pre-tendered equipment, refer to Bid Form 15005.

PART 3 - EXECUTION

3.1. DELIVERY, STORAGE AND HANDLING

.1 Store and handle units per manufacturer's recommendations.

3.2. INSTALLATION

.1 Install units with service clearance recommended by unit manufacturer.

.2 When existing units are lifted off roof curbs, a roof contractor previously retained by St. Catharines Public Library will re-roof curbs prior to new units being set in place. Roofing contractor is Goodmen Roofs, contact Hugo Oliveira, Project Manager, at 1-888-766-7735 and/or hugo@goodmenroofs.ca. Cost of re-roofing existing curbs shall not be included in this contract.

.3 If existing roof curbs are found to be in poor condition after existing units are removed, contact St. Catharines Public Library and mechanical engineering prior to installing new units.

3.3. STARTUP

.1 The installing contractor shall be responsible for startup of each unit. Manufacturer's representative shall be present at startup. Provide Owners instruction in accordance with manufacturer's recommendations.

3.4. LOW VOLTAGE CONTROL PANELS

.1 Install rooftop air conditioning low voltage control panels where indicated on the drawings.

3.5. WARRANTY

.1 Provide a 10 year warranty on gas fired heat exchangers.

END OF SECTION

PART 1 - GENERAL

1.1. WORK INCLUDED

.1 Comply with Division 1, General Requirements.

.2 Provide labour, materials, products, equipment and services to supply and install DX cooling coils, as indicated on the Drawings and specified in this Section.

1.2. REFERENCE STANDARDS

.1 Coil performance shall be ARI rated and labelled.

PART 2 - PRODUCTS

2.1. DIRECT EXPANSION TYPE COOLING COIL

.1 Provide Heatcraft extended surface coils of non ferrous construction. Coils shall meet ARI Standard 410.

.2 Provide extra heavy seamless copper tubing suction headers designed to permit expansion and contraction.

.3 Construct primary surface using round {16 mm} [5/8"] or {13 mm} [1/2"] outside dia. copper tubing brazed into header tube holes or short radius return bends.

.4 Provide secondary surfaces consisting of rippled aluminum plate fins fastened by tube expansion.

.5 Factory mount pressure type brass liquid distributors. Loading per circuit shall be such that the refrigerant pressure drop is equalized to minimize loss of coil capacity.

.6 Construct casings of galvanized steel with {9.5 mm} [3/8"] dia. mounting holes. Provide reinforced flange type coil side plates. Provide fin angles on long coils to hold the fin tube assembly in place.

.7 Test coils with {1700 kPa} [250 psi] air pressure under water and guaranteed for {1380 kPa} [200 psi] gauge working pressure. Coils shall be dehydrated before shipment. Coils which are hydrostatically tested will not be permitted. All coils shall be circuited in a counterflow manner.

PART 3 - EXECUTION

3.1. INSTALLATION

.1 Individually support multiple coils so that one coil may be removed without disturbing the other coils. Coil support structure shall be stainless steel angles and channels, bolted or welded. Use 304L stainless steel if welding is used.

.2 Support coils over their entire length.

.3 Pipe condensate external to unit through a deep seal trap to a floor drain.

END OF SECTION

PART 1 - GENERAL

1.1. WORK INCLUDED

.1 Comply with Division 1, General Requirements and all documents referred to therein.

.2 Provide all labour, materials, products, equipment and services to supply and install all air filters indicated on the Drawings and Schedules, and specified in this Section of the Specification.

1.2. PROVISION REQUIREMENTS

.1 Meet filter schedule arrangement and type.

.2 Provide sufficient filter media and size filter banks:

.1 to limit maximum face velocity across filters to specified levels and to meet manufacturer's recommendations

.2 to ensure filters occupy maximum face area within unit enclosures

.3 to limit initial filter drops to specified values

.3 Use standard {600 mm x 600 mm} [24" x 24"] or {600 mm x 300 mm} [24" x 12"] units wherever possible.

PART 2 - PRODUCTS

2.1. MERV-8 FILTERS

.1 Provide Aeropleat IV pleated media disposable type filter consisting of non-woven blended polyester fabric media, media support grid and enclosing frame.

.2 Initial resistance to airflow shall not exceed {54 Pa} [0.22 in wg], {67 Pa} [0.27 in wg] or {52 Pa} [0.21 in wg] w.g. at an airflow of {1.78 m/s} [350 fpm], {2.54 m/s} [500 fpm] or {2.54 m/s} [500 fpm] on 1”, 2” or 4” deep models respectively.

.3 Meet average efficiency of 25% to 30% per ASHRAE Test Standard 52-76 with average arrestance of 90% to 92%.

.4 Provide welded wire grid media support, 96% free area, bonded to the media and formed to effect radial pleat design.

.5 Provide enclosing frame, constructed of rigid heavy duty high wet strength beverage board with diagonal support members bonded to air entering and leaving side of each pleat.

.6 Filters shall be listed as ULC, Class 2.

2.2. MERV-13 FILTERS

.1 Provide Farr Riga-Flow 15 high performance, deep pleated, totally rigid, disposable units consisting of high density microfine glass fibre media, media support grid, contour stabilizers and enclosing frame.

.2 Do not exceed {88 Pa} [0.35 in] w.g. initial resistance at {2.54 metre/second} [500 fpm] approach velocity.

.3 Meet average efficiency of 60% to 65% per ASHRAE Test Standard 52-76, with average arrestance of 97%.

.4 Filters shall be listed as ULC, Class 2.

2.3. AIR FILTER GAUGES

.1 Provide across each filter installation, an inclined manometer type draft gauge kit, similar to Dwyer 250-AF Series.

.2 Include static pressure tips and three port vent valves.

.3 Provide {0 to 500 Pa} [0 to 2 in w.g.] range.

PART 3 - EXECUTION

3.1. INSTALLATION

.1 Arrange filters for upstream servicing or side access, to suit air handling unit installation.

.2 Take all necessary precautions including blanket filter media coverage over the entire filter installation for protection during construction and startup.

.3 Replace prefilter and final-filter media units immediately prior to acceptance.

END OF SECTION

PART 1 - GENERAL

1.1. WORK INCLUDED

.1 Comply with Division 1, General Requirements and all documents referred to therein.

.2 Provide all labour, materials, products, equipment and services to supply and install the sheet metal and ductwork systems as indicated on the Drawings and specified in this Section of the Specifications.

1.2. REFERENCE STANDARDS

.1 Meet Standards described in the latest Edition of HVAC Duct Construction Standards handbook from Sheet Metal and Air Conditioning Contractors National Association (SMACNA).

.2 Duct dimensions shown on Drawings are net, inside insulation and acoustic duct lining.

.3 Combination fire and smoke dampers and fire dampers shall be ULC listed and labelled, and meet requirements of Ontario Fire Marshall and NFPA-90A.

PART 2 - PRODUCTS

2.1. DUCTWORK

.1 Fabricate ductwork from galvanized sheet metal with a minimum coating of {1.83 grams/m^2} [0.60 oz/sq.ft.] (G60coating) unless other materials are specifically named. Duct installation shall conform to the following:

.1 Ductwork shall be smooth on the inside and free of obstructions, vibration and rattle.

.2 Fabricate ductwork, except as described in the next item, according to the following classifications:

.1 Class 1: All ducting subject to positive or negative static pressure of {250 Pa} [1 in w.g.] or less with maximum velocities of {13 m/s} [2500 fpm] shall be constructed in accordance with SMACNA construction standards for {250 Pa} [1 in w.g.] duct.

.2 Class 2: All ducting subject to positive or negative static pressure of more than {250 Pa} [1 in w.g.] up to {500 Pa} [2 in w.g.] with maximum velocity of {13 m/s} [2500 fpm] shall be constructed in accordance with SMACNA construction standards for {500 Pa} [2 in w.g.] duct.

.3 Class 3: All ducting subject to positive or negative static pressure of greater than {500 Pa} [2 in w.g.] up to {750 Pa} [3 in w.g.] with maximum velocity of {20 m/s} [4000 fpm] shall be constructed in accordance with SMACNA construction standards for {750 Pa} [3 in w.g.] duct.

.3 Provide duct transformation with expansion fittings having slopes not exceeding 1 to 7 and contraction fittings having slopes not exceeding 1 to 4.

.4 Provide full radius tees, bends, and elbows for changes in direction except where square elbows are required due to space restrictions. Provide DuroDyne double thickness {0.8 mm} [24 gauge] turning vanes assembled in top and bottom rails in square elbows.

.5 Provide balancing dampers free to move in either direction without binding and rattling. Construct dampers in ductwork from {1.2 mm} [18 gauge] galvanized sheet metal. Use manual quadrants on small ducts. On dampers longer than {375 mm} [15"] use push rods with DuroDyne Model SRP ball joints. Use two push rods on ducts wider than {600 mm} [24"]. Provide OBD balancing dampers where shown on the drawings.

.6 Isolate equipment with DuroDyne neoprene {0.8 mm} [0.032"] thick flexible connectors with finished fabric width not less than {150 mm} [6"].

.7 Provide {50 mm} [2"] insulated sheet metal blank off panels behind unused portions of exterior louvers.

.8 Seal all joints in low, medium and high pressure ductwork with Transcontinental MP for low and medium pressure or DuroDyne S2 duct sealer for high pressure. Joints shall be sealed to conform to SMACNA standards as follows:

Seal Class	**Sealing Required**	**Static Pressure Construction Class**
A	All transverse joints, longitudinal seams and duct wall penetrations.	{1000 Pa} [4" w.g. and up]
B	All transverse joints and longitudinal seams.	{500-750 Pa} [2" - 3" w.g.]
C	Transverse joints	Up to {500 Pa} [2" w.g.]

.9 Seal joints in exhaust ducting where fan intake is further than {25 m} [82 ft] from furthest intake in accordance with seal Class A.

.2 Construct round ductwork to meet high pressure duct standards and as follows:

.1 Provide welded slip joint construction round duct fittings. Wipe pipe and fittings with DuroDyne S-2 duct sealer before assembly. Secure joints with self-tapping screws, and then brush again with thick coat of duct sealer.

.2 Provide dieformed round elbows through {200 mm} [8"] dia. constructed from {1.1 mm} [20 gauge] galvanized steel. Provide 5 section construction for larger elbows.

.3 Provide conical round tees.

.3 Flexible Ductwork:

.1 Provide Flexmaster Triple Lock Aluminum, flexible ductwork upstream and downstream of air terminal control units and/or other locations indicated on the Drawings.

.2 Construct ductwork from a tape of soft annealed aluminum sheet, spiral wound into a tube and spiral corrugated to provide strength and flexibility. Provide a triple mechanical lock to form a continuous secure air joint without the use of adhesives for pressures up to {3000 Pa} [12"].

.3 Conform to the requirements of NFPA 90 and Underwriters Laboratories classification for round duct to specification UL 181.

.4 Provide flexible ductwork in minimum lengths of {1500 mm} [5'-0"] and maximum lengths of {3600 mm} [12'-0"] Class 1 pressure systems. For Class 2 and higher pressure systems restrict minimum and maximum lengths to {1200 mm} [4'-0"].

2.2. ACCESS DOORS

.1 Provide access doors for galvanized ductwork using {0.7 mm} [24 gauge] galvanized material with galvanized mounting frame and {25 mm} [1"] rigid insulation between panels. Provide fastening devices to give tight closure.

.2 Provide access doors for stainless steel ductwork using {0.61 mm} [24 gauge] stainless steel with stainless steel mounting frame and {25 mm} [1"] rigid insulation between panels. Provide fastening devices to give tight closure.

.3 Provide access doors for aluminum ductwork of {0.61 mm} [24 gauge] aluminum with aluminum mounting frame, and {25 mm} [1"] rigid insulation between panels. Provide fastening devices to give tight closure.

.4 Provide access doors and removable panels in plenums and casings of {1.31 mm} [18 gauge] galvanized material with {50 mm} [2"] thickness fiberglass insulation. Equip doors with handles and hinges to open from either side (without risk of injury) as follows:

.1 for mandoors:

.1 handles - DuroDyne SP-20

.2 hinges - DuroDyne HB-3

.3 gaskets - DuroDyne GN-22

.2 for removable panels:

.1 sash locks - DuroDyne SL-1

.2 gaskets - DuroDyne GN-22

.5 Construct all access doors with double panels.

.6 Provide neoprene gaskets securely formed into door frames around the periphery of all duct access doors.

.7 Equip door frames for plenums and casings with hollow tubular gaskets. Provide all doors complete with {300 mm x 300 mm} [12" x 12"] viewing ports.

.8 Provide access doors at all fire dampers.

2.3. ACOUSTIC DUCT LINING

.1 Provide {25 mm} [1"] thick acoustic duct liner where shown on drawings and as follows:

.1 Rectangular Duct Liner: Permacote Linacoustic meeting ASTM C 1071 with air surface coated with acrylic coating treated with EPA registered anti-microbial agent proven to resist microbial growth as determined by ASTM G 21 and G 22.

.1 Noise Reduction Coefficient: .70 or higher based on “Type A mounting” and tested in accordance to ASTM C 423.

.2 Adhesive: meeting ASTM C 916.

.3 Fasteners: Duct liner galvanized steel pins, welded or mechanically fastened.

2.4. FIELD ASSEMBLED PLENUM AND CASING CONSTRUCTION

.1 Provide metal partitions, plenums and casings of not less than {1.61 mm} [16 gauge] galvanized sheet metal suitably reinforced with rolled angle sections.

.2 Provide metal partitions, plenums and casings with adequate strength for all operating conditions. Fabricate each sheet of material as a panel. Join panels by {40 mm} [1.5"] standing seams on outside of casings and secure with bolts at {300 mm} [12"] centres.

.3 Provide closure baffles around banks of coils, filters and other inline components.

.4 Provide {25 mm} [1"] minimum size rolled structural steel angles where casing meets floor. Caulk joints to prevent air and water leakage.

.5 Flange and bolt casings on {150 mm} [6"] centres to coils, blankoff panels and filler panels.

.6 Incorporate adjustable directional flow baffles into mixing plenums, to ensure complete mixing of outdoor and return airstreams with stratification not to exceed {$\pm$2^{o}C} [$\pm$4°F] across the coil face at winter outdoor design temperature.

2.5. INSULATED PLENUMS AND CASINGS

.1 Provide insulated metal sandwich panels for all exterior intake and exhaust air plenums consisting of prefabricated 18 gauge galvanized sheet metal panels and {50 mm} [2"] rigid fiberglass insulation with interlocking joints securely fastened.

.2 Provide steel supports, joiner sections, floor channels, opening frames and sealing materials. Provide {1.31 mm} [18 gauge] minimum channel stiffeners at not greater than {800 mm} [32"] centres.

.3 Connect corners and butt joints with {1.61 mm} [16 gauge] galvanized sections. Seal all joints with rubber mastic. Use angle joints to attach panel edges to walls.

.4 Construct entire plenum to resist deflection and seal sufficiently to avoid air leakage when subjected to a pressure differential between inside and outside of up to {2500 Pa} [10 in. w.g.].

.5 Provide access doors suitable for personnel pass through.

2.6. FIRE DAMPERS

.1 Provide Ruskin curtain or parallel blade type dampers to maintain fire rating integrity of membrane being pierced. Minimum rating to be 1-1/2 hours with {100ºC} [212ºF] fusible link. Provide multiple dampers where sizes exceed code limitation.

.2 Provide models as follows, to suit application:

Model No.	**Application**
IBD-2, Style B or C	Normal duct application (2 hrs.)
IBD-20 Style G	Behind grilles (2 hrs.)
IBDT	In doors or thin separations (2 hrs.)
IBD-23	In fire walls (4 hrs.)
FSF	Behind outlets in fire rated floor (roof) and ceiling assemblies
FD-35	Combination fire and balancing damper (2 hrs.)

.3 Select dampers with air flow resistance not exceeding {13 Pa} [0.05 in. w.g.] at design flow rates.

2.7. COMBINATION FIRE AND SMOKE DAMPERS

.1 Provide Ruskin FSD35 Class I dampers to maintain fire rating integrity of membrane being pierced. Minimum fire rating shall be 1-1/2 hours. Damper and actuator have to be supplied as a unit from the factory in order to maintain rating.

.2 Provide parallel blade type dampers, suitable for horizontal or vertical mounting. Provide multiple dampers where sizes exceed code limitations.

.3 Select dampers with air flow resistance not exceeding {13 Pa} [0.05 in. w.g.] at design flow rates.

2.8. SMOKE DAMPERS

.1 Provide Ruskin SD-35, Class I smoke dampers where indicated on the Drawings.

.2 Provide parallel blade type dampers, suitable for horizontal or vertical mounting. Provide multiple dampers where sizes exceed code limitations.

.3 Select dampers with air flow resistance not exceeding {13 Pa} [0.05 in. w.g.] at design flow rates.

2.9. BACKDRAFT DAMPERS

.1 Provide Ruskin Model CBD2 counter-balanced backdraft dampers suitable for use in temperatures from {-40ºC to 93ºC} [-40ºF to 200ºF].

.2 Frames shall be 6063T5 extruded aluminum {2.3 mm} [.090"] wall thickness. Blades shall be formed aluminum, {.63 mm} [.025"] wall thickness. Bearings shall be molded synthetic and linkage {12 mm} [1/2"] tie bars. Blade edge seals shall be extruded vinyl. Dampers shall be equipped with adjustable counter-balance weights attached to rear of blades.

.3 Refer to Drawings for locations, mounting direction and air flow direction.

2.10. FIRE RATED DUCTING AND ENCLOSURES

.1 Where indicated on the drawings, provide fire rated construction of ducts and enclosures using DuraSystems Barriers Inc., non combustible sheeting; fibre cement composite with mechanically bonded galvanized steel facing sheets. Provide inner liner of galvanized steel. Ensure that the duct construction meets the fire rating requirement.

.2 Duct material construction and installation methods shall meet NBCC 2005 3.2.6.2 and 3.2.6.6, and shall be ULC listed and labeled. Fabricate and install the ductwork according to the manufacturers written instructions and in accordance with the UL listing. Use hangers, support rods and firestopping in accordance with the UL listing.

PART 3 - EXECUTION

3.1. SHEET METAL INSTALLATION

.1 Provide acoustic insulation on supply air ductwork from discharge side of mechanical air volume control boxes and attenuators as follows:

.1 {3000 mm} [10 ft.] for straight duct run box or

.2 {1500 mm} [5 ft.] downstream of 1st elbow or

.3 {1500 mm} [5 ft.] for each branch downstream of 1st tee.

.2 Provide final duct connections to all fume hoods and other individual canopies or hoods provided by Division 11, as designated on the drawings.

.3 Frame and install motorized dampers. Unless shown otherwise, attach each motorized damper module to the channel framing.

.4 Provide frames in ductwork for airflow stations.

.5 Provide DuroDyne IP-1 or IP-2 test openings in all ducts entering and leaving air handling equipment. Install test openings at {150 mm} [6"] intervals across the long dimension of rectangular ducts, and at 90 degree intervals around circular ducts. In insulated surfaces, provide extension to suit insulation thickness. Provide additional Model IP-4 test ports in ductwork where required for air balancing. Submit drawings to indicate proposed locations.

.6 Make provisions in ductwork and plenums for installation of duct type smoke detectors and other control devices.

.7 Slope ductwork down to exhaust hoods and other equipment connections. Provide drains at low points and pipe to nearest floor or funnel drain.

.8 Provide neoprene isolation gaskets and nylon bolts at connections required for dissimilar metals.

.9 Seal water tight bottom and sides of intake and exhaust ducts connected to exterior louvers as follows:

.1 Intake - from Louvre to air handling unit.

.2 Exhaust - from Louvre to {2 metres} [6'-6"] upstream of Louvre.

3.2. ACOUSTIC DUCT LINING INSTALLATION

.1 Seal all leading and trailing edges and repair all rips or tears of acoustic duct liner with a suitable sealing compound similar to Johns-Manville Superseal.

.2 Provide a tapered sheet metal nose piece to hold the leading edge of acoustic duct liner and direct the air over the edge.

3.3. TESTING

.1 Pressure test all ductwork in accordance with the outlines and classification described in the SMACNA, HVAC Duct Leakage Test manual.

.2 The leakage amount shall not exceed the allotted amount for the pressure class. The test pressures shall be based on the static pressure for each fan.

Duct Construction Class	Leakage Class
{2500 Pa} [10" w.g.]	3
{1500 Pa} [6" w.g.]	6
{1000 Pa} [4" w.g.]	6
{750 Pa} [3" w.g.]	12
up to {500 Pa} [2" w.g.]	12

.3 Repair duct and retest where air leakage exceeds the specified limits.

.4 Make good all audible leakage, whether test is within limit specified or not.

.5 Provide calibrated tester, connection hoses, temporary plugs, etc., as required.

3.4. INSTALLATION OF FIRE DAMPERS, SMOKE DAMPERS AND COMBINATION FIRE AND SMOKE DAMPERS

.1 Install dampers in approved manner suitably anchored to building structure in locations indicated on the Drawings.

.2 Install fire dampers complete with sleeve and full perimeter steel angle on both sides of barrier being pierced. Provide manufacturers recommended minimum clearance between masonry or non-combustible frame and sleeve. Sleeve shall accept actual size of damper with blades pocketed outside of air stream.

.3 Divide openings into smaller openings using fire resistant structures where openings to be protected require dampers larger than maximum UL listed sizes.

3.5. CLEAN UP

.1 Vacuum clean the inside of all air handling systems affected by replacement units, and associated ductwork, to ensure that they are free from debris and dust.

END OF SECTION

PART 1 - GENERAL

1.1. WORK INCLUDED

.1 Comply with General Requirements.

.2 Integrate new equipment into the existing Siemens Building Automatic System (BAS). BAS may also be referenced in the specifications or on the drawings as the Building Management System (BMS) or the Electronic Controls and Monitoring System (ECMS).

.3 Provide labour, materials, tools, incidentals, equipment and services to supply, install, and commission the new equipment connected to the existing BAS..

1.2. GENERAL SYSTEM ARCHITECTURE

.1 Coordinate with the St. Catharines Public Library and Seimens to obtain the general system architecture. Follow the standards of this architecture when removing existing equipment and installing new equipment.

.2 The intent of this specification is to remove existing equipment and integrate new equipment into the distributed direct digital control (DDC) system. The network controllers and individual local controllers shall be selected so that each mechanical system operation is completely standalone. Each system operation, such as multizone units and packaged rooftop units, will be controlled by a single standalone DDC controller.

.3 The ECMS shall consist of modular microcomputer controllers providing distributed processing capability, and allowing future expansion of both input/output points and processing control functions.

.4 In no circumstance shall multiple application controllers be employed to control a single piece of equipment.

.5 Provide network interface modules or connections to third party controllers which are supplied as part of their equipment to achieve the level of interface specified in the control diagrams on the drawings. Provide interface software, coordinated with the Siemens, to achieve the specified interface communication across the full ECMS. Input and output with third party controllers shall have real time interoperability with ECMS software features such as control software, alarm management, historical data and trend analysis, totalization and LAN communications.

.6 The ECMS shall operate on a management by exception concept, enabling automatic operation and requiring minimal manual intervention and supervision.

.7 The modular design of the system software and hardware shall ensure easy maintenance and repairability. Self diagnostic programs shall report errors without the need for operator interrogation. Maintenance on one module shall not affect the operation of other system components.

.8 Backup and fail safe criteria shall be inherent. Any failure shall not place the system in a hazardous condition.

.9 Output current and historical data on energy, building loads, equipment operation and control status.

1.3. QUALITY ASSURANCE

.1 ECMS work shall be performed by one firm specializing in the manufacture and installation of control systems for building environmental control. This firm shall coordinate with Siemens in ensure proper integration into the existing ECMS.

.2 Products referenced under this Section establish the minimum acceptable standards of product quality, features and performance.

.3 The equipment and software provided by the supplier shall be the latest version currently in manufacture. No custom products shall be allowed. All products shall be supported for a minimum of 5 years, including spare parts, board repairs and software revisions.

1.4. RELATED WORK

.1 Provide all control devices and instrumentation to meet the points and sequences shown on the drawings.

.2 Provide all damper operators, damper end switches, relays, etc. for interface with the Central Alarm and Control Facility (CACF).

.3 Meet the requirements of Section 15993, ECMS Testing and Acceptance.

1.5. SHOP DRAWINGS

.1 Meet Section 15010 requirements.

.2 Submit all shop drawings for review before proceeding with procurement or site specific software development and according to a schedule to be established with the consultant.

.3 Submit Shop Drawings for all equipment to be provided, including but not limited to:

.1 Software packages.

.2 Specification data sheets of each hardware component or software module.

.3 Schematic diagrams for all building systems showing control devices, instrumentation, product interconnection, panel wiring, interlocking and component tag identification as well as written sequence of operation. Show panel spare capacity.

.4 Descriptive data of all operating, user and application software including complete operator's manuals, programmer's manuals, and alphanumeric mnemonic point name convention sheet.

.5 Other drawings as appropriate. General advertising type literature is only acceptable as additional support information.

.4 Submit 6 sets of final as-built documentation including the above items and complete with troubleshooting procedures.

.5 Provide final documentation to serve the diverse needs of personnel concerned with instruction, operation, procurement, installation and maintenance.

.6 Shop drawings and final documentation will be reviewed to ensure that such documents are in keeping with the intent of this specification and fully meet the requirements in terms of content and format. Make all required changes to this documentation at no additional cost.

.7 Delivery of the final approved documentation, in hardcover 3-ring binders with index page and index tabs, is required before the Certificate of Substantial Completion will be issued.

.8 Maintain a complete and current copy of all reviewed Shop Drawings at the job site.

1.6. REFERENCE STANDARDS

.1 Provide electrical material and installation in accordance with the appropriate requirements, and in accordance with applicable sections of the current edition of the applicable local codes for electrical work and signalling systems. Install wiring in conduit or approved totally enclosed raceways. Do not use cable raceways or troughs. Approved ceiling plenum cable is acceptable where permitted by the local Authorities.

.2 Provide electrical and electronic equipment which is CSA and ULC or UL approved.

.3 Provide (ASCII) American Standard for Communication and Information Interchange coded input/output devices with standard (EIA) Electronic Industry Association interface.

.4 Provide field processing units having the capability for accommodating inputs and outputs meeting ISA Instrument Society of American standards.

.5 All equipment and systems installed under this Contract shall meet all required performance specifications when subjected to VHF, UHF, FM, AM or background RFI as generated by commercial or private, portable or fixed transmitters that meet regulatory codes.

.6 Meet FCC Rules and Regulations, Part 15, Subpart J for Class A computing devices.

.7 Components installed within motor control devices shall be designed to operate within transient electrical fields within these devices.

.8 Provide equipment which functions and meets all detailed performance criteria when operating in the following minimum ambient condition ranges:

.1 Temperature - {0 to 32.2°C}[32 to 90°F]

.2 Relative Humidity 10% to 90% non –condensing

.3 Electrical power service of single phase, 125V AC +/- 10%, 60 Hz nominal

.4 The limits above are minimums and shall not take precedence over ranges detailed in this or the manufacturer’s specification.

PART 2 - PRODUCTS

2.1. LOCAL CONTROL UNITS (LCU)

.1 Each multizone unit, packaged rooftop unit and condensing unit shall have a unique DDC controller as a Local Control Unit. This controller shall be installed at the factory. All sensors, relays, etc. located within the units shall be provided and wired at the factory. All remote sensors (ex. duct temperature sensors) shall be wired in the field.

.2 Each LCU shall be compliant with either the BACnet standard compliant and be so designated.

.3 The LCU shall be capable of performing its assigned local loop control and other functions as a standalone unit. The LCU shall be capable of having data loaded from a desktop workstation or a portable terminal workstation. It shall perform all specified control functions without interaction to other field panels or to a workstation. Systems that rely only upon processing control functions in a workstation will not be acceptable.

.4 The LCU shall have the capability to communicate with a remote workstation and allow monitoring of every sensing point and controlled point data indicated on the drawings and/or input/output schedules.

.5 The LCU software and microprocessor operating system shall reside in non-volatile memory.

.6 Failure of an LCU shall not prevent other LCUs on the same network from communicating with each other.

.7 Each LCU shall consist of a micro computer-based controller, input/output modules, and termination modules.

.8 Provide additional LCUs if required to support the control loops specified, the sequence of operations, number of monitoring points or other criteria to permit the field panel capacity to meet the specified functional requirements of the project.

.9 Each LCU shall be capable of operation as a completely independent unit and as a part of a facility wide control system. All LCUs are to be equipped to enable transmission of all input and output information to a workstation

.10 Each LCU shall be capable of receiving signals from industrial grade and industry standard sensors and transducers. Each LCU shall have the capability to monitor the types of inputs and outputs as below:

.1 Analog Inputs - 0 to 20 mA or 4 to 20 mA, 0 to 10 volts DC and resistance (PT-1000, N1-1000, NTC thermistor and potentiometer). It shall be possible to carry out signal type declarations from the workstation, or locally via a portable terminal. Normalization and linearization routines shall exist for all supported inputs.

.2 Binary Inputs - from volt free contacts normally open or normally closed, including pulsed contacts at a rate of 20 pulses per second minimum.

.3 Analog Outputs - true analog i.e. 0 to 10 volts DC or 2 to 10 volts DC. Pulse width modulation is acceptable only for VAV box LCUs.

.4 Binary Outputs - momentary or maintained direct form the LCU using triac outputs or volt free contacts.

.11 Each control loop is to be of the PID type, although initially most loops will be of the PI type. Adding the derivative function or modifying loop parameters should not require further programming of algorithms, but only entering the desired changes via the workstation or portable terminal.

.12 Any analog input becoming short circuited shall not prevent any other analog inputs from working.

.13 Digital outputs shall be galvanically isolated from each other as well as from the internal electronics of the LCU.

.14 To prevent serious damage to the LCU from surges, RFI, electrically induced spikes, etc., protection in the following form shall be provided, as a minimum:

.1 Digital outputs singularly or collectively shall be galvanically isolated from the main LCU processor.

.2 Analog outputs shall have noise and surge suppressers fitted to prevent damage or malfunction due to induced voltages in series or common mode.

.3 Digital and analog inputs shall have noise and surge suppressers fitted to prevent damage or malfunction due to induced voltages in series or common mode.

.15 LCU application programs are usually to be entered by downline loading from a workstation. Limited program changes e.g. control parameters, setpoints, time delays, etc. may be carried out via a portable terminal plugged into the LCU.

.16 For each LCU it shall be possible to declare alarms on every input, digital as well as analog. Alarming of points shall be operator definable on a per point basis and shall comprise of at minimum:

.1 High/low limits

.2 High/low differential from setpoint limits

.3 Eng. units and timed deadbands

.4 Special and interlocked alarms

.17 After a power failure, the LCU is to refer to its various time programs and provide start signals in an orderly and predefined manner.

.18 Zone Temperature Sensors - The sensing element shall be influenced both by the surrounding air temperature and by the radiant heat in the zone. Each zone temperature sensor shall have a modular jack for connection of a portable terminal (PT). The PT via the jack shall be able to communicate to the controller which the sensor is connected to or any other controller or LCU within the system.

PART 3 - EXECUTION

3.1. INSTALLATION

.1 Install all equipment, accessories, conduit and interconnecting wiring in a neat and protected manner by skilled and qualified work persons using the latest standard practices of the industry.

.2 Unless otherwise specified, meet manufacturers latest printed instructions for materials, planned maintenance and installation methods.

.3 Notify Owner in writing of any conflict between these Specifications and manufacturer's instructions. Within 2 weeks of submission of Tender, contract award may be determined by these deviations. No deviations will be considered after this time period.

.4 Coordinate work and provide the necessary relays, auxiliary contacts and transformers required to interconnect equipment. Retain original equipment suppliers to provide contacts as required.

.5 All equipment installed shall be mechanically stable and fixed to wall or floor.

.6 Install equipment so as to allow for easy maintenance access and such that it does not interfere in any way with access to adjacent equipment and personnel traffic in the surrounding space.

.7 Install equipment in locations providing acceptable ambient conditions for its specified functioning, allowing for adequate ventilation and with no condensation traps.

.8 Shield and ground communication trunk wiring at a single end.

.9 Do not splice trunk cables.

.10 Provide complete installation, testing, debugging and interfacing of specified software.

3.2. SOFTWARE IMPLEMENTATION

.1 The work of this section shall include the full implementation of all software described in these specifications, such that all packages are fully operational systems. Where information is required from the Owner in order to complete any item, the Contractor shall request this information in writing at least 4 weeks prior to the date at which this information is required.

3.3. IDENTIFICATION

.1 Provide all pieces of supplied equipment with a minimum 25 mm x 75 mm [1 in x 3 in] black and white lamacoid nameplate with, at minimum, 6 mm high bold lettering and affix to control device or on panel front. Identify in accordance with the shop drawing descriptions. Except where specifically noted otherwise, permanently attach using self tapping screws or bead chain.

.2 Within each field panel provide a complete listing of points connected, system schematic diagrams, calculated point codes and other information useful to assist an operator using a PT for diagnostic purposes. Fasten information to inside of front door using adhesive backed paper, or mount information in sealed plastic covers and secure to field cabinet.

.3 Identify all field wiring terminations with labels corresponding to Shop Drawing identifications.

3.4. WIRING

.1 Provide all wiring required for Instrumentation. Install in EMT conduit or use fire rated cable. FT-6 rated cable may be used where approved by authority.

.2 Provide power wiring from nearest 125 volt emergency powered panel to each field device as required. . Provide wiring from breaker to all equipment unless specifically indicated otherwise. Power wiring from emergency source to a control device or panel serving any life safety functions shall be fire rated (2 hour minimum).

.3 Provide necessary relays required to interconnect equipment.

.4 Install wiring parallel and perpendicular to building planes.

3.5. TRAINING

.1 Provide practical training for the owners designated representatives. Direct training should include Control, Monitoring including Offsite Monitoring, Report Generation, Data Base Management, and Maintenance

.2 Provide training at the site at locations specified by the client. Allow 2 full 8 hour days of training for each group to cover the above and allow for these days to be staggered to meet the owner's schedule. Training sessions will be scheduled during normal working days and during normal working hours, excluding holidays.

.3 Training shall cover parts of the existing ECMS modified to suit the new equipment. Supervision training shall include for the software procedures to allow for the appropriate operators or supervisors to add, or modify points, programs, reports or graphics.

.4 Provide training specifically directed to controller programming with the Program Editor Module provided.

.5 Submit to the Construction Manager, check lists for each system or piece of equipment indicating that all components have been checked and are complete prior to instruction period.

.6 Provide all equipment and supplies, as required by the Contractor in order to execute the training program.

.7 Submit a complete record of instructions given to the owner's user groups. For each instruction period, supply the following data:

.1 Date

.2 Duration

.3 Agenda: System or equipment involved

.4 Names of persons giving instructions

.5 Names of persons being instructed

.6 Other persons present

.8 Provide at least four complete sets of approved training manuals including final documentation of systems, instructions for hardware and all software, troubleshooting procedures, etc. Provide these manuals as a draft submission for review by the lead consultant before submission of the four final sets. Make changes or additions as directed based on the draft submission. Submit the final sets in time for the training sessions.

.9 Verification of completed training shall be submitted to the Construction Manager prior to final release of holdback.

.10 Selected clients representatives shall be sufficiently trained so as to be qualified to perform emergency maintenance during the warranty period, without affecting, in any way, the warranty coverage provided. At the end of such training, provide qualification certificate.

3.6. WARRANTY AND WARRANTY SERVICE

.1 Warrant in writing, all provided equipment, accessories, installations, software and firmware against defects in workmanship and materials for a period of one year commencing from the date of issue of the Certificate of Completion. Include emergency 24 hour service.

.2 In addition to the above, provide a supplier's on-site warranty for two years minimum to cover all parts, materials and labour for the desktop and portable workstation computers, including monitors.

.3 These warranties shall take precedence over any other warranties.

.4 Maintain the affected parts operational during repair of defective equipment covered by the warranty.

.5 All warranty repairs shall be carried out on site or a replacement component shall be issued to the facility at no charge.

.6 During the warranty, all components described above shall be routinely inspected and serviced by trained ECMS technicians with written reports to the owner regarding condition, adjustments or changes made to any equipment following each inspection. Change consumable items such as printer ribbons as required at these inspections.

.7 Provide all service at no additional cost during the warranty period, with the specified exception of the supply of consumable items as defined above.

.8 Perform a final inspection in conjunction with the client and Consultant, 60 days prior to the termination of the warranty period. Submit a full report, to the client at least 30 days prior to the termination of the warranty period.

.9 During the warranty period, replace or repair all supplied equipment, documentation and software, at no additional cost. All defective equipment and software shall be replaced or repaired as soon as is reasonably possible after it is considered to be defective.

.10 Maintain an inventory of sufficient normal replacement parts, components, materials, tools, equipment and testing devices such that repair or replacement can commence within 8 hours of notification of an inoperable condition.

.11 At the end of the warranty period, update software such that all software will be the most recent product.

END OF SECTION

PART 1 - GENERAL

1.1. WORK INCLUDED

.1 Comply with Division 1, General Requirements and all documents referred to therein.

.2 Provide all labour, materials, products, equipment and services to demonstrate to the Owner and the Consultant that the equipment, networks, installations, programs and services supplied, installed and tested under this Contract meet the requirements of the Contract Documents in all respects.

1.2. SPECIAL TESTING AND USE OF EQUIPMENT PRIOR TO ACCEPTANCE TESTING

.1 The Owner/Consultant reserves the right to use any piece of equipment, device or material installed under this Contract for such reasonable lengths of time and at such times as they may be required to make complete and thorough tests of same before undertaking the final acceptance testing. Do not construe such tests as evidence of acceptance of any part of the contract. No claim for damage will be made by the Contractor for any injury or breakage to any parts of the above due to the aforementioned tests where caused by weakness or inaccuracy of the parts or by defective materials or workmanship of any kind whatsoever.

.2 Conduct such operation following prior agreement between the Owner/Consultant and the Contractor as to the format and scheduling of the tests.

.3 Arrange work to enable the Owner to change over local AHU control systems to the new system for extended operating periods to ensure proper functioning of software and hardware.

.4 Do not withhold consent to the execution of such operation when reasonably requested by the Owner/Consultant.

.5 Make ECMS available for the use of the Owner once the individual work items are such that they can be used for their intended function(s) as detailed herein.

.6 The warranty period shall not commence until the Owner's Certificate of Substantial Completion is issued.

.7 The Owner and/or Consultant reserve the right to defer acceptance testing on any item until all work included in this Contract has been completed by the Contractor or can be fully tested.

.8 Draft documentation must be provided before acceptance testing will commence.

PART 2 - PRODUCTS

2.1. TEST PROVISIONS

.1 Provide all equipment, software, consumable items, personnel and facilities as required to reasonably execute any factory or site acceptance tests, including any signal simulation equipment.

2.2. DOCUMENTATION

.1 Submit preliminary as-built drawings and documentation at least 4 weeks prior to the commencement of final acceptance testing. The intent is that this documentation may be used by the Owner and Consultant during the execution of the final acceptance testing.

.2 Submit data relevant to point index, functions, limits, sequences, interlocks, software routines and associated parameters and other pertinent information for the operating system and data base.

.3 Submit point log sheets to the Consultant at least 4 weeks prior to the test. Submit sample point log sheets for Consultant review prior to completion and final data entry.

.4 Submit for acceptance by the Consultant, a total demonstration test plan before commencement of each test/inspection. All hardware and software system components and all other work items shall be fully tested/inspected during the demonstration.

PART 3 - EXECUTION

3.1. SITE ACCEPTANCE TESTING

.1 Perform a complete demonstration of the ECMS realtime responsibilities of surveillance and command prior to online operation.

.2 Advise the Consultant and Owner, in writing, at least 2 weeks in advance of readiness to perform tests.

.3 Note deficiencies and correct before starting and continuing tests. Perform calibration and operational checks prior to the commencement of final acceptance testing for all relevant system parts.

.4 Perform final acceptance testing at the following defined levels:

.1 per point basis

.2 per system basis

.3 software functions and packages basis

.4 per building basis

.5 total ECMS basis

.5 Make available on site for the duration of these tests, all installation, engineering, software, system and personnel, required to enable test completion.

.6 Demonstrate the specified performance of the ECMS software and hardware, at all levels from individual end devices through to total system operation and the proper operation/undertaking of all other items of work performed under this Contract.

.7 Specifically orient acceptance test procedures to demonstrate the satisfactory operation of aspects of the operator interface terminals.

.8 Perform a complete and detailed calibration and operational check for each individual ECMS point and control function contained within the supplied system. Check to

ensure that all equipment, software, network elements, modules and circuits provided are functioning to meet the Specification and record on log sheets.

.9 Repeat acceptance testing until acceptable performance has been established.

3.2. FACTORY TESTING

.1 Factory testing of hardware or software shall not replace, in whole or in part, site acceptance testing as detailed in this Section.

.2 Submit for Consultant review, proposed format of factory tests.

END OF SECTION

PART 1 - GENERAL

1.1. QUALIFICATIONS

.1 The TAB Agency shall be a current member in good standing with either the Associated Air Balance Council, National Environmental Balancing Bureau or National Building Comfort Testing Association. Failure to provide evidence of good standing will jeopardize the LEED certification of the project.

1.2. SUBMITTAL REQUIREMENTS

.1 Submit the following information with the Bid Form:

.1 List of proposed equipment to be used for this project.

.2 Proof of membership in the Associated Air Balance Council (AABC), National Environmental Balancing Bureau (NEBB) or National Building Comfort Testing Association (NBCTA).

.3 The names and qualifications of all personnel who will be assigned to this project. Use of other personnel will be grounds for contract termination.

.4 A listing of references including project names, Consultant, Contractor and Owner references with telephone numbers.

1.3. WORK INCLUDED

.1 Comply with Division 1 - General Requirements and all documents referred to therein.

.2 Provide all labour, materials, products, equipment and services to test, adjust and balance all air systems to verify conformance to specified quantities and to the design intent of the mechanical system.

.3 Refer to Specification 15040 for commissioning activities to be performed by others. Cooperate with the Commissioning Agent.

.4 The following systems and/or equipment are included in the Scope of Work:

.1 Air Systems:

.1 Five (5) multizone unit supply fans

.2 Five (5) multizone unit return fans

.3 Trunk duct of each zone served by a multizone unit

.4 Packaged RTU RT-6

.5 AH-2 supply fan

.5 Refer to Specification Section 15890 for test openings in duct system. Provide additional openings to fulfill the work of this section.

1.4. REFERENCE STANDARDS:

.1 All work shall be in accordance with the latest edition of the AABC or NEBB National Standards. If these contract documents set forth more stringent requirements than the Reference Standards, these contract documents shall prevail.

1.5. REFERENCE DOCUMENTS:

.1 Obtain and pay for, a complete set of reviewed Shop Drawings of pumps, fans and control systems.

.2 Obtain and pay for, a complete set of Mechanical Drawings and Specifications.

PART 2 - PRODUCTS

2.1. TEST EQUIPMENT

.1 When requested by the Consultant, provide current calibration certificates for test equipment.

PART 3 - EXECUTION

3.1. GENERAL

.1 The specified systems shall be reviewed and inspected for conformance to design documents. Testing, adjusting and balancing on each identified system shall be performed. The accuracy of measurements shall be in accordance with AABC or NEBB Standards or "5%, which ever is more stringent.

.2 Any deficiencies in the installation or performance of a system or component shall be reported in writing to the Contractor and Consultant.

.3 Equipment settings, including manual damper quadrant positions, manual valve indicators, fan speed control levers, and similar controls and devices shall be physically marked to show final settings.

3.2. JOB SITE INSPECTION

.1 Inspect the installation of the systems to be tested at least twice during the construction period. Ensure specified devices and components required for testing and balancing functions have been installed according to the manufacturer’s recommendations.

.2 Ensure all required balancing dampers are installed, functional, and accessible for use in testing and balancing procedures.

.3 Provide a written report of inspection to the Contractor and Consultant identifying specific concerns and deficiencies affecting the testing and balancing procedures.

3.3. FANS AND AIR HANDLING SYSTEMS

.1 Verify that all ductwork, dampers, grilles, registers and diffusers have been installed per design.

.2 Balance air handling systems at minimum outdoor air quantities. On completion of TAB procedures, retest at maximum outdoor air quantities.

.3 Test and adjust fan RPM to achieve design flow.

.4 Test and record motor voltage and amperage. Compare data with nameplate limits.

.5 Perform pitot tube traverse at all main ducts. Compare traverse total with measured outlet total to determine actual duct leakage.

.6 Test, adjust, and record minimum outdoor and relief air volumes.

.7 Test and record system static pressure profile of each air handling system at minimum outdoor air volume. Note coil (i.e. wet/dry) and filter condition of time of testing.

.8 Test and record differential pressure across clean filters.

.9 Test and record entering and leaving air conditions for each heat transfer coil and device. Simulate conditions to achieve winter or summer design parameters.

.10 Test and record settings of motor thermal overload devices. Adjust settings where required.

3.4. AIR DISTRIBUTION AND TERMINALS

.1 Adjust duct distribution to obtain specified air quantities. At least one zone balancing damper shall be completely open. Multi diffuser/grille branch ducts shall have at least one volume damper completely open.

.2 Test and adjust each air terminal on RT-6 system to obtain 1,330 CFM per terminal (six (6) air terminals total). Adjust deflectors and pattern controllers to eliminate drafts.

.3 Test and adjust each air terminal on AHU-2 system to obtain 390 CFM per terminal (eleven (11) air terminals total). Adjust deflectors and pattern controllers to eliminate drafts.

.4 Test and adjust each zone on systems RT-1, RT-2, RT-3, RT-4 & RT-5 to provide values matching the existing air audit (refer to Appendix C).

3.5. PRELIMINARY TESTING

.1 In the event preliminary testing reveals a deficiency in the system which cannot be corrected through the balancing process, advise the Contractor and Consultant in writing describing the conditions and suggested corrective action.

3.6. REPORTS

.1 Provide four (4) copies of the TAB report for Consultant review.

.2 Summarize all testing into logical sections, tabulated and summarized.

.3 Identify system terminals and distribution on legible plan or schematic drawings depicting actual system arrangement. Label pitot tube traverse locations, terminal identification and equipment identification in a manner consistent with the contract documents.

3.7. REPORT VERIFICATION

.1 Cooperate with the Consultant in field verification of the final reported valves.

.2 Specific and random verifications will be performed using the same procedures used in preparation of the reports.

.3 Sufficient verifications will be performed to satisfy the Consultant that the reports accurately represent the actual system conditions.

3.8. GUARANTEE

.1 Provide AABC National Project Performance Guaranty or NEBB Performance Bond for the work.

.2 Include a copy of the guarantee in each copy of the Testing and Balancing Report.

END OF SECTION

PART 1 - GENERAL

1.1. GENERAL

.1 This specification shall apply to and govern all work of Division 16. The contractor shall supply, install, wire and connect all equipment, accessories, devices etc shown unless specifically noted otherwise. Should the contractor be unsure, they are to submit a question 3 working days prior to tender close to have an addendum issued to clarify the device, equipment or work scope in question.

.2 It is the contractors responsibility to obtain all drawings and specifications prior to tender submittal. Any discrepancies between these specifications and the drawings that causes doubt as to the true meaning of intent of the drawings and specifications, a ruling shall be obtained from the engineer prior to tender submittal. no allowance will be made for failure to do so. If clarification cannot be obtained in time, the contractor shall include for the more costly installation in their bid.

1.2. DEFINITIONS

.1 The following are definitions of words found in the specification and on associated drawings:

.1 "concealed" - hidden from normal sight in furred in spaces, shafts, ceiling spaces, walls, underfloor and partitions.

.2 "exposed" - all electrical work exposed to building occupants. wire and cabling shall be in conduit unless specifically noted otherwise.

.3 "provide" (and all tenses of "provide") supply, install, wire and connect complete.

.4 "install" (and all tenses of "install") install wire and connect complete, products and services specified.

.5 "supply" supply only

.6 "or approved equal" material or equipment proposed by the contractor in lieu of that specified as approved by the consultant. material or equipment shall meet or exceed the same quality, material, efficiency, etc as the specified products.

.7 "as indicated" as shown on drawings and/or noted in specifications.

1.3. LIABILITY INSURANCE

.1 Obtain and carry proper insurance to fully protect both the owner and himself from any and all claims due to accidents, misfortunes, acts of god, etc.

1.4. CODES, PERMITS AND INSPECTION

.1 Be responsible for and obtain all permits, inspection, etc., as required by all authorities having jurisdiction over this work and pay for all fees related to same.

.2 Deliver all permits to the engineer as soon as they become available.

1.5. CLOSE-OUT DOCUMENTS AND AS-BUILT DRAWINGS

.1 The contractor shall submit an enquiry to the architect/owner to obtain the final room names and numbers to be used in all the close out documents, reports, fire alarm/nurse call programming, panel schedules etc. Failure to use the final names and numbers will require the contractor to replace documentation/reprogram as required at their expense. They shall keep a separate set of white prints on the site and note all changes and deviations from the original design. Devices, etc., noted as "ex" (existing) and "rel" relocated are to have the circuit traced and designated on the drawings. Devices, etc., designated as “connect to existing circuit in area” are to have the circuit indicated on the plans. Provide as-built drawings in AutoCAD format (min. release 2010), pdf format and (2) two sets of these plans showing all as-built conditions to the owner at the completion of this contract and before applying for final payment. (include in-slab conduit runs). Should no markups be required tender and/or sealed plans by the engineer will not be accepted.

.2 Close out binders shall be provided with all test results, warranty letters and shop drawings. a pdf copy shall be provided along with the hard copy versions. PDF version shall be assembled versions where possible. Should a document require scanning, it shall be provided in high resolution and be clearly legible. Illegible documents will not be accepted.

1.6. DRAW BREAKDOWNS

.1 This contractor must submit a breakdown of the tender price into separate classification to the satisfaction of the consultant and totaling the total contract amount. Each item is to be broken into material and labour costs.

.2 Progress draws, when submitted, are to be itemized against each of the draw breakdowns and shall be in table form identifying contract amount, amount of this draw, total to date, percentage complete and balance.

.3 Breakdown shall follow, but not be limited to;

.1 permits and fees

.2 mobilization

.3 demolition

.4 distribution equipment (ie. switchboards, panelboards, etc.)

.5 incoming feeders and conduits

.6 branch wiring conduits

.7 branch wiring

.8 mechanical equipment wiring

.9 fire alarm devices

.10 fire alarm wiring

.11 fire alarm verification and certification

.12 miscellaneous and specialty equipment (ie. public address, sound, etc.)

.4 Above breakdown must be approved by the consultant prior to submission of the first draw, mobilization amount may only be drawn when all required shop drawings have been reviewed by the Consultant.

1.7. REVISIONS TO CONTRACT

.1 Provide itemized lists of materials/associated costs, labour rate/labour for each item, copy of manufacturers invoice, if requested, for each item given change notice.

1.8. WORK INCLUDED

.1 Comply with Division 1 - General Requirements and all documents referred to therein.

1.9. CODES AND STANDARDS:

.1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.

.2 Comply with CSA electrical bulletins in force at time of tender submission, while not identified and specified by number in this division, are to be considered as forming part of related CSA Part II standard.

.3 Do overhead and underground systems in accordance with CSA C22.3 No. 1 except where specified otherwise.

.4 Abbreviations for electrical terms: to CSA Z85.

.5 Comply also with the following codes:

.1 Ontario Electrical Safety Code

.2 National Building Code

.3 Ontario Building Code

.4 Local hydro utility requirements

.5 CAN/ULC S524 and S537

1.10. VISITING THE SITE:

.1 Visit the site of the project and become familiar with the site conditions. Report any deviation and/or conflicts between tender documents and site conditions prior to submitting tender.

PART 2 - PRODUCTS

2.1. EQUIPMENT AND MATERIALS

.1 All equipment and material, unless specifically noted otherwise, shall be new and without blemish or defect. All material and equipment shall bear ULC or CSA labels.

2.2. DIRECTORIES AND LABELLING

.1 Identify all electrical equipment. Identification shall consist of engraved lamacoid nameplates having black background with white letters. fasten nameplates to device using self-tapping, countersunk screws. tape-type nameplates will not be accepted.

.2 All receptacle cover plates shall be labeled with tape-type nameplates. The label shall indicate the panel designation and circuit number. (ie a19). tape shall be neatly trimmed on each end and placed plumb and level on the face plate. Labels shall have a neat, clean and professional appearance. Labels not trimmed or poorly positioned will not be accepted.

.3 All panels with circuits added or removed shall have new computer generated panel schedules placed in them. Schedule shall indicate panel designation, where panel is fed from, voltage, phase, branch circuit numbers, breaker amperage and circuit description.

2.3. ELECTRICAL EQUIPMENT

.1 Equipment shall have 1.0m (39") clearance in front of said equipment

.2 Electrical equipment rated at 1200a and over shall have 1.5m (59") clearance in front of said equipment.

.3 All equipment installed in sprinklered areas are to be complete with drip shields.

2.4. PANEL BOARDS

.1 Panel boards: to CSA C22.2, No. 29. Loadcentres are not acceptable.

.2 Panel boards are to be the product of one (1) manufacturer

.3 120/208v-3 phase-4 wire panel boards: bus and breakers rated for minimum 10,000a (symmetrical) interrupting capacity or as indicated on the drawings.

.4 Main breaker shall occupy a separate compartment from branch breakers. Panels with main breakers in branch breaker compartment will not be accepted.

.5 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number.

.6 Panel boards: mains, number of circuits, and number and size of branch circuit breakers as indicated

.7 Two (2) keys for each panel board and key panel boards alike.

.8 Copper bus with full size copper mains and neutral.

.9 Mains for bolt-on breakers.

.10 Finish trim and door baked gray enamel. paint tub same as door.

.11 Complete circuit directory with typewritten legend showing circuit label, amperage and panel location under plastic cover.

2.5. BREAKERS

.1 Bolt-on molded case circuit breaker, full module (i.e.. 1"minimum width), quick-make, quick-break type, for manual and automatic operation with temperature compensation for 40oc ambient. (mini-breakers not acceptable)

.2 Magnetic instantaneous trip elements in circuit breakers, to operate only when the value of current reaches setting.

2.6. DISCONNECT SWITCHES FUSED AND UNFUSED

.1 Enclosed manual air break switches in non-hazardous locations: to CSA C22.2 No. 4.

.2 Fuse holder assemblies to CSA C22.2 No. 39.

.3 Fusible and non-fusible disconnect switches as indicated.

.4 Provision for padlocking in on/off switch position by three locks

.5 Mechanically-interlocked door to prevent opening when handle in "on" position

.6 Quick-make, quick-break action.

.7 On/off switch position indication on switch enclosure cover.

.8 CSA enclosure 1 unless noted otherwise.

.9 Eaton Cutler Hammer, Aquare D, Siemens Canada manufacture.

2.7. JUNCTION BOXES

.1 Welded steel construction wire screw-on flat covers for surface mounting.

.2 Covers with 1” (25 mm) minimum extension all around, for flush-mounted pull and junction boxes.

.3 Install pull boxes in conduit runs so as not to exceed 30 m of conduit run or the equivalent of two (2) 90° bends between pull boxes.

2.8. GROUNDING

.1 Ground all equipment in accordance with code requirements and as indicated.

.2 Grounding conductors: copper, insulated (green); size per code.

.3 Grounding lugs, connectors: approved grounding type.

.4 All ground conductors #8AWG or smaller shall be run in EMT.

2.9. FIREPROOFING

.1 Where cables pass through floors or fire rated walls, pack space between wiring and sleeve full with approved rated fire stops and seal with caulking compound conforming to CGSB 19-GP-9MA.

PART 3 - EXECUTION

3.1. GENERAL

.1 The specified systems shall be reviewed and inspected for conformance to design documents.

.2 Any deficiencies in the installation or performance of a system or component shall be reported in writing to the Contractor and Consultant.

.3 Provide all labour and materials necessary to ensure that power, lighting and all other miscellaneous electrical services are maintained in full operating condition, in all areas of the existing building, during the construction period. Disconnect, move, relocate, and reconnect conduit and wiring as necessary to accommodate the new work and mechanical installation.

3.2. CUTTING AND PATCH

.1 Provide all cutting, patching and painting for electrical work, unless noted otherwise.

3.3. SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

.1 Submit shop drawings, product data and/or samples for all equipment, power distribution, power devices, communications devices, raceway, light fixtures, emergency lighting, etc. the drawings are to be reviewed and stamped by the contractor prior to submittal.

.2 Shop drawings shall include all relevant accessories and layouts where requested.

.3 Shop drawings that are illegible and of poor quality will be rejected.

.4 Shop drawings will be reviewed and return marked "reviewed", "reviewed as noted" or "revise and resubmit". The drawing review does not relieve the contractor of responsibility for its accuracy or for compliance with the contract documents.

.5 Installation of any equipment shall not start until after final review of shop drawings by the consultant has been obtained.

.6 Incomplete or incorrect shop drawings that are rejected, which adversely cause or result in any delay of the deliver schedule of any equipment shall be the contractors responsibility.

.7 If incorrect shop drawings are submitted and rejected any subsequent delivery delay will result in the contractor providing temporary facilities until said equipment is delivered and installed at no extra cost to the owner.

.8 Provide space for shop drawing review stamps for the contractor and consultant. this space shall be clear of all technical information and shall not be on the back of any sheets.

.9 Submit shop drawings in digital (PDF) format.

.10 One (1) original copy in digital format (PDF) will be returned. all copies required by trades, suppliers or other consultants will be provided and/or printed by the contractor.

.11 Failure to submit shop drawings will not relieve this contractor from ensuring that all installed equipment meets the intend of design documents. All costs associated with any issues associated with alternate or not submitted equipment will the responsibility of the installing contractor.

.12 Shop drawing submittal shall be (but not limited to) for any equipment as listed;

.1 high voltage equipment

.2 switchboard, meter centers, panel boards

.3 luminaires including lamps and ballasts

.4 electrical heaters

.5 millwork

.6 devices

3.4. ROOF AND WALL OPENINGS

.1 Location of conduits passing through roof and walls to be coordinated with division 15. All openings to be made watertight.

3.5. SCHEDULE OF CONSTRUCTION

.1 Consult general division for schedule of construction before commencing work and coordinate details with engineer, owner and all trades during construction.

3.6. PHASING

.1 The contractor shall review the phasing as indicated on all plans. This includes architectural, mechanical plans etc in the entire drawing package.

.2 The contractor shall include for temporary connections as required to facilitate the work.

.3 The contractor shall include for all weekend and premium time required to facilitate the phasing as indicated in the plans package.

3.7. MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation

.3 Install electrical equipment as specified in the obc for barrier free design. if not noted, install at following centerline heights:

.1 local switches: 3'-5" (1050mm).

.2 wall receptacles:

.1 general: 1'-6" (450mm).

.2 above top of continuous baseboard heater: 10" (250mm).

.3 above top of counters or counter splash backs: 6" (150mm).

.3 mechanical rooms: 3'-5" (1050mm).

.4 panelboards: as required by code or as indicated.

.5 fire alarm pull stations: 3'-9" (1150mm)

3.8. LOAD BALANCE

.1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance. adjust branch circuit connections as required to obtain best balance of current between phases and record changes.

.2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.

.3 Submit, at completion of work, report listing phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load. State hour and date on which each load was measured, and voltage at time of test.

3.9. CONDUIT AND CABLE INSTALLATION

.1 Install conduit and sleeves prior to pouring of concrete. sleeves through concrete: schedule 40 steel pipe, sized for free passage of conduit, and protruding 2" (50mm).

.2 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.

.3 Install cables, conduits and fittings to be embedded or plastered over, neatly and close to building structure so furring can be kept to minimum.

3.10. CLEANING

.1 Do final cleaning.

.2 At time of final cleaning, clean equipment surfaces that have been exposed to construction dust and dirt.

.3 Vacuum inside of all panel boards, etc., on completion of the project.

3.11. WARRANTY

.1 Warrant all work and apparatus installed under this contract for a period of one year after acceptance of same by the owner.

END OF SECTION

Appendix A

Mechanical Drawings

LEGEND – HVAC

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
HWS	HEATED WATER SUPPLY		SINGLE LINE RIGID DUCT
HWR	HEATED WATER RETURN		SINGLE LINE DUCT WITH ACOUSTIC LINING
RWS	RADIATION WATER SUPPLY		SINGLE LINE FLEXIBLE DUCT
RWR	RADIATION WATER RETURN		DOUBLE LINE FLEXIBLE DUCT
CHWS	CHILLED WATER SUPPLY		SUPPLY AIR DIFFUSER
CHWR	CHILLED WATER RETURN		RETURN AIR GRILLE
CWS	CONDENSER WATER SUPPLY	2-6"ø / A1-100	NUMBER/DIFF NECK SIZE / DIFF TYPE/SUPPLY AIR CFM
CWR	CONDENSER WATER RETURN	FD	FIRE DAMPER
S	STEAM MAIN (PRESSURE AS INDICATED)	SD	SMOKE DAMPER
C	CONDENSATE RETURN	MD	MOTORIZED DAMPER
FOS	FUEL OIL SUPPLY	BD	MANUAL BALANCING DAMPER
FOR	FUEL OIL RETURN	BDD	BACK DRAFT DAMPER
RL	REFRIGERANT LIQUID	FS	MOTORIZED COMBINATION FIRE AND SMOKE DAMPER
RD	REFRIGERANT DISCHARGE		FIRE DAMPER (IN RISER)
RS	REFRIGERANT SUCTION		SMOKE & FIRE DAMPER (IN RISER)
GS	GLYCOL SUPPLY		BALANCING DAMPER IN (IN RISER)
GR	GLYCOL RETURN		MOTORIZED DAMPER (IN RISER)
	SUPPLY OR OUTSIDE AIR DUCT	T	THERMOSTAT
	RETURN OR EXHAUST DUCT	H	HUMIDISTAT
	SUPPLY DUCT DOWN	UC	DOOR UNDERCUT
	RETURN DUCT DOWN	DG	DOOR GRILLE
	ROUND DUCT UP	OA	OUTDOOR AIR
	ROUND DUCT DOWN	RA	RETURN AIR
	DUCT WITH ACOUSTIC LINING	RF	RELEIF AIR
	DOUBLE LINE DUCT	SA	SUPPLY AIR
	SOUND ATTENUATOR		

ROOF TOP UNITS

TAG	SYSTEM	LOCATION	MODEL #	COOLING					HEATING		AIRFLOW		MIN O.A.		ESP		ELECTRICAL			WEIGHT		REMARKS
				TONS	TOTAL MBH	SENS MBH	SEER	EER	INPUT	OUTPUT	L/S	CFM	L/S	CFM	Pa	in.w.c.	VOLTAGE	MCA	MOCP	KG	lbs	
RT-6	ATRIUM	THIRD FLOOR ROOF	AV20S3CH5L1CAS11A1	20	236	184	N/A	10.8	400	324	3,776	8,000	236	500	125	0.5	575/3/60	42.1	50	1,089	2,400	C/W CURB ADAPTOR, STAGED HEATING, UNPOWERED CONVENIENCE OUTLET, ECONOMIZER. RE-USE EXISTING 50A BREAKER AND POWER WIRING. BREAKER PANEL LOCATED ON THIRD FLOOR.

NOTES:
1. SPECIFICATIONS BASED ON YORK
2. ACCEPTABLE ALTERNATES: TRANE, CARRIER

DRAWING SCHEDULE

DWG NO	DRAWING TITLE
M-100	LEGENDS, SCHEDULES, AND DETAILS
M-101	CONTROL DIAGRAMS
M-300	ROOFTOP HVAC PLAN

CONDENSING UNITS

TAG	SYSTEM	MODEL #	COOLING	ELECTRICAL			REMARKS
			TONS	VOLTAGE	MCA	MOCP	
CU-1	AHU-1	YC180C00A5GLB4	15	575/3/60	24	30	C/W NEW COIL TO SUIT EXISTING AIR HANDLING UNIT. RE-USE EXISTING 30A BREAKER AND POWER WIRING. BREAKER PANEL ON THIRD FLOOR.
CU-2	AHU-2	YC150C00A5AAA4	12.5	575/3/60	19.7	25	C/W NEW COIL TO SUIT EXISTING AIR HANDLING UNIT. REPLACE EXISTING 30A BREAKER WITH NEW 20A BREAKER, RE-USE EXISTING POWER WIRING. BREAKER PANEL ON THIRD FLOOR.

NOTES:
1. SPECIFICATIONS BASED ON YORK
2. ALTERNATES: TRANE, CARRIER

IMPERIAL TO METRIC SIZING CONVERSION

1/8"	3mm	1"	25mm
1/4"	8mm	1 1/4"	32mm
3/8"	10mm	1 1/2"	40mm
1/2"	15mm	2"	50mm
3/4"	20mm	2 1/2"	65mm
3"	80mm	4"	100mm

AIR HANDLING UNITS

TAG	SYSTEM	LOCATION	TYPE	MODEL #	AIRFLOW		MIN O.A.		FAN MOTOR (SUPPLY)				VOLTAGE	REMARKS
									POWER		ESP			
					L/S	CFM	L/S	CFM	KW	BHP	Pa	in.w.c.		
AHU-1	BASEMENT	BASEMENT MECHANICAL ROOM	–	MCCB012	2,832	6,000	–	–	3.0	4	150	0.6	575/3/60	EXISTING AIR HANDLING UNIT, REPLACE DX COOLING COIL WITH NEW COIL SUITABLE FOR R-410A REFRIGERANT TO MATCH CU-1
AHU-2	ATRIUM	BASEMENT MECHANICAL ROOM	–	MCCB008	2,029	4,300	236	500	2.0	2.7	150	0.6	575/3/60	EXISTING AIR HANDLING UNIT, REPLACE DX COOLING COIL WITH NEW COIL SUITABLE FOR R-410A REFRIGERANT TO MATCH CU-2. BALANCE MINIMUM OUIDOOR AIRFLOW TO 500 CFM AND TOTAL AIRFLOW TO 4,300 CFM (PREVIOUS DESIGN AIRFLOW 4,000 CFM, PREVIOUSLY AUDITED AIRFLOW 5,400 CFM)

NOTES:
1. EXISTING UNITS ARE TRANE.

AIR HANDLING UNITS

TAG	LOCATION	TYPE	MODEL #	SUPPLY AIRFLOW		RETURN AIRFLOW		MIN O.A.		FAN MOTOR (SUPPLY)				FAN MOTOR (RETURN)				DX COOLING						GAS HEATING				VOLTAGE	MCA	WEIGHT	REMARKS
										POWER		ESP		POWER		ESP		TOTAL	SEN	EAT		LAT		INPUT	OUTPUT	EAT	LAT				
				L/S	CFM	L/S	CFM	L/S	CFM	KW	HP	Pa	in.w.c.	KW	HP	Pa	in.w.c.	MBH	MBH	DB (°F)	WB (°F)	DB (°F)	WB (°F)	MBH	MBH	°F	°F			LBS	
RT-1	FIRST FLOOR ROOF	ROOFTOP MULTIZONE	PAC400/MZ	6,135	13,000	5,663	12,000	944	2,000	///		185	0.75	///		50	0.20	476	343	77.8	65.2	55	54.5	500	400	59.4	88.9	575/3/60	89.2	9,120	REPLACE EXISTING 90A BREAKER WITH NEW 100A BREAKER. PROVIDE SEPARATE PRICE TO PROVIDE NEW 3C/3+GND WIRING FOR POWER. BREAKER PANEL LOCATED ON FIRST FLOOR.
RT-2	FIRST FLOOR ROOF	ROOFTOP MULTIZONE	PAC400/MZ	6,135	13,000	5,663	12,000	944	2,000	///		185	0.75	///		50	0.20	476	343	77.8	65.2	55	54.5	500	400	59.4	88.9	575/3/60	89.2	9,120	
RT-3	SECOND FLOOR ROOF	ROOFTOP MULTIZONE	PAC400/MZ	6,135	13,000	5,663	12,000	944	2,000	///		185	0.75	///		50	0.20	476	343	77.8	65.2	55	54.5	500	400	59.4	88.9	575/3/60	89.2	9,120	REPLACE EXISTING 90A BREAKER WITH NEW 100A BREAKER. PROVIDE SEPARATE PRICE TO PROVIDE NEW 3C/3+GND WIRING FOR POWER. BREAKER PANEL LOCATED ON THIRD FLOOR.
RT-4	SECOND FLOOR ROOF	ROOFTOP MULTIZONE	PAC400/MZ	6,135	13,000	5,663	12,000	944	2,000	///		185	0.75	///		50	0.20	476	343	77.8	65.2	55	54.5	500	400	59.4	88.9	575/3/60	89.2	9,120	
RT-5	THIRD FLOOR ROOF	ROOFTOP MULTIZONE	PAC256/MZ	2,360	5,000	2,360	5,000	189	400	///		185	0.75	///		50	0.20	194	137	76.0	63.5	55	54.5	320	256	59.4	95	575/3/60	41.3	7,120	REPLACE EXISTING 50A BREAKER WITH NEW 60A BREAKER. RE-USE EXISTING POWER WIRING. BREAKER PANEL LOCATED ON THIRD FLOOR.

NOTES:
1. SPECIFICATIONS BASED ON AIRWISE (PRE-TENDERED)
2. PRE-TENDERED ROOFTOP MULTIZONE UNIT, CONTRACTOR RESPONSIBLE FOR ASSUMING PURCHASE ORDER CONTRACT FOR UNITS, HANDLING DELIVERY, INSTALLING UNITS ON SITE AND WARRANTY.
3. REMOVE EXISTING ROOFTOP MULTIZONE UNITS AND CHECK EXISTING CURBS FOR DETERIORATION PRIOR TO INSTALLING NEW UNITS. IF DETERIORATION IS FOUND IMMEDIATELY NOTIFY THE OWNER AND THE ENGINEER.

GENERAL NOTES

PRELIMINARY
NOT FOR CONSTRUCTION

No.	DESCRIPTION	DATE	BY
0	ISSUED FOR TENDER	NOV. 26, 2021	J.C.

REVISIONS

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PROJECT:
ST. CATHARINES PUBLIC LIBRARY CENTRAL BRANCH ROOFTOP EQUIPMENT REPLACMENT
54 CHURCH STREET
ST. CATHARINES, ONTARIO

START DATE:	DRAWN BY:	DESIGNED BY:
2021 10 22	JC	JC

DRAWING TITLE:
LEGENDS, SCHEDULES, AND DETAILS

SCALE: AS NOTED
PROJECT: 21-219-010
DRAWING No.: M-100

PLOT DATE: November 26, 2021
ORIGINAL SHEET SIZE: ARCH D
15" 10" 5" 0

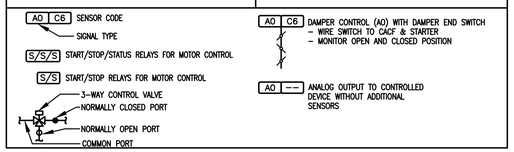
CONTROL LEGEND

SENSOR AND INSTRUMENT CODES

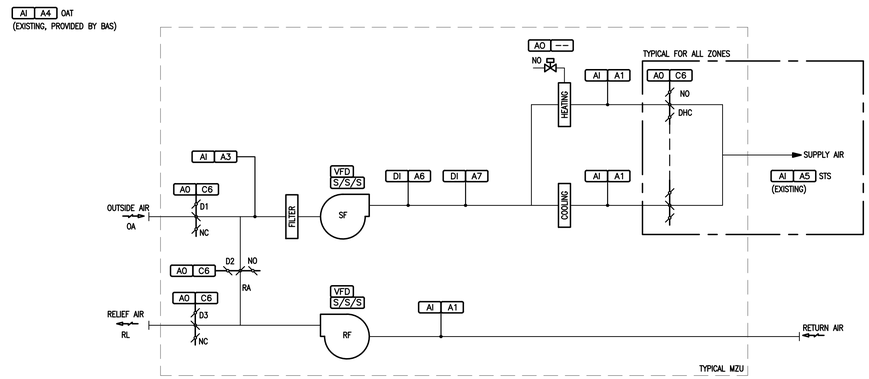
A1	TEMPERATURE SENSOR, DUCT MOUNTED
A2	TEMPERATURE SENSOR, PIPE MOUNTED
A3	TEMPERATURE SENSOR, AVERAGING ELEMENT
A4	TEMPERATURE SENSOR, OUTSIDE AIR TYPE
A5	TEMPERATURE SENSOR, ROOM TYPE
A6	TEMPERATURE SENSOR, LOW LIMIT
A7	TEMPERATURE SENSOR, HIGH LIMIT
B1	HUMIDITY SENSOR, DUCT MOUNTED
B2	HUMIDITY SENSOR, ROOM TYPE
B3	HUMIDITY SENSOR, OUTSIDE AIR TYPE
B5	HUMIDITY SENSOR, HIGH LIMIT TYPE
C1	DIFFERENTIAL PRESSURE
C2	PRESSURE SENSOR
C3	STATIC PRESSURE SENSOR
C4	PRESSURE SWITCH
C5	WATERFLOW SWITCH
C6	DAMPER STATUS SWITCH
C7	AIR VOLUME
C8	PULSED OUTPUT FROM POWER METER
C9	PULSED OUTPUT FROM WATER METER
C10	EMMERSION HEATER ON/OFF
C11	CURRENT SENSOR
C12	Co2 SENSOR
C02	CARBON DIOXIDE SENSOR
CO	CARBON MONOXIDE SENSOR
D1	MOTOR CONTROL RELAYS, START/STOP/STATUS TYPE
D2	CURRENT TRANSFORMERS AND RELAYS
D3	MOTOR STATUS CONTACTS
D4	DIFFERENTIAL PRESSURE SWITCH
D5	LEVEL SWITCH, TANK MOUNTED
D6	LEVEL SWITCH, FLOAT TYPE
D7	DIFFERENTIAL PRESSURE TRANSMITTER
D8	CURRENT SENSITIVE RELAY
D9	LEVEL TRANSMITTER
K1	WATERFLOW TRANSMITTER, ANNUBAR TYPE
K2	WATERFLOW TRANSMITTER, TURBINE TYPE
K3	AIRFLOW TRANSMITTER, DIGITRON TYPE
K4	AIRFLOW TRANSMITTER, ANNUBAR AIRBAR
K5	ENERGY METER, DELTA T AND FLOW
K6	GAS DETECTOR
F1	INTERFACE CONTACT TO CACF
F2	VIBRATION DETECTOR
F3	INTERFACE CONTACT
F4	INTERFACE TO HOOD SUPPRESSION
G1	OUTPUT TO VALVE
G2	OUTPUT TO DAMPER
G3	START/STOP
G4	OUTPUT TO VSD
G5	FAULT INPUT
G6	STATUS
G7	VIBRATION CUT-OUT
G8	ELECTRICAL POWER CONSUMPTION

ABBREVIATIONS

ADJ	ADJUSTABLE
AI	ANALOG INPUT
AO	ANALOG OUTPUT
BAS	BUILDING AUTOMATION SYSTEM
CACF	CENTRAL ALARM & CONTROL FACILITY
CHWS	CHILLED WATER SUPPLY
CHWR	CHILLED WATER RETURN
CLG	COOLING
CWS	CONDENSER WATER SUPPLY
CWR	CONDENSER WATER RETURN
DI	DIGITAL INPUT
DO	DIGITAL OUTPUT
DP	DIFFERENTIAL PRESSURE
DS	DAMPER END SWITCH
EAT	EXHAUST AIR TEMPERATURE
EF	EXHAUST FAN
EWT	ENTERING WATER TEMPERATURE
FPVAV	FAN POWERED VAV TERMINAL
FCS	FAN COIL SUPPLY
FCR	FAN COIL RETURN
FCU	FAN COIL UNIT
FS	FLOW SENSOR
HL	HIGH LIMIT
HWS	HEATED WATER SUPPLY
HWR	HEATED WATER RETURN
HTG	HEATING
LL	LOW LIMIT
LWT	LEAVING WATER TEMPERATURE
MAT	MIXED AIR TEMPERATURE
OARH	OUTSIDE AIR RELATIVE HUMIDITY
OAT	OUTSIDE AIR TEMPERATURE
RA	RETURN AIR
RARH	RETURN AIR RELATIVE HUMIDITY
RAT	RETURN AIR TEMPERATURE
RF	RETURN FAN
RTT	RUN TIME TOTALIZATION
SA	SUPPLY AIR
SARH	SUPPLY AIR RELATIVE HUMIDITY
SAT	SUPPLY AIR TEMPERATURE
SF	SUPPLY FAN
SP	STATIC PRESSURE
ST	SPACE TEMPERATURE
STP	SETPOINT
STS	SPACE TEMPERATURE SENSOR
TUC	TERMINAL UNIT CONTROLLER
VAV	VARIABLE AIR VOLUME



CD-1 / M-102 CONTROL LEGEND



SEQUENCE

THE SYSTEM OPERATES ON A TIME OF DAY SCHEDULE. WHEN SYSTEM IS OFF ALL VALVES AND DAMPERS ARE IN NORMAL POSITION AND ALL FANS ARE OFF.

ON START SIGNAL, START RF, THEN START SF. OPEN D1, D2 AND D3 TO MINIMUM POSITION.

COLD DECK
COLD DECK SAT SHALL BE MAINTAINED AS HIGH AS POSSIBLE. WHEN A ZONE CALLS FOR COOLING AND THE CORRESPONDING COLD DECK ZONE DAMPER IS 100% OPEN, REDUCE COLD DECK SAT SETPOINT. WHEN NO COLD DECK ZONE DAMPERS EXCEED 85% OPEN, INCREASE COLD DECK SAT SETPOINT. LEAD COMPRESSOR SHALL MODULATE TO MAINTAIN COLD DECK SAT AND LAG COMPRESSORS SHALL CYCLE AS REQUIRED.

HOT DECK
HOT DECK SAT SHALL BE MAINTAINED AS LOW AS POSSIBLE. WHEN A ZONE CALLS FOR HEATING AND THE CORRESPONDING HOT DECK ZONE DAMPER IS 100% OPEN, INCREASE HOT DECK SAT SETPOINT. WHEN NO HOT DECK ZONE DAMPERS EXCEED 85% OPEN, DECREASE HOT DECK SAT SETPOINT. GAS BURNER SHALL MODULATE TO MAINTAIN HOT DECK SAT.

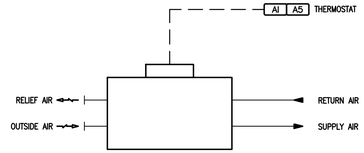
FREE COOLING
WHEN THE OUTDOOR AIR TEMPERATURE IS BELOW THE COLD DECK TEMPERATURE SAT SETPOINT AND MORE THAN 50% OF THE AIRFLOW IS FLOWING THROUGH THE COLD DECK (AS CALCULATED BY SUMMING THE AMOUNT OF COLD DECK AIR BEING SUPPLIED TO EACH ZONE BASED ON ZONE COLD DECK DAMPER % OPEN AND TOTAL ZONE AIRFLOW FOR EACH ZONE), DISABLE MECHANICAL COOLING AND MODULATE THE ECONOMIZER DAMPERS TO MAINTAIN COLD DECK SAT SETPOINT. RESET COLD DECK SAT SETPOINT AS DESCRIBED ABOVE DURING FREE COOLING MODE.

OCCUPIED MODE: SPACE TEMPERATURE SETPOINTS SHALL BE 75°F (ADJ) FOR COOLING AND 72°F (ADJ) FOR HEATING. A DEADBAND OF AT LEAST 2°F SHALL BE MAINTAINED BETWEEN HEATING AND COOLING SETPOINTS. ECONOMIZER DAMPERS SHALL BE SET TO PROVIDE 2,000 CFM (FOR RT-1 – RT-4) OR 400 CFM (FOR RT-5) OF OUTDOOR AIR.

UNOCCUPIED MODE: SPACE TEMPERATURE SETPOINTS SHALL BE 80°F (ADJ) FOR COOLING AND 65°F (ADJ) FOR HEATING. A DEADBAND OF AT LEAST 2°F SHALL BE MAINTAINED BETWEEN HEATING AND COOLING SETPOINTS. ECONOMIZER DAMPERS SHALL BE SET TO PROVIDE 1,500 CFM (FOR RT-1 – RT-4) OR 250 CFM (FOR RT-5) OF OUTDOOR AIR.

ON SENSING HIGH OR LOW LIMIT TEMPERATURES, ALARM BAS AND SHUT DOWN SYSTEM.
ON FIRE SIGNAL, SHUT DOWN SYSTEM.

CD-2 / M-101 ROOFTOP MULTIZONE UNITS
RT-1 – RT-5



SEQUENCE

PROVIDE VENDOR SUPPLIED RTU CONTROL PACKAGE FOR STANDALONE CONTROL. SPACE THERMOSTAT IS TO BE WIRED TO RT-6 AND AH-2 (SAME AS EXISTING CONFIGURATION). WHEN UNIT IS OFF, HEATING, COOLING AND FAN SHALL REMAIN OFF AND ECONOMIZER DAMPERS SHALL REMAIN CLOSED.

VENDOR CONTROL PACKAGE STAGES THE GAS BURNER TO MAINTAIN SPACE TEMPERATURE IN THE HEATING SEASON AND STAGES THE COMPRESSORS TO MAINTAIN SPACE TEMPERATURE IN THE COOLING SEASON.

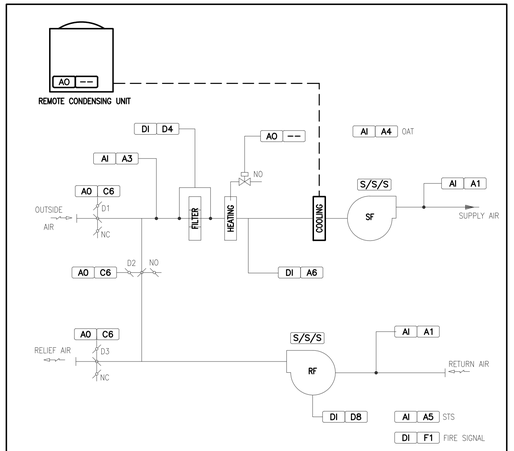
OPERATE THE RTU IN ECONOMIZER MODE WHEN OUTDOOR AIR CONDITIONS PERMIT FREE COOLING. RELIEVE EXCESS AIR VIA A RETURN AIR BAROMETRIC DAMPER THAT DISCHARGES TO THE OUTSIDE.

ADJUST THE PACKAGE CONTROLS FOR SUMMER / WINTER TEMPERATURES (ADJUSTABLE) SETPOINTS OF 75°F AND 72°F RESPECTIVELY DURING OCCUPIED HOURS; AND SETPOINTS OF 80 °F AND 65 °F RESPECTIVELY DURING UNOCCUPIED HOURS.

OCCUPIED MODE: SPACE TEMPERATURE SETPOINT SHALL BE 75°F (ADJ) FOR COOLING AND 72°F (ADJ) FOR HEATING. A DEADBAND OF AT LEAST 2°F SHALL BE MAINTAINED BETWEEN HEATING AND COOLING SETPOINTS. ECONOMIZER DAMPERS SHALL BE SET TO PROVIDE 500 CFM OF OUTDOOR AIR.

UNOCCUPIED MODE: SPACE TEMPERATURE SETPOINTS SHALL BE 80°F (ADJ) FOR COOLING AND 65°F (ADJ) FOR HEATING. A DEADBAND OF AT LEAST 2°F SHALL BE MAINTAINED BETWEEN HEATING AND COOLING SETPOINTS. ECONOMIZER DAMPERS SHALL BE SET TO PROVIDE 250 CFM OF OUTDOOR AIR.

CD-3 / M-101 PACKAGE CONSTANT VOLUME UNIT
RT-6



SEQUENCE

EXISTING UNIT CONTROL/OPERATION SHALL REMAIN UNCHANGED. INTEGRATE NEW REMOTE CONDENSING UNIT AND REFRIGERANT COIL TO MATCH EXISTING DX COOLING CYCLING/STAGING.

CD-4 / M-101 CONSTANT VOLUME SYSTEM - DX COOLING CONTROL
AHU-1, AHU-2

GENERAL NOTES

PRELIMINARY
NOT FOR CONSTRUCTION

No.	DESCRIPTION	DATE	BY
0	ISSUED FOR TENDER	NOV. 26, 2021	J.C.

REVISIONS

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PROJECT:
ST. CATHARINES PUBLIC LIBRARY
CENTRAL BRANCH ROOFTOP
EQUIPMENT REPLACMENT
54 CHURCH STREET
ST. CATHARINES, ONTARIO

START DATE:	DRAWN BY:	DESIGNED BY:
2021 10 22	JC	JC

DRAWING TITLE:
CONTROL DIAGRAMS

SCALE: N/A
PROJECT: 21-219-010
DRAWING No.: M-101

PLOT DATE: November 26, 2021
ORIGINAL SHEET SIZE: ARCH D
15" 10" 5" 0

NOTES:

1) LIBRARY ROOFING CONTRACTOR TO RE-ROOF EXISTING ROOF CURBS AFTER EXISTING UNITS ARE REMOVED AND PRIOR TO NEW UNITS BEING INSTALLED. ROOFER IS GOODMEN ROOFS, 1-888-766-7735. COST OF RE-ROOFING EX. ROOF CURBS SHALL NOT BE INCLUDED IN THIS CONTRACT.

2) INSPECT ROOF CURBS AFTER EXISTING UNITS HAVE BEEN REMOVED. REPORT ANY CURBS THAT ARE IN POOR CONDITION TO LIBRARY AND MECHANICAL ENGINEER PRIOR TO RE-ROOFING AND INSTALLING NEW UNITS.

GENERAL NOTES

PRELIMINARY
NOT FOR CONSTRUCTION

No.	DESCRIPTION	DATE	BY
0	ISSUED FOR TENDER	NOV. 26, 2021	J.C.

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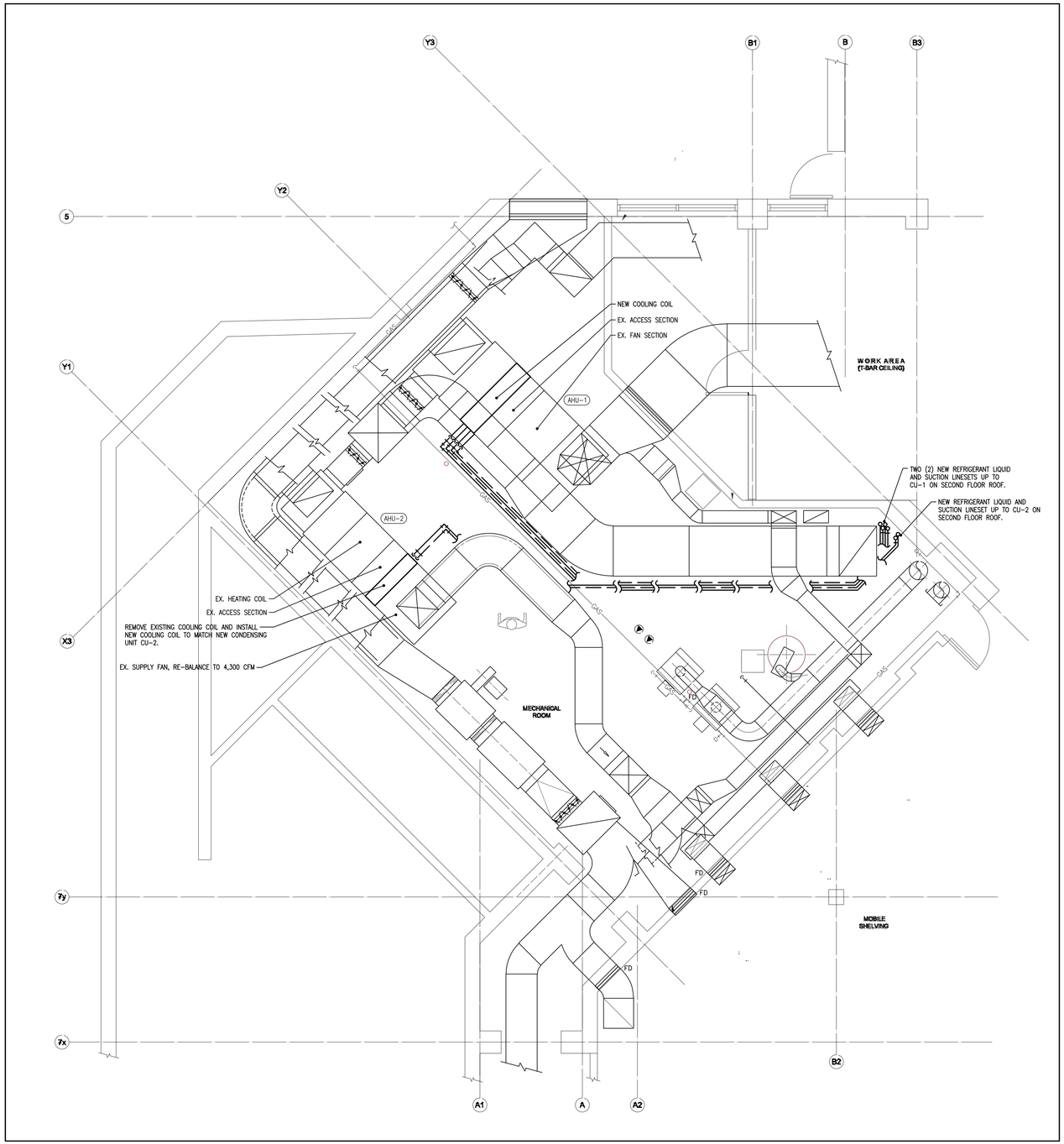
PROJECT:
ST. CATHARINES PUBLIC LIBRARY CENTRAL BRANCH ROOFTOP EQUIPMENT REPLACMENT
54 CHURCH STREET
ST. CATHARINES, ONTARIO

START DATE:	DRAWN BY:	DESIGNED BY:
2021 10 22	JC	JC

DRAWING TITLE:
ROOFTOP HVAC PLAN

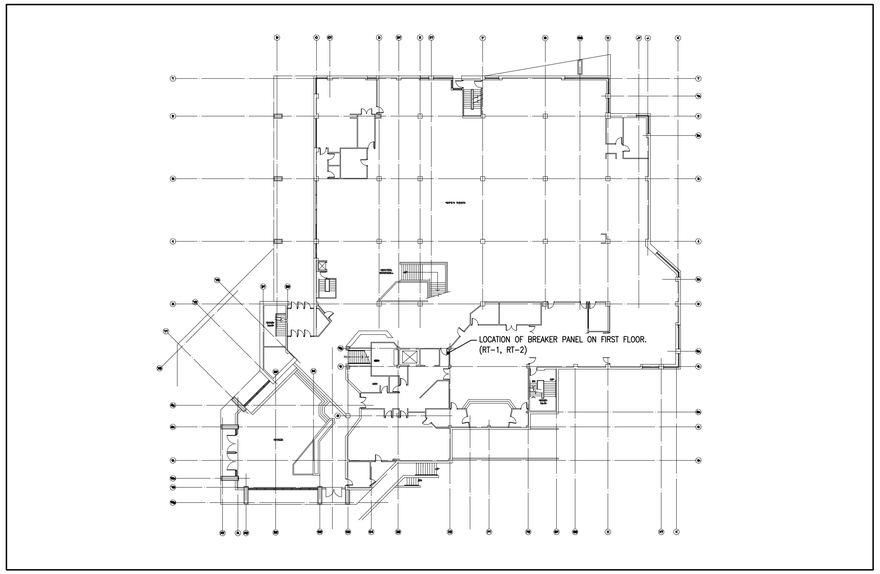
SCALE: 1/32" = 1'-0"
PROJECT: 21-219-010
DRAWING No.: M-300

PLOT DATE: November 26, 2021
ORIGINAL SHEET SIZE: ARCH D
15" 10" 5" 0



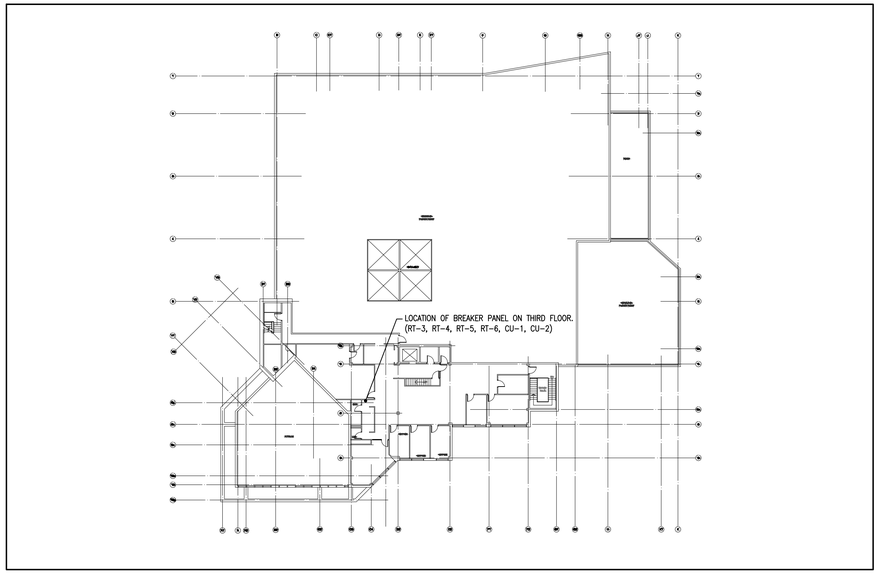
1 M-301 BASEMENT MECHANICAL ROOM

SCALE: 1/4" = 1'-0"



2 M-301 FIRST FLOOR ELECTRICAL PANEL LOCATION

SCALE: 1/32" = 1'-0"



3 M-301 THIRD FLOOR ELECTRICAL PANEL LOCATION

SCALE: 1/32" = 1'-0"

GENERAL NOTES

PRELIMINARY
NOT FOR CONSTRUCTION

No.	DESCRIPTION	DATE	BY
0	ISSUED FOR TENDER	NOV. 26, 2021	J.C.

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PROJECT:

ST. CATHARINES PUBLIC LIBRARY
CENTRAL BRANCH ROOFTOP
EQUIPMENT REPLACMENT

54 CHURCH STREET
ST. CATHARINES, ONTARIO

START DATE:	DRAWN BY:	DESIGNED BY:
2021 10 22	JC	JC

DRAWING TITLE:

BASEMENT MECHANICAL
ROOM PLAN

SCALE: 1/32" = 1'-0"

PROJECT: 21-219-010

DRAWING No.: M-301

PLOT DATE: November 26, 2021

ORIGINAL SHEET SIZE: ARCH D

15" 10" 5" 0

Appendix B

Rooftop Multizone Unit Prepurchase Shop Drawings

1425 Osprey Dr. Suite 201| Ancaster, ON | L9G 4V5 P| 905.648.0012 F| 905.648.0013 W|www.eficoncepts.com

PROPOSAL

St. Catharines Public Library, 54
Church Street
St. Catharines, Ontario L2R 7K2

Date: 2021-11-08
Total Pages: 3

Attn: Purchasing Department

Ref: **St Catharines Library**
EFI Concepts #: 21Q0084RK

We offer the following for your consideration:

4 only Custom Airwise Outdoor Roof Top Multi-zone Units
40 Ton Unit, 12,000 cfm Return Air, 13,000 cfm Supply Air

c/w

- *2 inch double wall construction,*
- *MultiZone Section with Actuators*
- *Lights in 2 sections*
- *Light switch with GFCI Outlet*
- *Return Air Fan c/w VFD*
- *Supply Air Fan c/w VFD*
- *Modulating Gas Heat c.w induction blower, stainless in-shot tube burners*
- *DX Cooling*
- *Siemens Digital Control*
- *Air Cooled Condenser Scroll Tandem Digital Lead Compressor*
- *Ship as a single Unit*

Price Each……..$ 183,000 each.

Weight 9,120 (Existing Unit 8.919 lbs)

Delivery after approval - 19-20 weeks
Approval Dwgs - 3 weeks

1 only Airwise Outdoor Roof Top Multi-zone Units
17 Ton Unit, 5,000 cfm Return Air, 5,000 cfm Supply Air

c/w

- *2 inch double wall construction,*
- *MultiZone Section with Actuators*
- *Lights in 2 sections*
- *Light switch with GFCI Outlet*
- *Return Air Fan c/w VFD*
- *Supply Air Fan c/w VFD*
- *Modulating Gas Heat c.w induction blower, stainless in-shot tube burners*
- *DX Cooling*

- *Siemens Digital Control*
- *Air Cooled Condenser Scroll Tandem Digital Lead Compressor*
- *Ship as a single Unit*

Price Each…….$ 125,000.00 each.

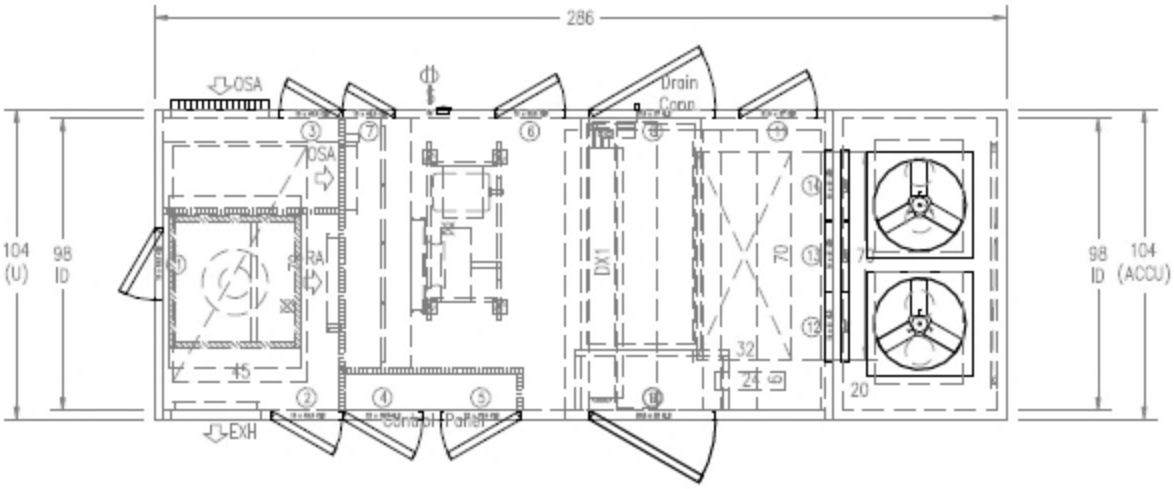
Weight 7,120 lbs (Existing Unit 6,685 lbs)

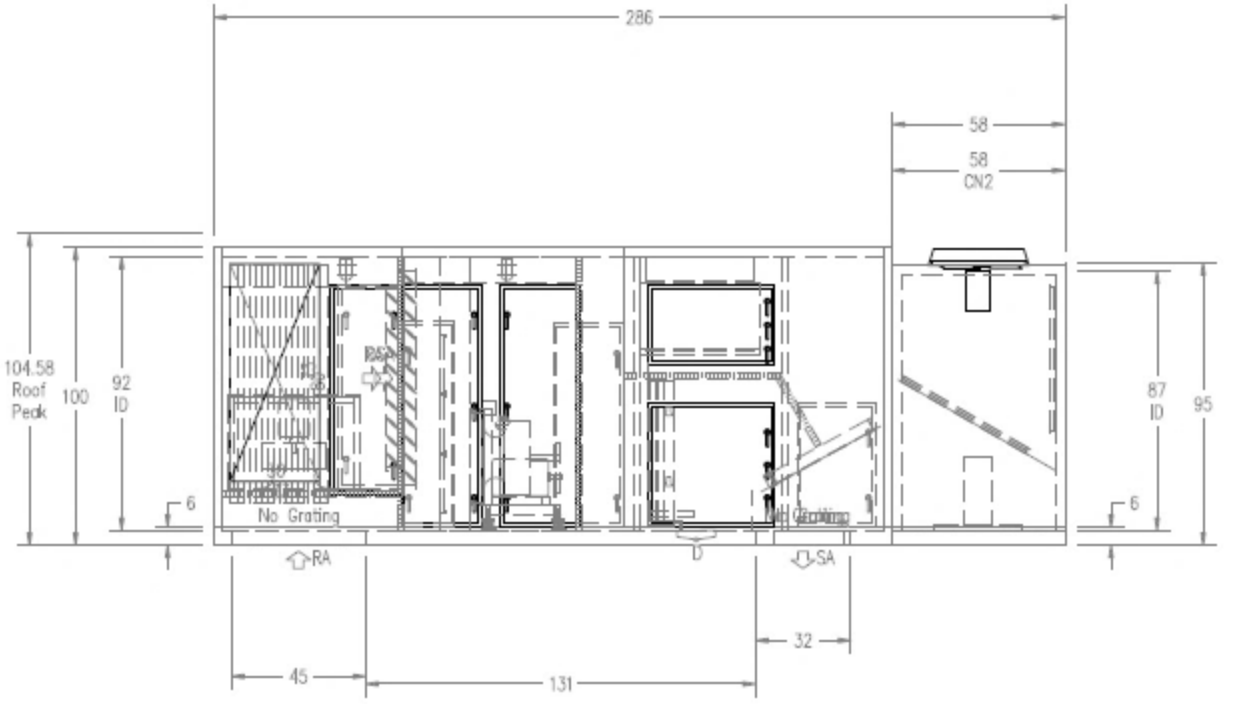
Price is net, EXW – Ex Works - supplier plant. Freight included to jobsite, truck at curb. All Applicable Taxes (HST/GST/PST) **extra**. Terms **Net 30 Days** from date of shipment on approved credit, with **NO holdbacks**. Manufacturer's "Terms and Conditions of Sale" shall apply.

A copy of EFI's Terms and Conditions of Sale are attached.

Yours truly,

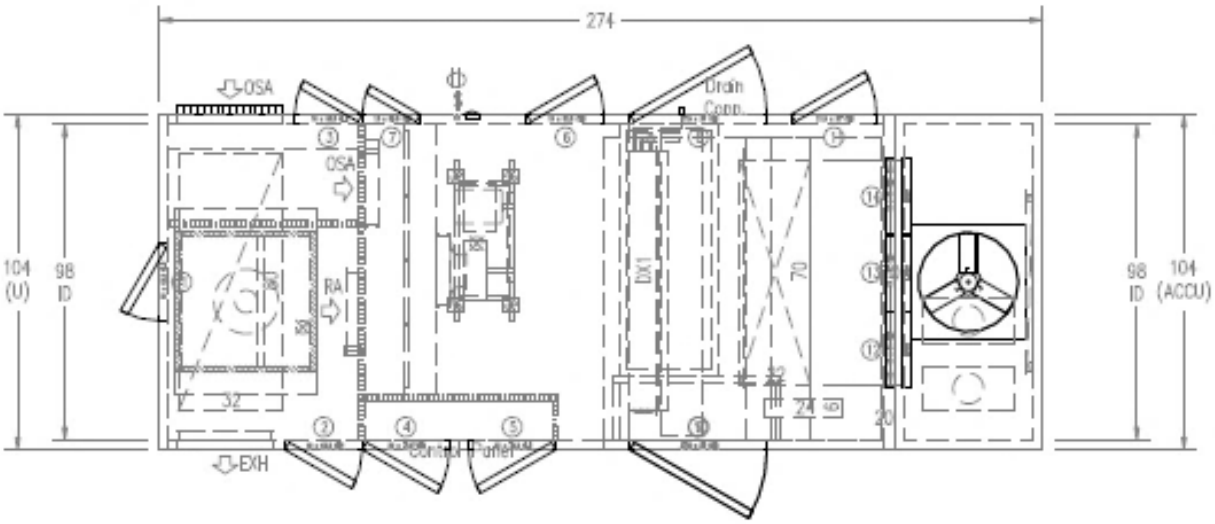
EFI Concepts
Marco Ciallella, P. Eng.
(905)64645-4987
mciallella@master.ca

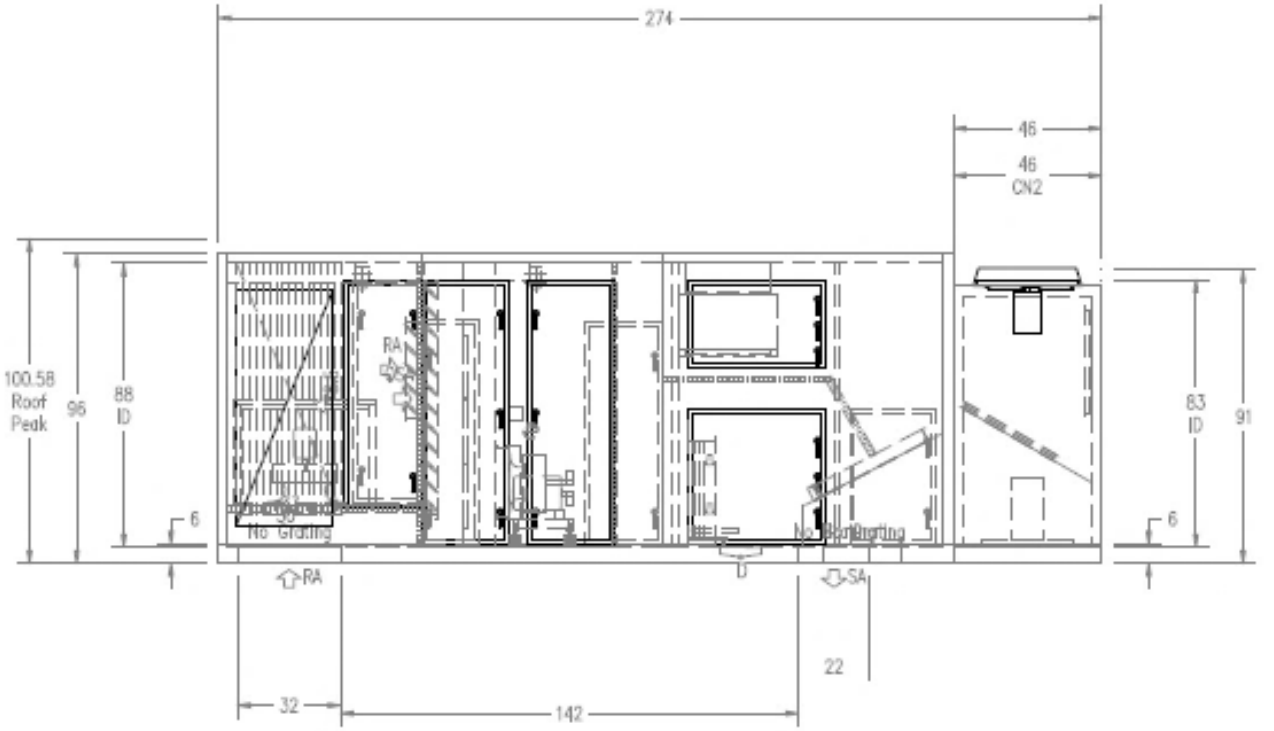




Centennial Library

Unit Tag: RT-1, RT-2, RT-3, RT-4			Unit Type: Outdoor	Dwg Qty: 4
Rep Firm: EFI Concepts: Ancaster Ancaster, ON, Canada			Weight	Box Qty: 1
Rep Contact: Ralph Kosir, (905) 648-0012 X114			Model No	
HASSIA Ver: 7.13.1	Factory SAE: CB	Quote No	Job No: 21Q0084RK	Date m/d/y: 3/24/2021	Rev





Centennial Library					
Unit Tag: RT-5				Unit Type: Outdoor	Dsg Qty: 1
Rep Firm: Concepts: Ancaster Ancaster, ON, Canada				Weight:	Sim Qty: 1
Rep Contact: Ralph Kosik, (905) 648-0012 X114			Model No:		
HAMDA Ver: 7.13.1	Primary SAE: CB	Quote No:	Job No: 210006HK	Date m/d/y: 3/24/2021	Rev:

EFI CONCEPTS
TERMS AND CONDITIONS OF SALE POLICY

1. **COMPANY:** The Company as used herein shall mean EFI CONCEPTS.

2. **PRICE POLICY:** Prices of the goods may be increased depending on the date of release and/or shipment of the order, announced increases in the Company's list prices, or increases in labour and material cost.

3. **TERMS OF PAYMENT:** Terms of payment are subject at all times to prior approval of the Company's credit department. Terms of payment are net 30 days from date of shipment unless previously otherwise agreed in writing. If at any time the financial conditions of the Purchaser or other circumstances affecting the credit decision, in the Company's opinion, does not justify continuance of production of products or shipment of products on the terms of payment specified, the Company may require full or partial payment in advance, or may at its sole discretion stop or delay production or shipment of products. In the event of default in payment, Purchaser agrees to pay all costs of collection incurred by the Company including but not limited to collection agency fees, attorney fees and court costs. All past due amounts shall bear interest at highest rate allowed by law.

4. **SHIPPING TERMS:** All shipments will be made EXW – Ex Works - supplier plant with freight as quoted. All shipments will be made via a low cost common carrier and charges for special carrier services requested by the Purchaser shall be paid by the Purchaser. The Company may ship the goods in one or more lots.

5. **CLAIMS:** The responsibility of the Company for all shipments ceases upon delivery of goods in good order to the carrier. Since all goods are shipped at Purchaser's risk, damage or shortage in transit must be filed by Purchaser against the carrier. Claims for factory shortages will not be considered unless made in writing to the Company within ten (10) days after receipt of the goods and accompanied by reference to the Company's bill of lading and factory order numbers.

6. **TAXES:** The amount of any present or future taxes applicable to the product shall be added to the price contained herein and paid by the Purchaser in the same manner and with the same effects as if originally added thereto.

7. **CANCELLATIONS:** Accepted orders are not subject to cancellation without the Company being reimbursed for any and all expenses, and being indemnified by the Purchaser against any and all loss.

8. **SHIPMENT DATES:** Shipment dates are only estimates. No contract has been made to ship in a specified time unless in writing, and signed by two officers of the Company.

9. **PRODUCT CHANGES:** In the interest of continuous product improvements, the Company reserves the right to change specifications and/or design without incurring obligation.

10. **RETURNED GOODS:** Goods may not be returned except by permission of an authorized Company official, and when so returned will be subject to handling and transportation charges. Authorized return goods must be shipped prepaid to the location designated by the authorization.

11. **LIMITED WARRANTY:** Free replacement parts will be provided by the manufacturer the Company represents in the event any product supplied by the Company and used in Canada proves defective in material or workmanship for a period of twelve (12) months from the initial start-up or eighteen (18) months from date of shipment, whichever expires sooner. Goods sold under this agreement are warranted only to the extent that the manufacturer warranted them to the Company or directly to the Purchaser. The Company's liability to the Purchaser shall not exceed the lesser of the cost of correcting defects in the goods sold or the original purchase price of the goods, and the Company shall not in any event be liable to buyer or third parties for any delays of special, indirect or consequential damages. The Company's warranty does not apply to any goods which have been opened, disassembled, repaired or altered by anyone other than the Company or its authorized service representative or which have been subjected to misuse, misapplication or abuse. The Company is not obligated to pay any labour or service costs for removing or replacing parts, or any shipping charges. Refrigerants, fluids, oils, and expendable items such as filters are not covered by this warranty. This parts warranty and any optional extended warranties are granted only to the original user. Company's duty to perform under any warranty may be delayed, at Company's sole option, until the Company has been paid in full for all goods purchased by Purchaser. No such delay shall extend the warranty period. For additional consideration the Company will provide an extended warranty (ies) on certain goods or components thereof. To obtain assistance under this limited warranty, please contact EFI CONCEPTS, 315A Humberline Drive, Etobicoke, Ont., M9W 5T6 (416) 674-6744. This warranty constitutes the purchaser's sole remedy. It is given in lieu of all other warranties; expressed or implied. There is no implied warranty of merchantability or fitness for a particular purpose. In no event and under no circumstances shall EFI CONCEPTS be liable for incidental or consequential damages, whether the theory be breach of this or any other warranty, negligence or strict tort. The Company must receive a start-up information report for goods containing motor-compressors and /or furnaces. The registration/start-up form must be completed and returned to the Company within ten (10) days of original equipment start-up or start-up date and ship date will be deemed the same for warranty determination. No person has the authority to expand the Company's obligation beyond the terms of this express warranty.

12. **TERMS OF SALE:** Sale of goods covered hereby to Purchaser is made solely on the terms and conditions set forth herein, notwithstanding any additional or conflicting terms and conditions that may be contained in any purchase order or other form or purchase, all of which additional or conflicting terms and conditions are hereby rejected by the Company unless agreed upon in writing and signed by an officer of the Company. Specifically, the Company does not accept any holdbacks from its billings (see TERMS OF PAYMENT above). The Company is a supplier (not a contractor as defined in the Construction Lien Act) and is NOT subject to the holdback rules contained in the Construction Lien Act. No waiver, alteration or modification of the foregoing terms and conditions shall be valid unless made in writing and signed by an authorized official of EFI CONCEPTS. In particular and without limiting the foregoing, notwithstanding anything to the contrary in Purchaser's purchase order or any other documents, the Company does not accept any order subject to project design and specifications. Purchaser agrees to accept full and sole responsibility to determine whether the product ordered by the Purchaser meets the design and specification requirements of any project.

Appendix C

Air Audit Report, dated August 2021

TROUP
ENGINEERING
SERVICES INC.

P.O. Box 113
Jordan Station, ON
L0R 1S0

Tel: (905) 651-8082
troupeng@gmail.com

TEST REPORT

St. Catharines Library

August 2021

TROUP
ENGINEERING
SERVICES

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PROJECT: ST. CATHARINES LIBRARY

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TROUP
ENGINEERING
SERVICES

AIR OUTLET TEST REPORT

PROJECT: ST. CATHARINES LIBRARY
SYSTEM : BASEMENT - SUPPLY

TEST DATE: AUG 2021

Outlet			Velocity	Airflow	Notes
Location	**No.**	**Size**	**fpm**	**cfm**	
HC-1	S1	24x24		225	
"	S2	24x24		247	
"	S3	24x24		200	
"	S4	24x24		131	
"	S5	24x24		165	
"	S6	24x24		212	
"	S7	24x24		220	
"	S8	24x24		88	
HC-2	S9	24x24		261	
"	S10	24x24		291	
"	S11	24x24		300	
HC-3	S12	24x24		259	
HC-4	S13	24x24		44	
"	S14	24x24		76	
"	S15	24x24		82	
"	S16	24x24		110	
"	S17	24x24		82	
HC-5	S18	24x24		N/A	Diffuser replaced with ductless split.
"	S19	24x24		57	
"	S20	24x24		98	
"	S21	24x24		89	
"	S22	24x24		73	
HC-6	S23	24x24		64	
"	S24	24x24		124	
HC-7	S25	24x24		166	
HC-8	S26	24x24		56	
"	S27	24x24		38	
"	S28	24x24		44	
HC-9	S29	24x24		125	
"	S30	24x24		49	
"	S31	24x24		143	
HC-10	S32	24x24		266	
"	S33	24x24		251	
"	S34	24x24		277	
HC-11	S35	24x24		203	
"	S36	24x24		403	
HC-12	S37	24x24		125	
"	S38	24x24		274	
			Total	5918	Design = 6000 cfm (-1.4%)

Note: - Refer to drawing M2 for outlet locations.

TROUP
ENGINEERING
SERVICES

AIR OUTLET TEST REPORT

PROJECT: ST. CATHARINES LIBRARY
SYSTEM : BASEMENT – RETURN

TEST DATE: AUG 2021

Outlet			Velocity	Airflow	Notes
Location	**No.**	**Size**	**fpm**	**cfm**	
Return	R1	18x18	248	558	
"	R2			341	
"	R3	18x18	293	659	
"	R4	10x8	332	184	
"	R5	10x6	329	137	
"	R6	6x4	209	35	
"	R7	8x6	529	176	
"	R8	10x8	309	172	
"	R9	10x8	346	192	
"	R10	10x8	779	433	
"	R11			N/A	
"	R12			1710	
"	R13			768	
			Total	5365	

Note: - Refer to drawing M2 for outlet locations.

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SERVICES

AIR OUTLET TEST REPORT

PROJECT: ST. CATHARINES LIBRARY
SYSTEM : GROUND FLOOR ATRIUM – SUPPLY & RETURN

TEST DATE: AUG 2021

Outlet			Velocity	Airflow	Notes
Location	**No.**	**Size**	**fpm**	**cfm**	
Supply	S39	18x6	1077	679	
"	S40	18x6	1085	684	
"	S41	18x6	629	396	
"	S42			457	
"	S43			540	
"	S44			467	
"	S45			571	
"	S46			447	
"	S47	18x6	930	586	
"	S48			460	
"	S49			494	
			Total	5781	Design = 4000 cfm (+44.5%)
Return	R14			1220	
"	R15			909	
			Total	2129	

Note: - Refer to drawing M3 for outlet locations.

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SERVICES

AIR OUTLET TEST REPORT

PROJECT: ST. CATHARINES LIBRARY
SYSTEM : GROUND FLOOR - RT-1 – SUPPLY & RETURN

TEST DATE: AUG 2021

Outlet			Velocity	Airflow	Notes
Location	**No.**	**Size**	**fpm**	**cfm**	
Supply					
Zone 1	S50	24x24		539	
"	S51	24x24		555	
"	S52	24x24		481	
"	S53	24x24		492	
"	S54	24x24		648	
Zone 2	S55	24x24		303	
"	S56	24x24		305	
"	S57	24x24		307	
"	S58	24x24		62	
Zone 3	S59	24x24		798	
"	S60	24x24		630	
"	S61	24x24		475	
"	S62	24x24		142	
"	S63	24x24		157	
"	S64	24x24		147	
Zone 4	S65	24x24		662	
"	S66	24x24		633	
"	S67	24x24		630	
"	S68	24x24		575	
"	S69	24x24		470	
"	S70	24x24		472	
Zone 5	S71	24x24		92	Blocked with cardboard.
"	S72	24x24		581	
"	S73	24x24		615	
"	S74	24x24		80	
"	S75	24x24		501	
"	S76	24x24		626	
"	S77	24x24		151	
			Total	12129	Design = 12000 cfm (+1.07%)
Return	R16	24x24	698	2792	
"	R17	24x24	1098	4392	
"	R18	24x24	928	3712	
"	R19	24x24	671	2684	
			Total	13580	

Note: - Refer to drawing M3 for outlet locations.

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SERVICES

AIR OUTLET TEST REPORT

PROJECT: ST. CATHARINES LIBRARY
SYSTEM : GROUND FLOOR - RT-2 – SUPPLY

TEST DATE: AUG 2021

Outlet			Velocity	Airflow	Notes
Location	**No.**	**Size**	**fpm**	**cfm**	
Zone 1	S78	24x24		428	
"	S79	24x24		369	
"	S80	24x24		435	
"	S81	24x24		463	
"	S82	24x24		408	
"	S83	24x24		464	
"	S84	24x24		442	
"	S85	24x24		217	
"	S86	24x24		275	
"	S87	24x24		291	
Zone 2	S88	24x24		60	
"	S89	24x24		109	
"	S90	24x24		249	
"	S91	24x24		175	
"	S92	24x24		262	
"	S93	24x24		69	
"	S94	24x24		52	
"	S95	24x24		409	
"	S96	24x24		337	
"	S97	24x24		298	
"	S98	24x24		89	
"	S99	24x24		104	
"	S100	24x24		84	
"	S101	24x24		81	
"	S102	24x24		121	
Zone 3	S103	24x24		674	
"	S104	24x24		662	
"	S105	24x24		107	
	S106	24x24		121	
"	S118	24x24		727	
Zone 4	S107	24x24		530	
"	S108	24x24		324	
"	S109	24x24		118	
"	S110	24x24		74	
Zone 5	S111	24x24		264	
"	S112	24x24		270	
"	S113	24x24		294	
"	S114	24x24		300	
"	S115	24x24		73	
"	S116	24x24		157	
"	S117	24x24		89	
			Total	11075	Design = 12000 (-7.71%)

Note: - Refer to drawing M3 for outlet locations.

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SERVICES

AIR OUTLET TEST REPORT

PROJECT: ST. CATHARINES LIBRARY
SYSTEM : GROUND FLOOR - RT-2 – RETURN

TEST DATE: AUG 2021

Outlet			Velocity	Airflow	Notes
Location	**No.**	**Size**	**fpm**	**cfm**	
Return	R20			27	
"	R21			134	
"	R22			1212	
"	R23	10x6	1255	523	
"	R24	8x4	181	40	
"	R25			648	
"	R26			1683	
"	R27			316	
"	R28			2252	
"	R29			111	
"	R30			N/A	Concealed.
"	R31			188	
"	R32	10x6	408	170	
"	R33			251	
"	R34			573	
"	R35			137	
			Total	8265	

Note: - Refer to drawing M3 for outlet locations.

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SERVICES

AIR OUTLET TEST REPORT

PROJECT: ST. CATHARINES LIBRARY
SYSTEM : SECOND FLOOR - RT-3 – SUPPLY & RETURN

TEST DATE: AUG 2021

Outlet			Velocity	Airflow	Notes
Location	**No.**	**Size**	**fpm**	**cfm**	
Supply					
Zone 1	S119	24x24		457	
"	S120	24x24		1060	
"	S121	24x24		781	
Zone 2	S122	24x24		481	
"	S123	24x24		554	
"	S124	24x24		420	
"	S125	24x24		444	
Zone 3	S126	24x24		762	
"	S127	24x24		872	
"	S128	24x24		30	Damper closed.
"	S129	24x24		312	
Zone 4	S130	24x24		631	
"	S131	24x24		722	
Zone 5	S132	24x24		448	
"	S133	24x24		452	
"	S134	24x24		1900	24x18 traverse @ 667 fpm, less 100 cfm for S135.
"	S135	24x24		100	
"	S136	24x24		N/A	36x18 traverse taken, not useable due to turbulence.
"	S137	24x24		521	
"	S138	24x24		493	
			Total	11440	Design = 12000 (-4.67%)
Return	R36	24x24	1090	4360	
"	R37	24x24	903	3612	
"	R38	24x24	309	1236	
"	R39	24x24	1018	4072	
			Total	13280	

Note: - Refer to drawing M4 for outlet locations.

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AIR OUTLET TEST REPORT

PROJECT: ST. CATHARINES LIBRARY
SYSTEM : SECOND FLOOR - RT-4 – SUPPLY & RETURN

TEST DATE: AUG 2021

Outlet			Velocity	Airflow	Notes
Location	**No.**	**Size**	**fpm**	**cfm**	
Supply					
Zone 1	S139	24x24		362	
"	S140	24x24		370	
"	S141	24x24		777	
"	S142	24x24		418	
"	S143	24x24		492	
"	S144	24x24		114	
"	S145	24x24		601	
"	S146	24x24		628	
Zone 2	S147	24x24		1001	
"	S148	24x24		599	
"	S149	24x24		510	
"	S150	24x24		526	
"	S151	24x24		636	
"	S152	24x24		97	
"	S153	24x24		620	
"	S154	24x24		549	
"	S155	24x24		606	
"	S156	24x24		551	
Zone 3	S157	24x24		307	
"	S158	24x24		317	
"	S159	24x24		349	
"	S160	24x24		309	
"	S161	24x24		348	
Zone 4	S162	24x24		459	
"	S163	24x24		222	
"	S164	24x24		586	
			Total	12354	Design = 12000 (+2.95%)
Return	R40	24x24	124	496	Damper closed.
"	R41	24x24	1160	4640	
"	R42	24x24	680	2720	
"	R43	24x24	574	2296	
"	R44			N/A	
"	R45			188	
"	R46			1731	
			Total	12071	

Note: - Refer to drawing M4 for outlet locations.

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SERVICES

AIR OUTLET TEST REPORT

PROJECT: ST. CATHARINES LIBRARY
SYSTEM : SECOND FLOOR - RT-6 – SUPPLY

TEST DATE: AUG 2021

Outlet			Velocity	Airflow	Notes
Location	**No.**	**Size**	**fpm**	**cfm**	
Supply	S191			1334	
"	S192			1213	
"	S193			1244	
"	S194			1242	
"	S195			1323	
"	S196			655	Damper may be partially closed.
			Total	7011	Design = 8000 (-12.3%)

Note: - Refer to drawing M4 for outlet locations.

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SERVICES

AIR OUTLET TEST REPORT

PROJECT: ST. CATHARINES LIBRARY
SYSTEM : THIRD FLOOR - RT-5 – SUPPLY

TEST DATE: AUG 2021

Outlet			Velocity	Airflow	Notes
Location	**No.**	**Size**	**fpm**	**cfm**	
Supply					
Zone 1	S165	24x24		209	
"	S166	24x24		146	
"	S167	24x24		147	
"	S168	24x24		160	
"	S169	24x24		176	
"	S170	24x24		141	
Zone 2	S171	24x24		266	
"	S173	24x24		163	
"	S174	24x24		87	
"	S175	24x24		213	Damper closed.
"	S176	24x24		147	
"	S177	24x24		59	
Zone 3	S172	24x24		226	
"	S178	24x24		114	
"	S179	24x24		154	
"	S180	24x24		205	
"	S181	24x24		214	
"	S191	24x24		198	
"	S197	24x24		94	
"	S198	24x24		198	
Zone 4	S182	24x24		45	Blocked with cardboard.
"	S183	24x24		61	Blocked with cardboard.
"	S184	24x24		223	
Zone 5	S185	24x24		140	
"	S186	24x24		169	
"	S187	24x24		169	
Zone 6	S188	24x24		125	
"	S189	24x24		97	
"	S190	24x24		265	
			Total	4611	Design = 5000 (-7.78%)

Note: - Refer to drawing M5 for outlet locations.

TROUP
ENGINEERING
SERVICES

AIR OUTLET TEST REPORT

PROJECT: ST. CATHARINES LIBRARY
SYSTEM : THIRD FLOOR - RT-5 – RETURN

TEST DATE: AUG 2021

Outlet			Velocity	Airflow	Notes
Location	**No.**	**Size**	**fpm**	**cfm**	
Return	R47			0	Damper shut.
"	R48	10x10	522	362	
"	R49			113	
"	R50			470	
"	R51	10x10	811	563	
"	R52	10x10	510	354	
"	R53	18x12	75	113	Damper closed.
"	R54			420	
"	R55	10x10	456	317	
"	R56	12x12	404	404	
"	R57	12x12	400	400	
"	R58			768	
			Total	4284	

Note: - Refer to drawing M5 for outlet locations.

TROUP
ENGINEERING
SERVICES

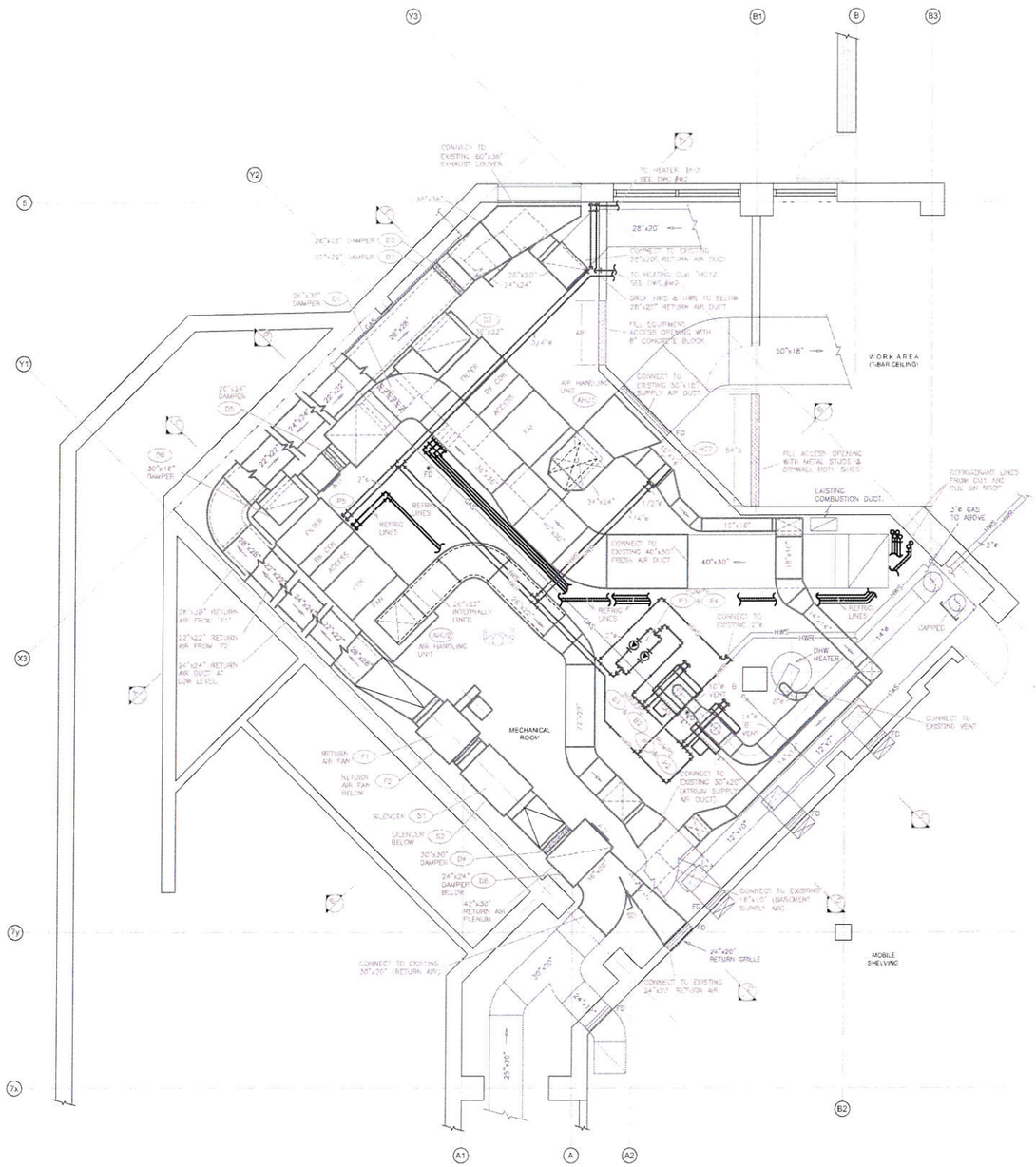
AIR OUTLET TEST REPORT

PROJECT: ST. CATHARINES LIBRARY
SYSTEM : EXHAUST SYSTEMS

TEST DATE: AUG 2021

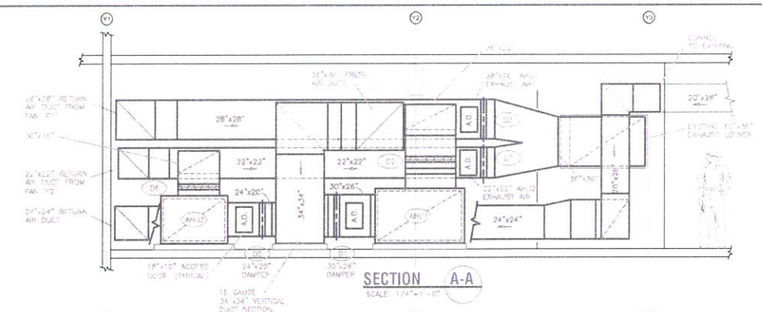
Outlet			Velocity	Airflow	Notes
Location	**No.**	**Size**	**fpm**	**cfm**	
Basement	E1	7x7	464	158	
"	E2			1203	
"	E3	10x10	814	565	
"	E4	14x12	64	75	
			Total	2001	
First Floor	E5			163	
"	E6			0	
"	E7			67	
"	E8			0	
"	E9			344	
"	E10			0	
"	E11			0	
			Total	574	
Second Floor	E12			46	
			Total	46	
Third Floor	E13			46	
"	E14	8x6	518	173	
"	E15	6x4	491	82	
"	E16			0	
"	E17			0	
			Total	301	

Note: - Refer to drawing M2, M3, M4, M5 for outlet locations.



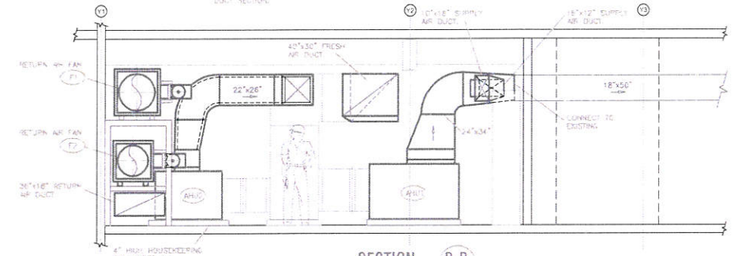
MECHANICAL ROOM - BASEMENT LEVEL

SCALE: 1/4"=1'-0"



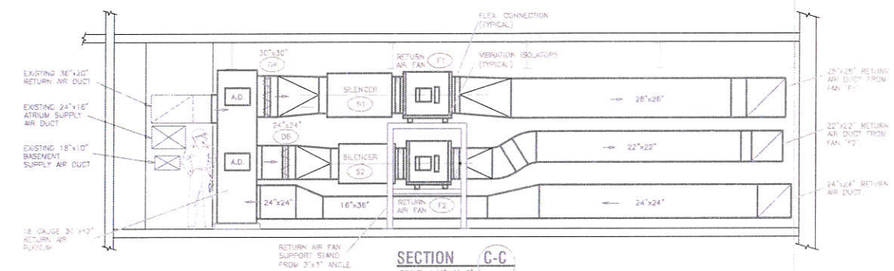
SECTION A-A

SCALE: 1/4"=1'-0"



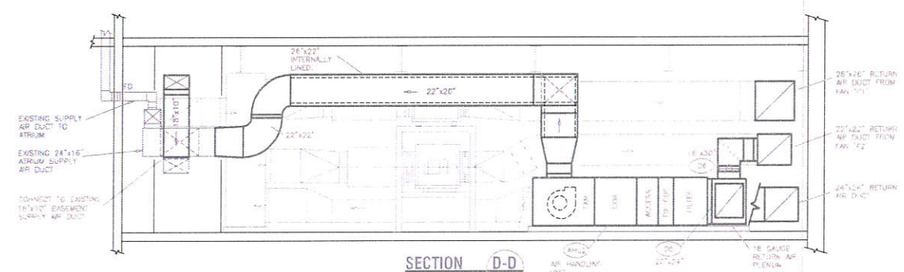
SECTION B-B

SCALE: 1/4"=1'-0"



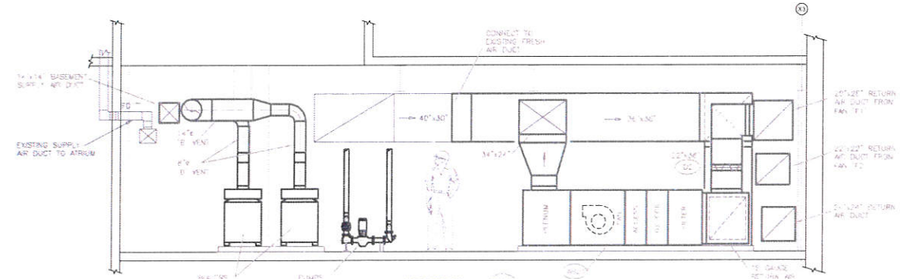
SECTION C-C

SCALE: 1/4"=1'-0"



SECTION D-D

SCALE: 1/4"=1'-0"



SECTION E-E

SCALE: 1/4"=1'-0"

LINE LEGEND

EXISTING

NEW

SEAL:

Engineering Concepts Niagara
Professional Mechanical & Electrical Engineers
82 LAKE STREET - P.O. BOX 1 - ST. CATHARINES, ONTARIO L2R 5X4
TEL: (905) 687-9221 FAX: (905) 687-9521
email: admin@ecn.on.ca

DATE:	NOVEMBER 2000
SCALE:	AS SHOWN
DRAWN BY:	K. MICHA
CHECKED BY:	T. BRANNAN

NO.	REVISION	DATE
2	AS BUILT	2000/04/07
1	ISSUED FOR TENDER	2000/03/16
0	ISSUED FOR COMMENT	2000/12/05

DRAWING REVISIONS

PROJECT TITLE:

City of St. Catharines

CENTENNIAL LIBRARY

HVAC UPGRADE

54 Church Street, St. Catharines, ON

SHEET TITLE:

MECHANICAL ~ MECHANICAL ROOM PLAN AND SECTIONS

JOB NO. A01188

DWG. NO. M1

BASEMENT LEVEL

LINE LEGEND

EXISTING

NEW

RELOCATE

Engineering Concepts Niagara

Professional Mechanical & Electrical Engineers

82 LAKE STREET • ST. CATHARINES, ONTARIO L2R 5X4
TEL: (905) 687-9510 FAX: (905) 687-9521
email: admin@eccn.on.ca

NO.	REVISION	DATE:
1	AS BUILT	2014/10/27
0	ISSUED FOR TENDER	2013/10/29
A	ISSUED FOR COMMENTS	2013/09/30

DRAWING REVISIONS

DATE: NOVEMBER 1991
SCALE: AS SHOWN
DRAWN BY: J. MOCUK
CHECKED BY: T. BRANDAO

PROJECT TITLE:
City of St. Catharines
CENTENNIAL LIBRARY
HVAC UPGRADE
24 Church Street, St. Catharines, ON

SHEET TITLE:
MECHANICAL
BASEMENT FLOOR PLAN

JOB NO: 2013-106

DWG. NO: M2

GROUND FLOOR LEVEL

LINE LEGEND

SEAL:

Engineering Concepts Niagara
Professional Mechanical & Electrical Engineers
82 LAKE STREET • ST. CATHARINES, ONTARIO L2R 5X4
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NO:	REVISION	DATE:
C	AS BUILT	2004/04/07
B	ISSUED FOR TENDER	2003/05/09
A	ISSUED FOR COMMENTS	2003/05/05

DRAWING REVISIONS

DATE: NOVEMBER 2003
SCALE: AS SHOWN
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PROJECT TITLE:
City of St. Catharines
CENTENNIAL LIBRARY
HVAC UPGRADE
54 Church Street, St. Catharines, ON

SHEET TITLE:
MECHANICAL –
GROUND FLOOR PLAN

JOB NO:

DWG. NO.
M3

SECOND FLOOR LEVEL

LINE LEGEND

SEAL

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NO.	REVISION	DATE:
1	AS BUILT	
2	ISSUED FOR CONSTRUCTION	
3	ISSUED FOR COMMENT	
4	ISSUED FOR COMMENT	

DRAWING REVISIONS

DATE: NOVEMBER 2002
SCALE: AS SHOWN
DRAWN BY: ROSA
CHECKED BY: J. BRANDAN

PROJECT TITLE:
City of St Catharines
CENTENNIAL LIBRARY
ADDITION
54 Church Street St Catharines, ON

SHEET TITLE:
MECHANICAL
SECOND FLOOR PLAN

JOB NO: A0198

DWG. NO: M4

THIRD FLOOR LEVEL

SEAL

Engineering Concepts Niagara

82 LAKE STREET - 44 ST. CATHARINES, ONTARIO L2R 5X4
TEL: (905) 687-7470 FAX: (905) 687-5521
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DATE:	
SCALE:	
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NO.	REVISION	DATE:
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PROJECT TITLE: City of St. Catharines
CENTENNIAL LIBRARY
1464 Ontario Street, St. Catharines, ON

SHEET TITLE: 2nd Floor Plan
Third Floor Plan

JOB NO.:

DWG. NO.: M5

Appendix D

SCPL Vaccination Policy for Contractors

ST. CATHARINES PUBLIC LIBRARY

POLICY

Section: General **Number:** TBD	**Subject:** COVID-19 Vaccination Policy for Contractors	**Motion#** N/A
Policy Level: Management	**Author:** CEO	**Review:** Semi-Annual
Approval Date: 2021-11-03	**Last Review:**	**Next Review:** 2022
Notes: Approved at the Management Meeting of November 3, 2021.		

POLICY STATEMENT

The health and safety of employees is a Library's top priority. The Library is committed to taking every precaution reasonable to protect the health and safety of employees from the hazard of COVID-19. Vaccination has been proven to be effective in reducing COVID-19 virus transmission and protecting vaccinated individuals from severe consequences of COVID-19 and its variants.

Given the continuing spread of COVID-19, including the Delta variant, within Ontario, the compelling data demonstrating a higher incidence of COVID-19 among the unvaccinated population and the increasing levels of contact between individuals as businesses, services, and activities have reopened, it is critical for the safety of library employees to work alongside vaccinated individuals to protect themselves against the serious illness from COVID-19 as well as to provide indirect protection to others including colleagues and the public.

This policy is designed to ensure library employees to work with fully vaccinated individuals as one of the critical control measures for the hazard of COVID-19.

SCOPE

This policy applies to all library contractors, presenters, speakers, and visitors excluding library customers.

For the purpose of this policy only, reference hereafter to "contractors" shall also be read to include presenters, speakers, and visitors.

The Library also reserve the right to amend the scope of this policy as needed, with minimal notice, to meet changing provincial or federal requirements.

DEFINITIONS

COVID-19 Vaccine: Vaccines approved by World Health Organization or Health Canada

Full Vaccination: Have received the final dose of approved COVID-19 vaccine (two doses of a two-dose vaccine series or one dose of a single-dose vaccine series) at least 14 days prior, and may include any future amended requirements, such as a booster dose, as required by the provincial government and/or public health.

Contractor: a contractor in this policy means a business, the owner of this business, the employee of this business, or an individual, and will be interpreted accordingly in the context.

Visitor: A visitor is a person who enters staff area of the Library to interact with staff, but for the purposes of this policy, does not include customers who access library services and programs in public area.

REGULATIONS

All contractors who enter library facilities are required to be fully vaccinated with a COVID-19 vaccine series.

Contractors who are not able to obtain a COVID-19 vaccine for a reason listed below can be exempted from providing proof of vaccination:

- Contractors that have proven medical exemptions and can provide a note from a doctor or registered nurse confirming the exemption and a negative COVID-19 Antigen Test result that was taken less than 72 hours prior to engaging work at library facilities;

- Contractors that are protected by the Ontario Human Rights Code and can provide a negative COVID-19 Antigen Test Result that was taken less than 72 hours prior to engaging work at library facilities;

- Contractors that have been requested to address a Health and Safety hazard that requires immediate attention to avoid harm or risk to individuals, the organization, or the community and no other option is available and Library Management provides approval.

Where a Contractor who will be entering library facilities requests an exemption on medical or other protected grounds under the Ontario Human Rights Code, the Contractor will ensure that all such requests provide sufficient information to support the request and additional personal protective equipment be supplied to mitigate the possibility of COVID-19 transmission.

Contracts who do not provide proof of identification and full vaccination and do not meet exemption criteria will not be permitted to engage work at library facilities. Contractors are solely responsible for legitimacy of documents provided and submitting falsified documents will result in a ban on accessing library facilities.

Library staff are required to review the proof of identification and vaccination of the Contractor before contractors are permitted to engage work at library facilities.

Unless a legislated or regulatory exemption applies, contractors are expected and required to continue to comply with applicable health and safety measures to reduce the hazard of COVID-18, including but not limited to compliance with established workplace access controls (e.g. daily health check questionnaire), wearing a mask or face covering, using provided personal protective equipment (e.g. hand sanitizer, face mask, Plexiglas), maintaining social distancing, capacity limit, and self-monitoring of potential COVID-19 symptoms.

OPERATIONAL GUIDELINES

Contractor must disclose their vaccination status to the Library no later than December 1, 2021.

New contractors are required to disclose their vaccination status to the Library before they engage work at library facilities.

Proof of vaccination needs to clearly indicate receipt of a vaccination series approved by the Province of Ontario, Health Canada or the World Health Organization, name of the recipient, and date of the vaccination.

In accordance with Municipal Freedom of Information and Protection of Privacy Act and Personal Health Information Protection Act, the Library will not collect or retain any personal information including identification or proof of vaccination.

Contractors, who seek accommodation based on a protected ground set out in the Ontario Human Rights Code, are required to submit a written request with proof of the need for accommodation to the Library.

The Library will continue to closely monitor its COVID-19 risk mitigation strategy and the evolving public health information and context, to ensure that it continues to optimally protect the health and safety of employees in the workplace and the public that they serve.

The Library will continue to assess other available workplace risk mitigation measures, including but not limited to requiring proof of a negative COVID-19 test as an example.

Any contractor that is unable to comply with this policy may be subject to the Library exercising its available contract remedies, up to and including termination of the contract. Any acts of violence or threats to library employees, contractors, and library customers will not be tolerated and must be reported immediately to the direct supervisor and reported to policy by calling 911 if there is imminent danger.

IMPLEMENTATION

Management will implement this policy.

Appendix I:

MEMORANDUM

St Catharines Public Library
54 Church Street, St. Catharines, Ontario L2R 7K2
905-688-6103 or Fax 905-688-6292

TO: **ALL CONTRACTORS**

FROM: **K. Su, C.E.O.**

DATE: **November 3, 2021**

SUBJECT: **Contractor's Proof of Vaccination**

As we continue to navigate the COVID-19 pandemic, the St. Catharines Public Library continues to put the health and safety of its employees and the public at the forefront of all its decisions. In that spirit, the Library will now require all Contractors who are entering a Library-operated facility or where there is sustained or regular in-person interaction with Library employees or the public in the performance of the work under contract be fully vaccinated against COVID-19.

Only those individuals who cannot be vaccinated due to medical or other protected grounds under the Ontario Human Rights Code will be exempted from this requirement.

Vaccination Requirements
To be considered fully vaccinated, Contractors are required to have received the final dose of approved COVID-19 vaccine (two doses of a two-dose vaccine series or one dose of a single-dose vaccine series) at least 14 days prior, and may include any future amended requirements, such as a booster dose, as required by the provincial government and/or public health.

Proof of Vaccination
A COVID-19 Vaccination Compliance Declaration (attached) will be required from the Contractor prior to being awarded a contract or before commencement of Library contract work.

Also, Contractors entering Library-operated facilities will be required to provide proof of vaccination and identification each time they enter the facility.

Exemptions
Permitted exceptions to the vaccination requirements are limited to proven medical exemption or other protected grounds under the Ontario Human Rights Code. If a

Contractor will be entering a City-operated facility and requests an exemption on these grounds, they must provide valid proof of their medical exemption. If a Contractor has approved an exemption request, that Contractor must undertake a rapid antigen screening within 72 hours prior to entering library facilities and must show the result of a negative screening, prior to engaging work onsite.

Contractors who are exempted for grounds protected by the Ontario Human Rights Code are responsible for ensuring that there is sufficient information to support the exemption and supply additional personal protective equipment that will mitigate the transmission or offer protection against the hazards of COVID-19.

Timelines
These requirements take effect on Tuesday, December 1, 2021.

Additional Health and Safety Requirements
As per the conditions of their contracts, Contractors must continue to comply with all applicable laws, regulations, and public health recommendations applicable to their services.

Thank you for your cooperation with this important health and safety initiative. In order to safeguard the health and well-being of our community, the Library will continue to be guided by public health information and legislative requirements. These requirements may be updated as warranted by new public health guidance. The Library reserves the right to amend the scope of these requirements as needed, with minimal notice, to meet changing provincial or federal requirements.

We appreciate your understanding and support as we adjust to these new requirements.

Appendix II:

COVID-19 VACCINATION COMPLIANCE DECLARATION

The health and safety of Library employees and the public is a priority. The Library is committed to taking every precaution reasonable for the protection of the health and safety of Library employees and the public from the hazard of COVID-19. Vaccination is a key element in the protection of individuals against the hazard of COVID-19.

I am a duly authorized representative of the company listed below ("Contractor") and confirm:

a. Contractor has verified that all its Representatives who are sent to complete work in a Library-operated facility or who will be sustaining or regularly interacting in-person with Library employees or the public are fully vaccinated against COVID-19 and have provided proof of vaccination to Contractor.
b. Where a Contractor Representative who is sent to complete work in a Library-operated facility or will be sustaining or regularly interacting in-person with Library employees or the public requests an exemption on medical or other protected grounds under the Ontario Human Rights Code, Contractor will ensure that all such requests provide sufficient information to support the request.
c. Where a Contractor Representative who is sent to complete work in a Library-operated facility or will be sustaining or regularly interacting in-person with Library employees or the public has been approved for an exemption on medical or other protected grounds under the Ontario Human Rights Code, Contractor will ensure that its Representative undertakes rapid antigen screening within 72 hours prior to working at a Library-operated facility and provides proof of a negative screening prior to providing services on-site. Additional PPE (i.e. goggles, face shield) may be required.
d. Contractor will ensure that all its Representatives self-screen daily for COVID-19 symptoms prior to attending Library facilities.

Company Name:
Representative Name:
Title:

I/we declare that I/we have read, understand, and will meet or exceed the standards in this declaration, and I/we further acknowledge that as a Contractor/Consultant of the St. Catharines Public Library we are bound to always comply with this declaration.

_____ _____

Authorized Signature Date

Please return the completed declaration to the Library at admin@myscpl.ca.