ST. CLAIR CATHOLIC
DISTRICT SCHOOL BOARD

Lighting the Way ~ Rejoicing in Our Journey

REQUEST FOR TENDER: 645-CP2006

Gym Roof Top Unit

St. Philip Catholic School

420 Queen Street, Petrolia, ON N0N 1R0

Submission Deadline and Location:
Thursday, March 26, 2020
2:00:00 PM Local Time
Catholic Education Centre, Reception Desk
420 Creek Street, Wallaceburg

ISSUED: March 2, 2020

Part 1: INTRODUCTION

1.1. INTRODUCTION

The St. Clair Catholic District School Board (hereafter referred to as the "SCCDSB" or the "Board") invites interested parties to submit sealed submissions in response to this Request for Tender ("RFT") document. The SCCDSB currently operates 25 elementary schools, 2 secondary schools, and an administrative office within the regions of Sarnia-Lambton and Chatham-Kent.

1.2. PURPOSE

The purpose of this RFT document is to provide interested parties with sufficient information to enable them to prepare and submit bids for consideration by the SCCDSB for the Scope of Work provided, subject to the terms and conditions described herein.

1.3. INTERPRETATION AND DEFINITIONS

The following words are used throughout the bid document and proponents should note these conditions when completing their RFT submission.

"ADDENDUM" means a written instruction and/or clarification issued to the RFT Document. The term addenda is to mean the same as Addendum.

"AGREEMENT" or "CONTRACT" means the final document including, but not limited to, the terms and conditions of this document.

"APPLICABLE LAW" and "APPLICABLE LAWS" means any common law requirement and all applicable and enforceable statutes, regulations, directives, policies, administrative interpretations, orders, by laws, rules, guidelines, approvals and other legal requirements of any government and/or regulatory authority in effect from time to time.

"BID IRREGULARITY" means a deviation between the requirements (terms, conditions, specifications, special instructions) of a bid response for the purposes of this bid; bid irregularities are further classified as major irregularities or minor irregularities. The classification of what is a major irregularity or a minor irregularity shall be the sole discretion of the SCCDSB.

"BID SUBMISSION" or "SUBMISSION" means all of the documentation and information submitted by a Proponent in response to this request.

"CONFLICT OF INTEREST" means any situation or circumstance where, in relation to performance of obligations under the RFT, the Proponent's other commitments, relationships, or financial interests could result in a real, perceived, or potential unfair advantage to the Proponent.

"CONTRACTOR" means an entity that submits a bid in response to this tender document, as the context may suggest, refers to a potential Contractor.

"INFORMAL" shall mean bid submissions will be eliminated from further evaluation if the submission does not include the required information.

"MUST" shall mean proponents "must" include the required information in the bid submission. Failure to include the required information will deem the submission informal.

"PROPONENT" means an entity that submits a bid in response to this tender document, as the context may suggest, refers to a potential Proponent.

"SHOULD" shall mean proponents "should" include the required information in the bid submission.

"SUBCONTRACTOR" means the subcontractor and/or business who contracts to provide some service or material necessary for the performance of another's contract.

[End of Part 1]

PART 2: RFT PROCESS, INSTRUCTIONS, TERMS & CONDITIONS

2.1. RFT SCHEDULE

For the purposes of this RFT, the Board has established the following timing deadlines for the completion of the RFT process.

Event	Date & Time
Issue Date:	Monday, March 2, 2020
Mandatory Site Visit:	Tuesday, March 10, 2020 @ 10:00 AM
Last Day to Submit Questions:	Tuesday, March 17, 2020 @ 12:00 PM
Responses to Questions Received:	Thursday, March 19, 2020
Closing Date and Time:	Thursday, March 26, 2020 @ 2:00:00 PM

2.2. RFT CONTACT

Tony Prizio, Supervisor – Procurement
St. Clair Catholic District School Board
420 Creek Street, Wallaceburg, ON
P: (519) 627-6762 x10256
E: tony.prizio@st-clair.net

2.3. ACCEPTANCE OF TERMS

The submission of a bid by a Proponent represents that the Proponent has read and completely understands, and accepts all provisions contained within this RFT. Any bid that has alternative terms and conditions to those contained herewith may be considered a counteroffer to the Board's request and may be rejected.

2.4. AGREEMENT TO ABIDE BY ESTABLISHED PROCESS

The following rules must be observed to protect the integrity of the competitive procurement process:

- All communications, including requests for information, must be between only the Representative of the Board and each Bidder who have been authorized and designated for that particular purpose.
- Apart from the communications between and among the designated representatives, there must be no communication between any other Board staff and any other representatives of the Bidder, and no giving of information with respect to the competitive procurement process and the final contract.
- Any attempt on the part of the Bidder, or any of its Employees, Agents, Vendors, or Representatives to contact any person(s) other than the designated SCCDSB representative(s) with respect to the competitive procurement process or any violation of the above requirements will be grounds for disqualification. The Board may, at its discretion, in addition to any other rights or remedies available at law, reject any potential or actual submission submitted by that Bidder.

Bidders accepts and agrees to observe the conditions listed herein, inform their staff thereof, and ensure their compliance by submitting an executed Bid Submission in response to this RFT.

2.5. SCOPE OF WORK

The St. Clair Catholic District School Board (Board) is seeking a Contractor to provide all of the necessary materials, equipment and labour to complete Gym Roof Top Unit Replacement at St. Philip Catholic School, in Petrolia, ON.

2.6. EXAMINATION OF SITE & SITE VISIT

Location: St. Philip Catholic School, 420 Queen Street, Petrolia N0N 1R0

Contact: Juan Galindo, Cell: 226-402-4824

Instructions: The site examination will be held at the date and time specified in Section 2.1 RFT Schedule. Attendees are required to report to the main office. A sign-in sheet will be available at the site examination. It is the attendee's responsibility to ensure they are signed-in at the meeting.

This is a MANDATORY SITE VISIT. Only contractors who attend the site visit will be permitted to submit a bid response. Attendance will be taken and will form part if the Bid Documents. Representatives of the Owner and Consultant will be in attendance.

In submitting a bid, it will be assumed that the bidders have carefully examined the drawings and have included in the bid price the complete cost of the work contemplated by the drawings and specifications and other bid documents.

2.7. TIMING OF PROJECT

The schedule for the completion of the project is:

- Commencement no earlier than Thursday, July 2, 2020.
- Completion no later than Friday, August 21, 2020.

Work is to be completed during regular business hours. Working outside of school hours, including daytime access during weekends, holidays, March break, etc. shall be at the sole discretion of the SCCDSB's Project Manager.

2.8. COORDINATION WITH OCCUPANTS

The Owner will not occupy site of the construction during entire construction period; however the Childcare Provider (Generations Day Care) will occupy a small portion of the building which will be separated by hoarding from the main building. All services to the Childcare must be maintained for the duration of the project. The contractor will be completely responsible for the portion of the premises under construction during the length of the contract period until turned back over to the Owner. Please refer to Appendix C: Scope of Work & Specifications for the Floor Plan.

Partial Occupancy: Generations Day Care will continue to operate the childcare and the area identified in the drawings and will occupy part of the site during entire construction period except for weekends and Statutory Holidays. The contractor is to cooperate with the Childcare Operator during construction operations to minimize conflicts and facilitate Childcare Operator usage. Perform the Work so as not to interfere with Childcare Operator's day-to-day operations. Maintain existing exits unless otherwise indicated.

- Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner, Childcare Operator and approval of authorities having jurisdiction.
- Notify Owner and Childcare Operator not less than 48 hours in advance of activities that will affect Childcare Operator operations.
- Restrict high noise operations (i.e. breaking and cutting concrete) to unoccupied periods. Include any overtime wages due to the condition stipulated.
- Power shutdowns will be scheduled during unoccupied periods. Include any overtime wages due to the condition stipulated.

2.9. BID SUBMISSION

Bids shall be submitted with the project clearly identified on the sealed envelope:

Bid Package RFT # 645-CP2006 Gym Roof Top Unit Replacement – St. Philip Catholic School

Attention: Tony Prizio, Supervisor – Procurement

The sealed Bid Submission must be returned to:

Catholic Education Centre, Reception Desk

420 Creek Street, Wallaceburg, ON N8A 4C4

Bids MUST be received no later than the date and time specified in this tender document. Any bid submissions received after the deadline will be returned unopened to the bidder. It is the Bidder's responsibility to ensure their Bid Submission is received by a Board representative on or before the tender close. The Board will not take any responsibility for late submissions due to postal delay through Canada Post, third-party courier services, or for any other reason.

If a Bidder chooses to deliver their Bid Submission via post or courier, the envelope or package must reference the project number and project description on the outside.

Bids shall be filled out in ink or typed, signed in longhand by a duly authorized company official (having authority to bind) and sealed with a company corporate seal. One original of the fully completed Bid Form must be submitted. Failure to provide all of the requested information on the Bid Form may result in disqualification of the bid. Please refer to Appendix A: Bidder's Response Guide.

Bids by telephone, email, or fax will not be accepted.

After bid closing all submissions will be reviewed by the Board's evaluation team. Contractors submitting a bid are invited to stay for a public opening of Bids at the Catholic Education Centre following the submission deadline.

Supplier's Bid Submission, all Bid Documents and CCDC 2-2008 Stipulated Price Contract will form the agreement.

2.10. CONTRACT PRICING

Proponents must complete the Bid Form. Prices must include all travel, reimbursements, delivery (FOB Destination).

All charges must include the cost of the product or service. Prices quoted must be for products or services exactly as specified, unless otherwise noted or requested on the Bid Form.

Prices must remain in force for the initial term of the contract. Any price increases are subject to the approval of the SCCDSB and will be limited to proof of manufacturers' industry increases in written form from the successful proponent.

2.11. QUESTIONS AND REQUESTS FOR CLARIFICATION

Proponents finding discrepancies, ambiguities or omissions in the RFT documents or having doubt as to the meaning or intent thereof, shall immediately notify the Procurement Department. The board is not responsible for any misunderstanding of the RFT on the part of a Proponent. Questions must be received by the date and time specified in the RFT Document. Responses will be provided in writing to Proponents through the same platform that the original RFT documents were issued.

All questions to be addressed in writing to:

Tony Prizio, Supervisor - Procurement
St. Clair Catholic District School Board
E-mail: tony.prizio@st-clair.net
CC: victoria.iaccino@st-clair.net

For the purpose of this RFT, Proponents shall not contact anyone in the Board other than the designated contact listed in these bid documents. Any unauthorized communications may result in disqualification.

2.12. ADDENDA

Proponents may also, during the RFT Process, be advised by Addendum of any additions, deletions or alterations to RFT documents. All such Addenda shall become part of the RFT Documents.

If an addendum is issued, the document(s) will be made available to Proponents through the same platform that the original RFT documents were issued. Proponents are responsible for verifying before submitting its response that it has received all addenda that may have been issued.

Where a Bid Submission has been received by the Board prior to the publication of an Addendum or notice, the Board shall allow that Proponent to submit a revised Bid Submission prior to the closing date for the RFT or send written acknowledgement (which may be by email) to the RFT contact that the original Bid Submission still stands.

2.13. WITHDRAWAL OF SUBMISSION

A Proponent may alter, amend, or withdraw a submitted proposal if such request is received in writing by the contact person for this RFT prior to the closing date and time specified in this document. The last submission shall supersede and invalidate all previous submission by that Proponent as it applies to this bid. Such requests received after the closing date and time will not be permitted.

2.14. BID ACCEPTANCE

It shall be understood by all proponents, that the RFT submission shall be valid and subject to acceptance by the Board, and that no adjustments shall be made to the proposal for a period of up to and including sixty (60) days from the RFT Closing Date.

The Board reserves the right to determine the successful proponent at its sole discretion. The lowest cost may not be accepted. The Board reserves the right to decline any or all submissions, in whole or in part, at any time prior to making an award.

The successful proponent shall be required to enter into a formal contract with the Board, which will include the terms and conditions of the RFT documents, the Proponent's bid, and all other applicable documents.

2.15. CANCELLATION

The Board may cancel this RFT at its discretion at any time prior to an award. The Board may do so for budgetary reasons, for any other reason, or without providing reasons and issue a new request for tender, request for qualifications, or do nothing.

2.16. CLARIFICATION

The Board reserves the right to seek clarification from any Proponents without being obligated to all Proponents if it finds certain aspects of a bid unclear.

2.17. BOARD'S RIGHT TO WAIVE MINOR IRREGULARITY

The Board reserves the right to accept or waive a minor irregularity, or where practical to do so, the Board may as a condition of bid acceptance request a Proponent to correct a minor irregularity with no change in bid price. Items of non-compliancy on any bid submissions which do not strictly comply with the provisions, procedures and requirements of this bid, or are incomplete, ambiguous, or which contain errors, alterations, misleading information, omissions, or irregularities of any kind, may be rejected and disqualified at the discretion of the Board. All proponents agree to provide all such additional information as, and when requested, at their own expense, provided no proponent in supplying any such information shall be allowed, in any way to change the pricing or other cost quotations originally given in its bid submission or in any way materially alter or add to the solution originally proposed.

2.18. ERRORS AND OMISSIONS

The Board will not be held liable for any errors or omissions in any part of the RFT. While the Board has used considerable effort to ensure an accurate representation in the RFT, the information contained in the RFT is supplied solely as a guideline for the Proponents. The information is not guaranteed or warranted to be accurate by the Board, nor is it necessarily comprehensive or exhaustive.

2.19. DOCUMENT AVAILABILITY

RFT documents are available on the Board's Website www.st-clair.net under Bid Opportunities or on Biddingo www.biddingo.com. Documents will also be provided to local construction associations: Sarnia Construction Association, Windsor Construction Association, Lambton Area Builders Exchange and the London & District Construction Association.

The Board assumes no responsibility for the proponent's failure to examine all of the RFT Documents.

2.20. PROPONENT EXPENSES

Any and all costs and expenses incurred by Proponents in the development, preparation, submission or presentation of their bids, or otherwise related to its participation in this RFT process will be borne by the Proponents. The selection of any bid, or the rejection of any or all bids, or the termination/cancellation of this RFT process, or initiation of a new RFT process shall not render the Board liable to pay or reimburse any such costs or damages incurred by any Proponent, or any partner or contractor of such Proponents.

2.21. VOLUNTARY ALTERNATE & SEPARATE PRICES

The bid amounts are to be based on the bid documents. Where there is any conflict within the bid documents, the bid amount shall include the higher cost alternative. Alternative proposals are encouraged

and should be clearly identified in the bid. Submit complete information including any impact on schedule to allow a full evaluation of the proposal including, as applicable, any particulars in which the alternate proposal is at variance with or unable to meet the specifications. Note also any impact on other trades if the alternative is accepted. Alternative proposals may be made without limitation, including for items specified as single sourced. The Board in its sole and unfettered discretion reserves the right to accept or reject alternatives.

2.22. BID INELIGIBILITY

Bids may, at the discretion of the Owner, be declared informal for any of the following reasons:

- the bid is incomplete, unsigned, improperly signed or sealed, conditional, illegible, obscure, contains arithmetical errors, erasures, alterations, or irregularities of any kind, or
- the bid does not include the required bonding/ consent of surety
- the Bid Forms and enclosures are improperly prepared, or
- the prices seem to be so unbalanced as to adversely affect the interests of the Owner, or
- the bid is based upon an unreasonable period of time for completion or delivery, or
- the bidder does not provide the required Proof of Insurance and/or WSIB coverage as specified in these Bid Documents

2.23. AWARD

The Board has the right to reject any or all bids. The lowest Bid will not necessarily be accepted. The invitation to bid does not constitute an offer by the Contractor to enter into a contract. In the event of a tie, a coin flip conducted by the Supervisor – Procurement (or designate) with a minimum of one other Board staff will determine the successful proponent.

Acceptance of the Bid and/or award is subject to the approval of the St. Clair Catholic District School Board.

The SCCDSB reserves the right to withdraw the award of the contract to a successful bidder(s) within 30 days of the award if, in the opinion of the SCCDSB, the successful bidder(s) is unable or unwilling to enter into a form of contract satisfactory to the SCCDSB. The SCCDSB shall be entitled to do so without any liability being incurred by the SCCDSB to the bidder.

2.24. ENTITLEMENT TO A DEBRIEFING

In accordance with the Broader Public Sector Procurement Directive unsuccessful Bidders are entitled to a debriefing, during which they will be provided with feedback regarding their Tender. In order to be debriefed, unsuccessful Bidders must contact the Owner representative identified in the Bid Documents in writing to request a debriefing within sixty (60) days from the date of the notification of award.

2.25. BID DISPUTE PROCEDURE

In the event that a Bidder wishes to review the decision of the Board in respect of any material aspect of the Request For Tender process, the Bidder shall submit a protest in writing to the Board to the attention of the Supervisor – Procurement within ten (10) days of the closing date of the Tender.

Any protest in writing shall include the following:

a) a specific identification of the provision and/or procurement procedure that is alleged to have been breached;
b) a specific description of each act alleged to have breached the procurement process;
c) a precise statement of the relevant facts;
d) an identification of the issues to be resolved;
e) the Bidder's arguments and supporting documentation;
f) the Bidder's requested remedy.

2.26. INVOICING & PAYMENT

The Board shall pay by electronic funds transfer (EFT), P-Card, or cheque within twenty eight (28) days after the receipt of a proper invoice. Invoices will be reviewed and certified by the Board's Consultant, if applicable, before the invoice is processed for payment. Invoices must include all back-up material for time and material charges, disbursements, and other fees.

Invoices should be sent digitally to the consultant and be based upon the consultant's approved format for invoicing with copies sent to victoria.iaccino@st-clair.net. Digital invoices will be processed as an original. Please do not send duplicate copies by mail.

Note: Invoices should reflect a 10% holdback (final construction cost) which will be retained by Board through substantial completion of the project in accordance with relevant legislation.

2.27. TAXES

Include in Bid all Taxes and all other Customs Duties and Excise Taxes which are in force at Bid date as detailed in General Conditions. Harmonized Sales Tax (H.S.T.) is **not** to be included in the bid. The H.S.T. amount and the Bidder's **H.S.T. Registration Number** are to be indicated on the Bid Form in the spaces provided.

2.28. CHANGE NOTICES, CHANGE ORDERS

The following fee percentage and overhead charges shall be applied to additional work ordered by the Board:

- For work carried out by the Contractor's own forces – 10% Overhead & Profit
- For work involving a subcontractor, the subcontractor may charge a maximum 10% fee. The Contractor may charge a maximum of 5% in addition to subcontractor's fee.

2.29. PROJECT SPECIFIC REQUIREMENTS

Any and all damages to facilities while under the control of the contractor shall be repaired at the contractor's cost. Please be advised that the Owner has a No Smoking Requirement on the Owners' property. Contractors shall provide their own washroom facilities for their employees; board washrooms will be off limits to the contractor's employees. Contractors are requested to ensure that employees and suppliers are advised of these Requirements. Contractor shall remove rubbish and debris from the site on a daily basis or as directed by the Board. On completion of the work, all debris shall be removed; the floor shall be thoroughly cleaned and swept; the site shall be left in a tidy condition (construction clean). Do not use the Board's equipment or facilities for cleaning or for any reason.

2.30. SUBCONTRACTORS

The successful Proponent(s) may not, at any time, subcontract any portions of its contract with the Board nor shall it assign the contract without the written permission of the Board. The successful Proponent(s) must not, at any time, change subcontractors approved by the Board without the written permission of the Board.

2.31. GENERAL TERMS AND CONDITIONS

The issuance of this bid document shall not constitute and obligation on the part of the Board to any proponent who submits a bid.

The laws of the Province of Ontario shall govern any dispute occasioned as a result of the performance or non-performance and/or workmanship of a contract issued pursuant to the bid and any dispute arising out of the issuance of and response to this bid document.

All SCCDSB policies, procedures and regulations must be adhered to by the successful bidder(s).

Some of the Board sites are equipped with video surveillance cameras.

The successful proponent(s) is obliged to cooperate with all recycling and environmental procedures and initiatives established by government, the Board and each school.

The successful bidder(s)' employees and contracted staff shall not be considered SCCDSB employees and shall not represent themselves as an agent of the SCCDSB nor be eligible for any of the benefits provided to SCCDSB employees.

The SCCDSB reserves the right to demand the removal of any successful bidder's employees or contracted staff engaged in this contract if, in the SCCDSB's opinion, their conduct has been of an unacceptable nature.

The successful bidder(s) will be responsible for ensuring that regular supervision is maintained over all working personnel. It is the bidder's responsibility to ensure that all their activities are properly coordinated with the SCCDSB's operations and modify assignments as required.

This bid document is being issued pursuant to the SCCDSB's Purchasing Policies and Procedures.

The acceptance of the bid by the successful proponent(s) and the award of the contract contemplated by this bid document may be subject to approval of the Board of Trustees.

2.32. BONDING

On bids exceeding $100,000.00 (inclusive of all taxes) the following tender security / bonding is required and must accompany the bid:

- Agreement to Bond: 50% Performance and 50% Labour and Material
- Bid Bond: 10% of the bid price, payable to the St. Clair Catholic District School Board

If the bid amount is greater than $100,000 and less than $500,000 (inclusive of all taxes) the Surety or Bid Bond may be provided in the form of an irrevocable letter of credit, a certified cheque, or money order payable to the Board in the value of 10% of the bid amount.

Only bond and agreements to bond issued by a licenced Canadian surety company authorized to do business in the Province of Ontario will be accepted. Upon request, the successful Bidder will be required to present the bonds to the Purchasing Department. Bonds must be issued as prescribed by the *Construction Act* regarding Broader Public Sector contracts. Failure to provide the proper surety to the Board upon award will result in rejection of that Bid. The cost of bonding shall be included in the Bid price, if applicable.

2.33. INSURANCE

The successful Proponent(s) must maintain, at the Proponent's expense for the entire term of the Contract or as otherwise required, all insurance as set out below. Proof of coverage must be provided as part of the bid submission.

- Comprehensive General Liability and Property Damage with a limit of not less than **$5,000,000.00 (five million dollars)**.
- Motor Vehicle Public Liability and Property Insurance on all owned and rented equipment with a limit of not less than **$2,000,000.00 (two million dollars).**

The Proponent agrees to indemnify, hold harmless, and defend the Board, its Consultants, agents or employees from and against any and all liability for loss, damage and expense, which the Board may suffer or for which the Board may be held liable by reason of injury (including death) or damage to any property arising out of negligence on the party of the proponent or any of its representatives, employees, or subcontractors in the execution of the work preformed or by way of ownership or operation of an automobile.

The successful Proponent shall provide the Board with a complete certified copy of all policies. Copies of renewed policies must be provided to the Board on or before the policy renewal date for projects that extend past the original policy term or for multi-year contracts. The successful Proponent must name the St. Clair Catholic District School Board as additional insured on their insurance policies.

2.34. WORKPLACE SAFETY INSURANCE BOARD (WSIB)

Successful Proponent(s) must ensure that all workers are covered by the Workplace Safety and Insurance Board coverage for the duration of this contract. Proof of coverage must be provided as part of the bid submission.

Proponents must furnish a Certificate of Clearance from the Workplace Safety and Insurance Board as evidence that all returns have been made and all necessary assessments have been paid as required, or levied, by the Workplace Safety and Insurance Board.

Alternatively, if the Proponent is an Independent Operator and is not classified under Class G: Construction, the proponent must provide a letter from the Work Place Safety & Insurance Board confirming independent operator status and identification number under the WSIB Act.

2.35. PERMITS

The Board will apply and pay for a building permit if applicable. The contractor is to obtain all other permits as required to complete the project, including but not limited to ESA, hot work permit etc.

2.36. MEETINGS

A Post Bid Meeting may be convened and chaired by the Board who will invite the Successful Proponent and his major Subcontractors, if applicable, to review the Contract Documents and Bid submitted. This meeting will be prior to the Board issuing a Letter of Intent or Contract. This meeting does not constitute or infer any contract award to the proposed contractor or any other contractor, nor that will the project proceed.

During the course of Work, scheduled progress meetings may be required at the call of the Project Leader.

2.37. WARRANTY

The vendor/contractor warrants that all goods/services, materials and equipment supplied under contract are free of all defects in manufacture and workmanship for a period of not less than 1 year from date of delivery, installation or performance (whichever is the later) whether or not any portion or trade has been sublet.

The vendor/contractor shall promptly remedy any defect or deficiency in any goods/services, materials and equipment supplied under contract to the satisfaction of the Board within seven (7) calendar days following notice to do so from the Board at no additional cost to the Board, unless otherwise specified.

In the event that the vendor/contractor doesn't not promptly honour the above warranties to the satisfaction of the Board, the Board may, at the sole cost of the vendor/contractor do whatever it deems necessary and advisable to remedy, rectify or replace the defective, deficient or non-compliant goods, services, materials or equipment. The Board shall inform the vendor/contractor in advance of the approximate cost of such work to be done by the Board.

All goods/services and/or equipment furnished or supplied pursuant to the contract shall be installed or attached in such a manner as to preserve all manufacturer's and vendor/contractor's warranties, which shall, together with all parts and components, become the property of the Board after the successful and satisfactory installation or attachment.

2.38. GUARANTEE

The vendor/contractor guarantees that all goods/services, materials and equipment supplied under contract are new manufacture. The products must not contain re-manufactured parts and/or accessories and must not have been used under contract with any other customer(s) unless specified by the Board. The submissions will be of the latest design and technology at the time of submission by the vendor.

The vendor/contractor represents and warrants that the goods and/or services supplied pursuant to this bid will be manufactured and/or supplied under such conditions that do not contravene the Ontario Human Right Code or the minimum standards of Ontario workplace legislation and regulations or are otherwise unethical. In the event in the opinion of the Board, the bidder is in breach of the foregoing representation and warranty, the Board may cancel the award or any such subsequent contract entered into between the Board and bidder pursuant thereto.

2.39. SCHEDULE

The Contractor will be required to perform the work in accordance with the Schedule dates provided in 2.7. Timing of Project. Ordering of major and long delivery items shall begin immediately upon successful bidder's receipt of contract award. The Contractor will provide a construction schedule within five (5) days of being awarded the project.

Time is of the essence. Bidders are to include adequate manpower, overtime and shift work necessary to meet or improve the schedule, and to make up any time lost to weather or normal delays. Include travel, room and board costs for out of town workers, shop overtime and other premiums to expedite material and equipment, shipping premiums and any incentive costs required to meet the schedule.

2.40. CONTRACTED SERVICES PROGRAM

Contractors performing work on Board property must complete the Contracted Services Program. The Contracted Services Program is a joint program with Lambton Kent District School Board. This program has three basic components that **must** be met before the bid is awarded. Contractors who cannot meet the minimum requirements of this program will not be awarded this tender. Program information can be found

on the Board's web site at www.st-clair.net or through the Board contact identified previously in this document. If the contractor has already been pre-qualified by LKDSB they must provide proof of completion. Identification badges can be used on SCCDSB or LKDSB property. All Insurance and WSIB certificates must be up to date under the Contracted Services Program.

2.41. HEALTH and SAFETY

The Occupational Health and Safety Act describes the responsibilities of an employer. The Board requires Contractors to maintain procedures, training, and enforcement so that the responsibilities are carried out in the workplace. The Contractor shall abide by and strictly adhere to the regulations and conditions set out and laid down by the most current versions of the Occupational Health and Safety Act. All staff employed or hired by the Contractor and working on the Board's premise MUST be trained in WHMIS in accordance with Occupational Health and Safety Act and Regulations. They MUST adhere to all of the Board's Health and Safety Procedures and Guidelines and to Municipal By-Laws.

Contractor will submit proof of its health and safety program, procedures and training as detailed above upon request by the Board.

The Contractor shall appoint a Competent Person as the Supervisor of this project. The Competent Person shall be as defined in Section 1 of the Occupational Health and Safety Act.

The successful Contractor shall conform to the Ontario "Occupational Health and Safety Act" and all regulations made under said act and assume full responsibility for contraventions of same.

All workplace injuries or accidents on Board property MUST be reported by the Contractor to the Board's representative within 24 hours.

Any workplace injury that is defined under the Occupational Health and Safety Act as a "Critical Injury" must be reported to the Board's representative IMMEDIATELY.

2.42. ELECTRICAL AND SAFETY APPROVALS

All electrical/electronic components supplied by the vendor/contractor must be CSA, ULC and/or Ontario Hydro/Ontario Electrical Safety Authority approved. Appropriate labels must be affixed to the equipment prior to delivery. The vendor/ contractor is responsible for ensuring goods or services supplied to the Board must comply with the Occupational Health and Safety Act and Regulations of Industrial Establishments.

2.43. DESIGNATED SUBSTANCES

The contractor shall conduct work in recognition of the most current regulations related to Designated Substances. The contractor is required to review the site specific designated substances report to ascertain potential for exposure to designated materials and notify the board of instances where the scope of work under this contract will require remediation. If the report does not schedule designated materials in the attached report and should the contractor uncover material which is believed to be asbestos, work is to cease immediately and the Board staff are to be contacted immediately.

2.44. SAFE SCHOOL PROCEDURES

Contractor's staff is required to report to the main office of the site where work will be carried out during regular school hours and notify the school office staff of the purpose of the visit. The Contractor is required to adhere to all school specific procedures if applicable.

It is the responsibility of the Contractor's staff to sign in and sign out of the Log Book, which is located in the main office area, while performing their duties.

The following information must be recorded in a legible manner:

Date
Company Name
Employee Name
Employee Signature
Reason for Visit
Time Entering Building
Time Leaving Building

2.45. HOISTING, SCAFFOLDS, ELEVATED WORK PLATFORMS

The Contractor is responsible for all hoisting and other equipment necessary to facilitate their work if required.

2.46. TEMPORARY POWER

A source of electric power will be designated by the Board. The Board will allow a tie-in connection with fuse or breaker protection for the Contractor's estimated load requirements. The Contractor must provide the power connections and all extensions from the point to the job site. All electrical connections and extensions must meet ESA requirements and must be approved by the Board. The Contractor's estimated load requirements must not be exceeded without the Owner's permission.

2.47. NOISE AND TRAFFIC CONTROL

Bidders shall comply with all applicable **noise by-laws** (or local requirements governing same) and traffic routing that may be in effect during the life of the Project.

This **may** limit some activities to restricted time periods. Where the schedule requires for after hour work, the Contractor shall include all costs associated with obtaining the necessary permits to work such time periods.

The Contractor shall be responsible for all costs associated with providing a traffic officer as necessary to facilitate construction.

2.48. SITE ACCESS AND EGRESS

Contractors will be required to sign out a master key and will be assigned an access code for the alarm system. Successful Contractor will be responsible for building security during working hours and locking up the facility at night, which includes setting the alarm.

Any false alarms generated by the Contractor's workforce will result in a back charge for the costs incurred to the Board.

The Contractor shall make good any damage to roads, curbs, sidewalks, fencing, or grass damaged by vehicles or equipment during the course of construction.

2.49. PARKING

Contractors must park within the designated areas and allow for provisions to and from the designated parking area onto the job site.

2.50. CONTRACTOR'S PERSONNEL

The Contractor shall, at its own expense, provide all the personnel required to take a proactive role in managing the project as it relates to their work and its coordination with other trades. This will include but is not limited to the following:

- Competent supervision of the work of the Contract and coordination with the work of other Subcontractors. This includes being responsible for and properly supervising any subcontractors of this subcontractor.
- All layout work required to complete the work of the trade contract.
- Competent supervision of the work of the trade contract to ensure work is done in accordance with the OHSA and any other applicable regulations.
- Expediting the procurement of material and equipment to ensure delivery by their required dates.
- Submission of Requests for Information where required in a timely manner and wherever possible providing the Board with information to assist in the answering of these requests.
- Submission in a timely manner of all required shop drawings and samples and assistance to the Board required to obtain approvals to suit the schedule. All shop drawings are to be reviewed by the Contractor prior to submitting for approval.
- Attendance at all construction coordination meetings when requested by the Board.
- Provision of all necessary information requested by the Board for cost control and billing purposes.
- Inspection of the work of the Trade Contract for defects and deficiencies and cooperation with the Board and other inspection authorities to allow their inspections to take place.
- Submission of pricing for all changes to the work within five (5) working days after receipt of change documentation including the breakdown and backup necessary to allow checking and approval.

2.51. ACCESSIBILITY FOR ONTARIANS WITH DISABILITIES ACT

The Purchaser is committed to the highest possible standards for accessibility. Proponent(s) must be capable to recommend and deliver, as appropriate for each Deliverable, accessible and inclusive Services consistent with the Ontario Human Rights Code (OHRC), the Ontarians with Disabilities Act, 2001 (ODA) and Accessibility for Ontarians with Disabilities Act, 2005 (AODA) and its regulations in order to achieve accessibility for Ontarians with disabilities.

In accordance with Ontario Regulation 429-07 made under the Accessibility for Ontarians with Disabilities Act, 2005 (Accessibility Standards for Customer Service), the Purchaser has established policies, practices and procedures governing the provision of its services to persons with disabilities.

Proponents are required to comply with the Purchaser's accessibility standards, policies, practices, and procedures, which may be in effect during the Term of the Agreement and which apply to the Deliverables to be provided by the Proponent.

2.52. CANADA'S ANTI-SPAM LEGISLATION

Please note that vendors are required to comply with all applicable laws, including CASL, in providing goods or services to the Board. This also extends to communications sent on the Boards behalf. The successful proponent(s) will be required to indemnify the Board for any failure by the successful proponent(s) to comply with CASL, to the extent that the successful proponent(s) action, or inaction, could expose the Board to liability.

2.53. CONFIDENTIAL INFORMATION

All correspondence, documentation, and information of any kind provided to any Proponent in connection with or arising out of this Request for Tender or the acceptance of any Bid:

- Remains the property of the Purchaser and shall be removed from the Purchaser's premises only with the prior written consent of the Purchaser.
- Must be treated as confidential and shall not be disclosed except with the prior written consent of the Purchaser.
- Must not be used for any purpose other than for replying to this RFT and for the fulfilment of any related subsequent agreement.
- Must be returned to the Purchaser upon request.

Except as provided otherwise in this request, or as may be required by Applicable Laws, the Purchaser shall treat the Proponents' Proposals and any information gathered in any related process as confidential, provided that such obligation shall not include any information that is or becomes generally available to the public other than as a result of disclosure by the Purchaser.

During any part of this Request for Tender process, the Purchaser or any of its representatives or agents shall be under no obligation to execute a confidentiality agreement.

All correspondence, documentation, and information provided in response to or because of this RFT may be reproduced for the purposes of evaluating the Proponent's Bid Submission.

If a portion of a Proponent's Bid Submission is to be held confidential, such provisions must be clearly identified in the Bid.

The Purchaser reserves the right to require any Proponent to enter into a non-disclosure and/or confidentiality agreement satisfactory to the Purchaser.

2.54. CONFLICT OF INTEREST

Proponents must declare all conflicts of interest or any situation that may reasonably perceived as a conflict of interest in relation to the Project that exists now or may exist in the future. The Board, at its sole discretion, waive any and all actual, potential, or perceived conflicts of interest, on such terms and conditions and the Board, at its sole discretion, considers to be appropriately managed, mitigated, and minimized. In this regard the Board may require the Proponent to implement measures or take steps to manage or mitigate the impact of any actual, potential, or perceived conflict of interest.

2.55. MUNICIPAL FREEDOM OF INFORMATION AND PROTECTION OF PRIVACY ACT

The *Municipal Freedom of Information and Protection of Privacy Act* (Ontario) applies to information provided by Proponents. A Proponent should identify any information in its Quotation or any accompanying documentation supplied in confidence for which confidentiality is to be maintained by the Purchaser. The confidentiality of such information will be maintained by the Purchaser, except as otherwise required by law or by order of a court, tribunal, or the Ontario Privacy Commissioner.

By submitting a Bid, including any Personal Information requested in this RFT, Proponents agree to the use of such information for the evaluation process, for any audit of this procurement process, and for contract management purposes.

2.56. PERSONAL INFORMATION PROTECTION AND ELECTRONIC DOCUMENTS ACT

The Proponent represents and warrants that if the Proponent becomes subject to any private sector privacy legislation in responding hereto, or in carrying out its obligations under any subsequent agreement, the bidder will be solely responsible with such legislation. Without limitation, the Proponent represents and warrants that if the Proponent is subject to the *Personal Information Protection and Electronic Documents Act* (PIPEDA) the Proponent shall ensure compliance of all PIPEDA Protected Information that the Bidder:

- Collects directly from the individuals or indirectly from the Board or others;
- Uses or discloses in the course of responding hereto or in performing its obligations under and subsequent agreement; or
- Transfers or discloses to the Board

2.57. TRADE AGREEMENTS

Proponents should note that procurements within the scope of either Chapter 5 of the Canadian Free Trade Agreement, Chapter 19 of the Comprehensive Economic and Trade Agreement, within the scope of the Trade and Cooperation Agreement between Quebec and Ontario or any other applicable agreement not listed herein are subject to such agreements, although the rights and obligations of the parties shall be governed by the specific terms of this RFT.

2.58. WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM

The Proponent should provide Workplace Hazardous Materials Information System (WHMIS) material safety data sheets (MSDS) for all Services. Additionally, the Proponent should provide the Purchaser's personnel WHMIS training, as it relates to the Services, in accordance with the Ontario Occupational Health and Safety Act.

2.59. VENDOR PERFORMANCE

Where the Contractor fails to comply with any of its obligations under the Contract, the Board may issue a notice setting out the manner and time-frame for rectification. Within seven (7) Business Days of receipt of that notice or in a timeframe as otherwise agreed to, the Contractor shall either: (a) comply with that rectification notice; or (b) provide a rectification plan satisfactory to the Board. If the Contractor fails to either comply with that rectification notice or provide a satisfactory rectification plan, the Board may immediately terminate the Contract. Where the Contractor has been given a prior rectification notice, the same subsequent type of non-compliance by the Contractor may allow the Board to immediately terminate the Contract and result in the suspension of bidding privileges to the Board for up to two years at the sole unfettered discretion of the Board.

2.60. TERMINATION OF CONTRACT

Either party may terminate the Agreement on written notice to the other where such other party neglects or fails to perform or observe any material term or obligation of the Agreement and such failure has not been cured within 30 Days of written notice being provided.

If the Proponent fails to execute the work properly or otherwise fails to comply with the requirements of the contract to a substantial degree, the Board may correct such default and deduct the cost thereof from any payment then or thereafter due to the contractor.

The Board shall be entitled to terminate the Agreement immediately, without liability, cost, or penalty on written notice to the Proponent:

- if any proceeding in bankruptcy, receivership, liquidation, or insolvency is commenced against the Proponent or its property;
- if the Proponent makes an assignment for the benefit of its creditors, becomes insolvent, commits an act of bankruptcy, ceases to carry on its business or affairs as a going concern, files a notice of intention or a proposal, or seeks any arrangement or compromise with its creditors under any statute or otherwise;
- following the occurrence of any material change in the Board's requirements which results from a regulatory or funding changes, or recommendations issued by a Governmental Authority;
- in the event of a breach of the representation regarding conflict of interest;
- in the event of a misrepresentation or material breach;
- if the proponent uses, destroys, exploits, or discloses any Board Confidential Information to any Personal Information contrary to this Agreement; and
- in accordance with any provision of the Agreement that provides for early termination;

The Board reserves the right to terminate the Agreement, without cause, upon sixty (60) days' prior written notice to the Proponent.

The Board shall be liable to the Vendor only for the payment of Deliverable(s) supplied and accepted up to the date of termination.

The Board, at its sole and unfettered discretion, may extend the timelines for termination if it is deemed to be in the Board's best interest to do so.

Any termination of the Agreement shall not in any respect limit any of either party's rights or remedies either in law or in equity or relieve either party of any obligation incurred prior to the effective date of such termination.

[End of Part 2]

APPENDIX A: Bidder's Response Guide

Each bid submission should be structured using only the criteria identified in this bid document.

1. A completed copy of APPENDIX B: Bid Form **must** be included in your bid submission.
2. Proof of WSIB Coverage and proof of insurance **must** be included in your bid submission.
3. Supplemental material will not qualify as substitutes for direct responses to the bid's requirements, except for specifically requested material.
4. The successful contractor must be prequalified under the contracted services program before an award is made.

APPENDIX B: Bid Form

Submitted By: _____

To:

St. Clair Catholic District School Board

645-CP2006 Gym Roof Top Unit Replacement

St. Philip Catholic School, Petrolia

B1. Base Bid Price

The Drawings, Specifications and other Contract Documents for this Project have been examined, as well as the premises and job site conditions affecting the work. The undersigned hereby offers to complete the work in accordance with the Contract Documents for the following bid price, except as defined below for HST:

_____

_____ Dollars ($ _____)

in Canadian funds EXCLUDING HST. HST will be added to the bid price.

In submitting this Bid, the undersigned recognizes and accepts the right of the Owner to accept any Bid, which is deemed the most advantageous to the Owner, (or any part thereof), at the price submitted, or to reject any or all Bids. Acceptance of the Bid and/or award of the contract is subject to the approval of the Board. In the event that a discrepancy arises between the written bid price and the associated numerical price, the written bid price will be deemed to be correct.

B2. Harmonized Sales Tax (HST)

The bidder shall not include the applicable HST in the bid price. The successful contractor will indicate on each application for payment as a separate amount the appropriate HST the Owner is obliged to pay.

HST Registration # _____

B3. Cash Allowances

1. Include Stipulated Sum of Thirty Six Thousand Dollars ($36,000.00) to cover over the following items from which the Consultant shall direct payment for services, labour, and material.
    a. Provisional Cash Allowance: $25,000
    b. Roofing work to complete the installation for the new RTU along with the decommission of one exhaust fan unit by the owner's vendor: $6,000
    c. Building systems control commissioning: $5,000

Time and Materials rates to be applied against Cash Allowance work. Final reconciliation will adjust the cash allowance as credit to the SCCDSB for unexpended amounts and extra to the contractor for over expenditure. The contractor shall mark-up sub-trade time and materials billing for this portion of work at 10% only.

B4. Itemized Prices

The following prices have been included in the Base Bid amount. The following prices, if accepted by the owner, shall include all labour, material, tools, equipment, overhead and profit, but exclude H.S.T. No other cost consideration shall be added to the contract for the scope of this work if accepted by the owner. The owner retains the right to cancel any or all of the sites for any reason.

Itemized Price #1: None at this time.

B5. Alternate Prices

It is accepted that the intent of alternate prices is to allow the Owner to select an alternative scope of work at a price which is declared below, and solely at the owner's discretion. All prices submitted take into consideration and allow for changes and adjustments in other work as may be necessary to provide a finished functional result, unless specifically indicated otherwise.

The following alternate prices are for work which is not included in the stipulated bid price listed on the bid form but which may be substituted by the Owner for work which is included (no price listed shall mean no change in cost) and the Owner has the right to accept or reject any or all of the prices quoted. The following prices, if accepted by the owner, shall include all labour, material, tools, equipment, overhead and profit, but exclude H.S.T. No other cost consideration shall be added to the contract for the scope of this work if accepted by the owner.

Alternate Price #1: None at this time.

B6. Separate Prices

It is accepted that the intent of separate prices is to allow the Owner to select a separate scope of work at a price which is declared below, and solely at the owner's discretion.

The following price has not been included in the Base Bid amount. The following prices, if accepted by the owner, shall include all labour, material, tools, equipment, overhead and profit, but exclude H.S.T. No other cost consideration shall be added to the contract for the scope of this work if accepted by the owner.

Separate Price #1: None at this time.

B7. List of Subcontractors

Trade: Roofing _____ Contractor: Bullock Roofing _____

Trade: _____ Contractor: _____

Trade: _____ Contractor: _____

B8. Project Superintendent / Supervisor

The Owner requires the Contractor provide a full time site supervisor for the duration of the project. A minimum of 5 years supervisory experience is required. List proposed personnel and their experience in the table below. Supervisory experience with firms other than the Bidder is acceptable to include on the list. The Contractor shall indicate the person chosen in writing to the Owner within 5 days of contract award.

Name	Firm/Position	Qualifications/ Experience

B9. Conflict of Interest

I /We confirm that: (please check one)

_____ There is not nor was there any actual or perceived Conflict of Interest or any other type of unfair advantage in our submitting this Proposal or performing or observing the contractual obligations of the Contractor in the Agreement.

OR

_____ Complete with this bid submission is a declaration on company letterhead of situations which may be a Conflict of Interest or an instance of unfair advantage or appears as potentially a Conflict of Interest or unfair advantage in our company submitting this Proposal or the contractual obligations of the Contractor under the Agreement.

Please note that the Board has the right to waive an actual or perceived conflict of interest as described in section 2.54 CONFLICT OF INTEREST.

B10. Agreement of Terms

I/We hereby acknowledge and agree that I/we have read, accepted, and completed all Contract Terms and Conditions and Appendices.

I/We understand it is the SCCDSB's intention that this RFT and the successful proponent(s)'s returned RFT submission will form the basis of the proposed contract. All of the terms and conditions of this RFT must be accepted by the proponent(s) and incorporated into the proponent(s) RFT submission. It is the SCCDSB's intention to use a CCDC 2-2008 Stipulated Price Contract when establishing an Agreement with the successful proponent(s).

The undersigned acknowledges receipt of Addenda Numbers _____ through _____ inclusive, and that the price, or adjustment thereof, for all work required therein is included in this submission.

This page must be signed below and returned with your submission for your bid to be accepted.

I/We the undersigned are duly authorized to execute this Bid Submission on behalf of:

Company: _____

Address: _____

Name: _____

Title: _____

Signature: _____ Date: _____

Phone: _____ Fax: _____

Email: _____

Please refer to Appendix A: Bidder's Response Guide to ensure you include all necessary documentation with your bid submission

APPENDIX C: Scope of Work and Specifications

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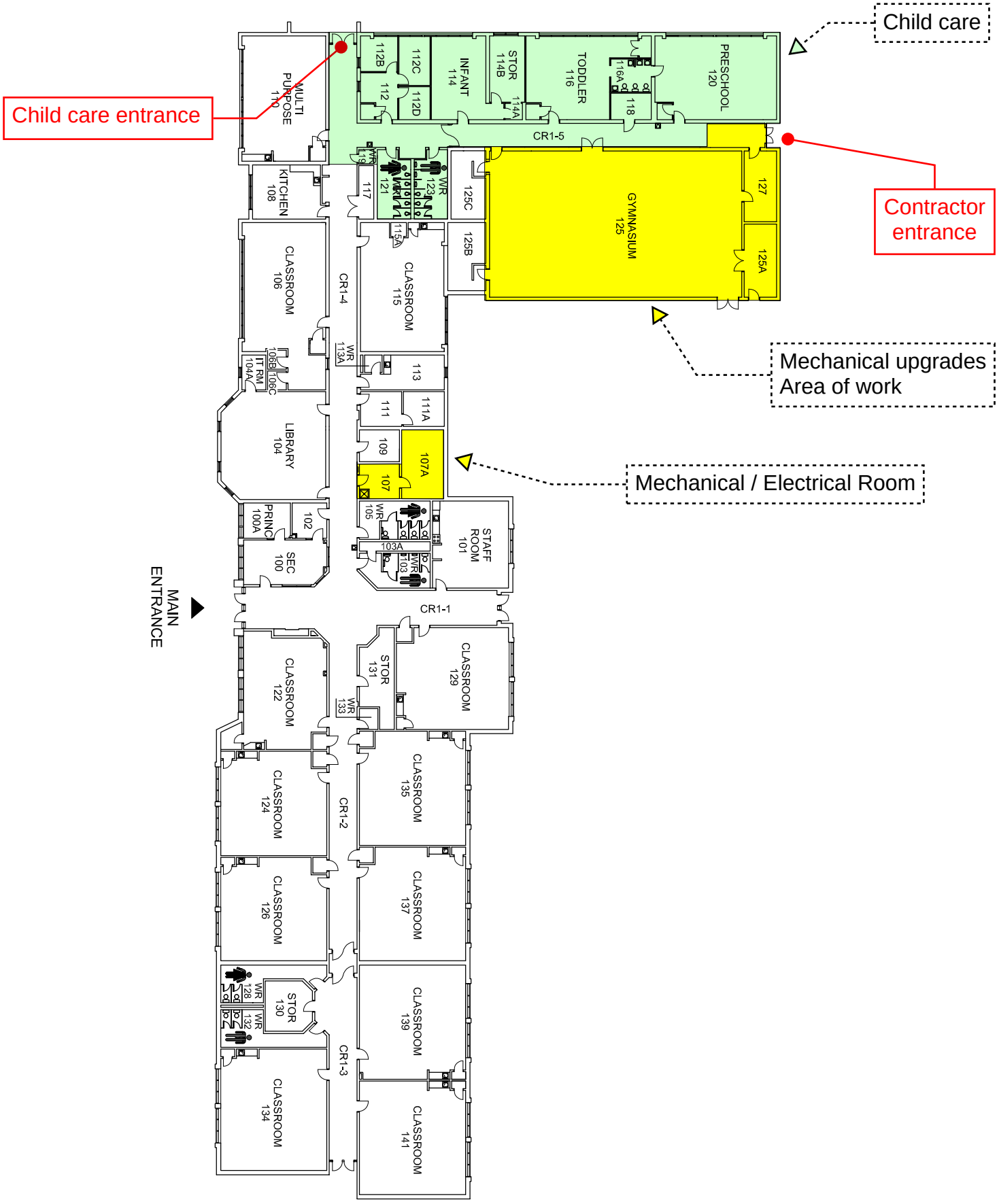

645	St. Philip Catholic School	N	FLOOR PLAN	ST. CLAIR CATHOLIC DISTRICT SCHOOL BOARD
	420 Queen Street, Petrolia, ON, N0N 1R0		05/24/2019	Lighting the Way ~ Rejoicing in Our Journey

ST. CLAIR CATHOLIC
DISTRICT SCHOOL BOARD

Lighting the Way ~ Rejoicing in Our Journey

CCDC 2- 2008

Stipulated Price Contract

Supplementary Conditions

November 10, 2009

2nd Revision: 1 February 2013

3rd Revision: 3 July 2013

The Standard Construction Document CCDC 2 2008 for a Stipulated Price Contract, English version, consisting of the Agreement Between *Owner* and *Contractor*, Definitions and General Conditions of the Stipulated Price Contract, Parts 1 to 12 inclusive, governing same is hereby made part of these *Contract Documents*, with the following amendments, additions and modifications:

AGREEMENT BETWEEN OWNER AND CONTRACTOR

ARTICLE A-3 – CONTRACT DOCUMENTS

3.1 Add the following to the list of *Contract Documents* in paragraph 3.1:

- Amendments to CCDC 2 – 2008
- *Drawings*
- *Specifications*
- Performance Bond
- Labour and Material Payment Bond

ARTICLE A-5 – PAYMENT

5.1.3 Amend paragraph 5.1.3, in the first line, by deleting the words "…the issuance of the…" and replacing them with "…receipt of the *Consultant's*..."

5.3.1 Delete paragraph 5.3.1 in its entirety and replace it with the following:

Interest
.1 Should either party fail to make payments as they become due under the terms of the Contract or in an award by arbitration or court, interest shall also become due and payable on such unpaid amounts at 0% above the prime rate. Such interest shall be compounded on a monthly basis. The prime rate shall be the rate of interested quoted by the Bank of Canada for prime business loans, as it may change from time to time.

ARTICLE A-9 – CONFLICT OF INTEREST

Add new Article A-9 – Conflict of Interest:

9.1 The *Contractor*, all of the *Subcontractors* and *Suppliers* and any of their respective advisors, partners, directors, officers, employees, agents, and volunteers shall not engage in any activity or provide any services where such activity or the provision of such services creates a conflict of interest (actually or potentially, in the sole opinion of the *Owner*) with the provision of the *Work* pursuant to the *Contract*. The *Contractor* acknowledges and agrees that a conflict of interest, as described in this Article A-9, includes, but is not limited to, the use of *Confidential Information* where the *Owner* has not specifically authorized such use.

9.2 The *Contractor* shall disclose to the *Owner*, in writing, without delay, any actual or potential situation that may be reasonably interpreted as either a conflict of interest or a potential conflict of interest, including the retention of any *Subcontractor* or *Supplier* that is directly or indirectly affiliated with or related to the *Contractor*.

9.3 The *Contractor* covenants and agrees that it will not hire or retain the services of any employee or previous employee of the *Owner* where to do so constitutes a breach by such employee or previous employee of the *Owner's* conflict of interest policy, as it may be amended from time to time, until after completion of the *Work* under the *Contract*.

9.4 It is of the essence of the *Contract* that the *Owner* shall not have direct or indirect liability to any *Subcontractor* or *Supplier*, and that the *Owner* relies on the maintenance of an arm's-length relationship between the *Contractor* and its *Subcontractors* and *Suppliers*. Consistent with this fundamental term of the *Contract*, the *Contractor* will not enter into any agreement or understanding with any *Subcontractor* or *Supplier*, whether as part of any contract or any written or oral collateral agreement, pursuant to which the parties thereto agree to cooperate in the presentation of a claim for payment against the *Owner*, directly or through the *Contractor*, where such claim is, in whole or in part, in respect of a disputed claim by the *Subcontractor* or *Supplier* against the *Contractor*, where the payment to the *Subcontractor* or *Supplier* by the *Contractor* is agreed to be conditional or contingent on the ability to recover those amounts or a portion thereof from the *Owner*, failing which the *Contractor* shall be saved harmless from all or a portion of those claims. The *Contractor* acknowledges that any such agreement would undermine the required arm's-length relationship and constitute a conflict of interest. For greater certainty,

the *Contractor* shall only be entitled to advance claims against the *Owner* for amounts pertaining to *Subcontractor* or *Supplier* claims where the *Contractor* has actually paid or unconditionally acknowledged liability for those claims or where those claims are the subject of litigation or binding arbitration between the *Subcontractor* or *Supplier* and the *Contractor* has been found liable for those claims.

9.5 Notwithstanding paragraph 7.1.2 of GC 7.1 - OWNER'S RIGHT TO PERFORM THE WORK, TERMINATE THE CONTRACTOR'S RIGHT TO CONTINUE WITH THE WORK, SUSPEND THE WORK OR TERMINATE THE CONTRACT, a breach of this Article by the *Contractor*, any of the *Subcontractors,* or any of their respective advisors, partners, directors, officers, employees, agents, and volunteers shall entitle the *Owner* to terminate the *Contract*, in addition to any other rights and remedies that the *Owner* has in the *Contract*, in law, or in equity.

DEFINITIONS

Add the following new definitions:

27. **Confidential Information**

Confidential Information means all the information or material of the *Owner* that is of a proprietary or confidential nature, whether it is identified as proprietary or confidential or not, including but not limited to information and material of every kind and description (such as drawings and move-lists) which is communicated to or comes into the possession or control of the *Contractor* at any time, but *Confidential Information* shall not include information that:

1) is or becomes generally available to the public without fault or breach on the part of the *Contractor*, including without limitation breach of any duty of confidentiality owed by the *Contractor* to the *Owner* or to any third party, but only after that information becomes generally available to the public;

2) the *Contractor* can demonstrate to have been rightfully obtained by the *Contractor* from a third party who had the right to transfer or disclose it to the *Contractor* free of any obligation of confidence;

3) the *Contractor* can demonstrate to have been rightfully known to or in the possession of the *Contractor* at the time of disclosure, free of any obligation of confidence; or

4) is independently developed by the *Contractor* without use of any *Confidential Information*.

28. Construction Schedule

Construction Schedule means the schedule for the performance of the *Work* provided by the *Contractor* pursuant to GC 3.5, including any amendments to the *Construction Schedule* made pursuant to the *Contract Documents*.

29. Force Majeure

Force Majeure means any cause, beyond the *Contractor's* control, other than bankruptcy or insolvency, which prevents the performance by the *Contractor* of any of its obligations under the *Contract* and the event of *Force Majeure* was not caused by the *Contractor's* default or active commission or omission and could not be avoided or mitigated by the exercise of reasonable effort or foresight by the *Contractor*. *Force Majeure* includes *Labour Disputes*, fire, unusual delay by common carriers or unavoidable casualties, civil disturbance, acts, orders, legislation, regulations or directives of any government or other public authority, acts of a public enemy, war, riot, sabotage, blockage, embargo, lightning, earthquake, or acts of God.

30. Install

Install means install and connect. *Install* has this meaning whether or not the first letter is capitalized.

31. Labour Dispute

Labour Dispute means any lawful or unlawful labour problems, work stoppage, labour disruption, strike, job action, slow down, lock-outs, picketing, refusal to work or continue to work, refusal to supply materials, cessation or work or other labour controversy which does, or might, affect the *Work*.

32. Overhead

Overhead means all site and head office operations and facilities, all site and head office administration and supervision; all duties and taxes for permits and licenses required by the authorities having jurisdiction at the *Place of the Work*; all requirements of Division 1, including but not limited to submittals, warranty, quality control, calculations, testing and inspections; meals and accommodations; and, tools, expendables and clean-up costs.

33. Request for Information/RFI

Request for Information or *RFI* means written documentation sent by the *Contractor* to the *Owner* or to the *Owner's* representative or the *Consultant* requesting written clarification(s) and/or interpretation(s) of the *Drawings* and/or *Specifications*, *Contract* requirements and/or other pertinent information required to complete the *Work* of the *Contract* without applying for a change or changes to the *Work*.

16. Amend Definition 16 by adding the following to the end of the Definition:

Provide has this meaning whether or not the first letter is capitalized.

GENERAL CONDITIONS OF THE STIPULATED PRICE CONTRACT

1.0 Where a General Condition or paragraph of the General Conditions of the *Contract* is deleted by these amendments, the numbering of the remaining General Conditions or paragraphs shall remain unchanged, unless stated otherwise herein, and the numbering of the deleted item will be retained, unused.

GC 1.1 CONTRACT DOCUMENTS

1.1.6 Add the following to the end of paragraph 1.1.6:

The *Specifications* are divided into divisions and sections for convenience but shall be read as a whole and neither such division nor anything else contained in the *Contract Documents* will be construed to place responsibility on the *Owner* or the *Consultant* to settle disputes among the *Subcontractors* and *Suppliers* with respect to such divisions. The *Drawings* are, in part, diagrammatic and are intended to convey the scope of the *Work* and indicate general and appropriate locations, arrangements and sizes of fixtures, equipment and outlets. The *Contractor* shall obtain more accurate information about the locations, arrangements and sizes from study and coordination of the *Drawings*, including *Shop Drawings* and shall become familiar with conditions and spaces affecting those matters before proceedings with the *Work*. Where site conditions require reasonable minor changes where the change requires only the additional labour of one half hour or less, the *Contractor* shall make such changes at no additional cost to the *Owner*. Similarly, where known conditions or existing conditions interfere with new installation and require relocation, the *Contractor* shall include such relocation in the *Work*. The *Contractor* shall arrange and install fixtures and equipment in such a way as to conserve as much headroom and space as possible. The schedules are those portions of the *Contact Documents*, wherever located and whenever issued, which compile information of similar content and may consist of drawings, tables and/or lists.

1.1.7 Amend paragraph 1.1.7.1 by adding "Amendments to CCDC 2 – 2008" before "the Agreement between the Owner and the Contractor" and deleting the reference to "Supplementary Conditions".

Add new paragraphs 1.1.7.5, 1.1.7.6, 1.1.7.7 and 1.1.7.8 as follows**:**

.5 noted materials and annotations on the *Drawings* shall govern over the graphic representation of the *Drawings.*

.6 finishes in the room finish schedules shall govern over those shown on the *Drawings.*

.7 architectural drawings shall have precedence over structural, plumbing, mechanical, electrical and landscape drawings insofar as outlining, determining and interpreting conflicts over the required design intent of all architectural layouts and architectural elements of construction, it being understood that the integrity and installation of the systems designed by the *Consultant* or its sub-*Consultants* are to remain with each of the applicable drawing disciplines.

.8 should reference standards contained in the *Specifications* conflict with the *Specifications,* the *Specifications* shall govern. Should reference standards and *Specifications* conflict with each other or if certain requirements of the *Specifications* conflict with other requirements of the *Specifications*, the more stringent requirements shall govern.

1.1.8 Delete paragraph 1.1.8 in its entirety and substitute as follows:

The *Consultant*, on behalf of the *Owner* shall provide the *Contractor* without charge, twelve (12) copies of the *Contract Documents*, exclusive of those required by jurisdictional authorities and the executed *Contract Documents*. Additional copies can be purchased by the *Contractor* at the *Consultant's* cost of reproduction, handling and sales tax.

GC 1.3 RIGHTS AND REMEDIES

1.3.2 Delete the word "No" from the beginning of paragraph 1.3.2 and substitute the words:

"Except with respect to the requirements set out in paragraphs 2.2.13, 6.4.1, 6.5.4, 6.6.1 and 8.2.2, no…"

GC 1.4 ASSIGNMENT

Delete paragraph 1.4.1 in its entirety and replace with the following:

1.4.1 The *Contractor* shall not assign the *Contract*, or any portion thereof, without the prior written consent of the *Owner*. The *Owner* shall be entitled to assign the *Contract* to a corporation, partnership or other entity (the "Assignee"). Upon the assumption by the Assignee of the *Owner's* obligations under the *Contract*, the *Owner* shall be released from its obligations under the *Contract*.

GC 1.5 EXAMINATION OF DOCUMENTS AND SITE

Add new GC 1.5 – EXAMINATION OF DOCUMENTS AND SITE as follows:

1.5.1 The *Contractor* declares and represents that in tendering for the *Work*, and in entering into a *Contract* with the *Owner* for the performance of the *Work*, it has investigated for itself the character of the *Work* to be done, based on information generally available from a site visit. The *Contractor* has assumed and does hereby assume all risk of conditions now existing or arising in the course of the *Work* which might or could make the *Work*, or any items thereof more expensive in character, or more onerous to fulfil, than was contemplated or known when the tender was made or the *Contract* signed.

1.5.2 The *Contractor* also declares that in tendering for the *Work* and in entering into this *Contract,* the *Contractor* did not and does not rely upon information furnished by the *Owner* or any of its agents or servants respecting the nature or confirmation of the ground at the site of the *Work*, or the location, character, quality or quantity of the materials to be removed or to be employed in the construction of *Work*, or the character of the construction machinery and equipment or facilities needed to perform the *Work*, or the general and local performance of the work under the *Contract* and expressly waives and releases the *Owner* from all claims with respect to the said information with respect to the *Work*.

GC 1.6 TIME IS OF THE ESSENCE OF THE CONTRACT

Add new GC 1.6 - TIME IS OF THE ESSENCE OF THE CONTRACT as follows:

1.6.1 All time limits stated in the *Contract Documents* are of the essence of the *Contract*.

GC 2.2 ROLE OF THE CONSULTANT

2.2.7 Delete the words "Except with respect to GC 5.1 – FINANCING INFORMATION REQUIRED OF THE OWNER" .

2.2.13 Amend paragraph 2.2.13 by the addition of the following to the end of that paragraph:

If, in the opinion of the *Contractor*, the *Supplemental Instruction* involves an adjustment in the *Contract Price* or in the *Contract Time*, it shall, within ten (10) *Working Days* of receipt of a *Supplemental Instruction*, provide the *Consultant* with a notice in writing to that effect. Failure to provide written notification within the time stipulated in this paragraph 2.2.13 shall be deemed an acceptance of the *Supplemental Instruction* by the *Contractor*, without any adjustment in the *Contract Price* or *Contract Time*.

2.2.19 Add new paragraph 2.2.1.9 as follows:

The *Consultant* or the *Owner*, acting reasonably, may from time to time require the *Contractor* to remove from the *Project* any personnel of the *Contractor*, including project managers, superintendents or *Subcontractors*. Such persons shall be replaced by the *Contractor* in a timely fashion to the satisfaction of the *Consultant* or the *Owner*, as the case may be, at no cost to the *Owner*.

GC 2.3 REVIEW AND INSPECTION OF THE WORK

2.3.2 Amend paragraph 2.3.2 by adding the words "and *Owner*" after the words "*Consultant*" in the second and third lines.

2.3.3 Delete paragraph 2.3.3 in its entirety and replace it with the following:

The *Contractor* shall furnish promptly two copies to the *Consultant* and one copy to the *Owner* of all certificates and inspection reports relating to the *Work*.

2.3.4 Insert the word "review" after the word "inspections" in the first line of paragraph 2.3.4.

2.3.5 In the first line after *"Consultant"*, add "or the *Owner"*.

2.3.8 Add a new paragraph 2.3.8 as follows:

The *Consultant* will conduct periodic reviews of the *Work* in progress, to determine general conformance with the requirements of the *Contract Documents*. Such reviews, or lack thereof, shall not give rise to any claims by the *Contractor* in connection with construction means, methods, techniques, sequences and procedures, nor in connection with construction safety at the *Place of Work*, responsibility for which belongs exclusively to the *Contractor*.

GC 2.4 DEFECTIVE WORK

2.4.1 Amend GC 2.4.1 by inserting ", the *Owner* and/or its agent" in the first sentence following "rejected by the *Consultant*".

Add new paragraphs 2.4.1.1 and 2.4.1.2:

2.4.1.1 The *Contractor* shall rectify, in a manner acceptable to the *Consultant* and to the *Owner through the Consultant* all defective work and deficiencies throughout the *Work*, whether or not they are specifically identified by the *Consultant*.

2.4.1.2 The *Contractor* shall prioritize the correction of any defective work, which, in the sole discretion of the *Owner through the Consultant*, adversely affects the day to day operations of the *Owner* or which, in the sole discretion of the *Consultant*, adversely affects the progress of the *Work*.

2.4.2 Delete paragraph 2.4.2 in its entirety and replace it with the following:

The *Contractor* shall promptly pay the *Owner* for costs incurred by the *Owner*, the *Owner's* own forces or the *Owner's* other contractors, for work destroyed or damaged or any alterations necessitated by the *Contractor's* removal, replacement or re-execution of defective work.

Add new paragraph 2.4.4 as follows:

2.4.4 Neither acceptance of the *Work* by the *Consultant* or the *Owner*, nor any failure by the *Consultant* or the *Owner* to identify, observe or warn of defective *Work* or any deficiency in the *Work* shall relieve the *Contractor* from the sole responsibility for rectifying such defect or deficiency at the *Contractor's* sole cost, even where such failure to identify, observe or warn is negligent.

GC 3.1 CONTROL OF THE WORK

3.1.3 Add a new paragraph 3.1.3 as follows:

Prior to commencing individual procurement, fabrication and construction activities, the *Contractor* shall verify at the *Place of the Work*, all relevant measurements and levels necessary for proper and complete fabrication, assembly and installation of the *Work* and shall further carefully compare such field measurements and conditions with the requirements of the *Contract Documents*. Where dimensions are not included or exact locations are not apparent, the *Contractor* shall immediately notify the *Consultant* in writing and obtain written instructions from the *Consultant* before proceedings with any part of the affected *Work*.

3.1.4 Add a new paragraph 3.1.4 as follows:

Notwithstanding the provisions of paragraphs 3.1.1 and 3.1.2, the *Owner* shall have access to the site at all times to monitor all aspects of construction. Such access shall in no circumstances affect the obligations of the *Contractor* to fulfill its contractual obligations.

GC 3.2 CONSTRUCTION BY OWNER OR OTHER CONTRACTORS

3.2.2.1 Delete paragraph 3.2.2.1 in its entirety.

3.2.2.2 Delete paragraph 3.2.2.2 in its entirety.

3.2.2.3 Delete paragraph 3.2.2.3 in its entirety.

3.2.2.4 Delete paragraph 3.2.2.4 in its entirety.

3.2.3.2 Delete paragraph 3.2.3.2 and replace it with the following:

Co-ordinate and schedule the activities and work of other contractors and *Owner's* own forces with the *Work* of the *Contractor* and connect as specified or shown in the *Contract Documents*.

3.2.3.4 Add new paragraph 3.2.3.4 as follows:

Subject to GC 9.4 CONSTRUCTION SAFETY, for the *Owner's* own forces and for other contractors, assume overall responsibility for compliance with all aspects of the applicable health and safety legislation in force at the *Place of the Work*, including all of the responsibilities of the "constructor", pursuant to the *Occupational Health and Safety Act* (Ontario)..

GC 3.3 TEMPORARY WORK

3.3.2 In paragraph 3.3.2, in the second line after the words "where required by law", insert "or the *Consultant*".

GC 3.4 DOCUMENT REVIEW

3.4.1 Delete paragraph 3.4.1 in its entirety and substitute new paragraph 3.4.1:

The *Contractor* shall review the *Contract Documents* and shall report promptly to the *Consultant* any error, inconsistency, or omission the *Contractor* may discover. Such review by the *Contractor* shall be undertaken with the standard of care

described in paragraph 3.14.1 of the *Contract*. Except for its obligation to make such review and report the result, the *Contractor* does not assume any responsibility to the *Owner* or to the *Consultant* for the accuracy of the *Contract Documents*. Provided it has exercised the degree of care and skill described in this paragraph 3.4.1, the *Contractor* shall not be liable for damage or costs resulting from such errors, inconsistencies, or omissions in the *Contract Documents*, which the *Contractor* could not reasonably have discovered through the exercise of the required standard of care.

3.4.2 Add new paragraph 3.4.2. as follows:

If, at any time, the *Contractor* finds errors, inconsistencies, or omissions in the *Contract Documents* or has any doubt as to the meaning or intent of any part thereof, including laying out of the Work, the *Contractor* shall immediately notify the *Consultant*, and request instructions, a *Supplemental Instruction, Change Order,* or *Change Directive,* as the case may require, and the *Contractor* shall not proceed with the work affected until the *Contractor* has received such instructions, a *Supplemental Instruction*, *Change Order* or *Change Directive*. Neither the *Owner* nor the *Consultant* will be responsible for the consequences of any action of the *Contractor* based on oral instructions.

3.4.3 Add new paragraphs 3.4.3 as follows:

Errors, inconsistencies and/or omissions in the *Drawings* and/or *Specifications* which do not allow completion of the *Work* of the *Contract* shall be brought to the *Consultant's* attention prior to the execution of the *Contract* by means of an *RFI*.

GC 3.5 CONSTRUCTION SCHEDULE

3.5.1 Delete paragraph 3.5.1 in its entirety and replace with the following:

The *Contractor* shall:

.1 within five (5) calendar days of receiving written confirmation of the award of the Contract, prepare and submit to the *Owner* and the *Consultant* for their review and acceptance, a construction schedule in the format indicated below that indicates the timing of the activities of the *Work* and provides sufficient detail of the critical events and their inter-relationship to demonstrate the *Work* will be performed in conformity with the *Contract Time* and in accordance with the *Contract Documents.* Such schedule is to include a delivery schedule for *Products* whose delivery is critical to the schedule for the *Work* or are required by the *Contract* to be included in a *Products* delivery schedule. The *Contractor* shall employ construction scheduling software, being the latest version of "Microsoft Project"*,* that permits the progress of the *Work* to be monitored in relation to the critical path established in the schedule. The *Contractor* shall provide the schedule and any successor or revised schedules in both electronic format and hard copy. Once accepted by the *Owner* and the *Consultant*, the construction schedule submitted by the *Contractor* shall become the baseline construction schedule; and,

.2 provide the expertise and resources, such resources including manpower and equipment, as are necessary to maintain progress under the accepted baseline construction schedule or revised schedule accepted by the *Owner* pursuant to GC 3.5 CONSTRUCTION SCHEDULE; and,

.3 monitor the progress of the *Work* on a weekly basis relative to the baseline construction schedule, or any revised schedule accepted by the *Owner* pursuant to GC 3.5 CONSTRUCTION SCHEDULE, update and submit to the *Consultant* and *Owner* the electronic and hard copy schedule on a monthly basis, at a minimum, or as required by the *Consultant* and advise the *Consultant* and the *Owner* weekly in writing of any variation from the baseline or slippage in the schedule; and,

.4 provide overtime work without change to the *Contract Price* if such work is deemed necessary to meet the schedule; and,

.5 ensure that the *Contract Price* shall include all costs required to phase or stage the *Work*.

3.5.2 Add new paragraph 3.5.2 as follows:

If, at any time, it should appear to the *Owner* or the *Consultant* that the actual progress of the *Work* is behind schedule or is likely to become behind schedule, or if the *Contractor* has given notice of such to the *Owner* or the *Consultant* pursuant to subparagraph 3.5.1.3, the *Contractor* shall, either at the request of the *Owner* or the *Consultant*, or following giving notice pursuant to subparagraph 3.5.1.3, take appropriate steps to cause the actual progress of the *Work* to conform to the schedule or minimize the resulting delay. Within five (5) calendar days of the request by the *Owner* or the *Consultant* or the notice

being given pursuant to subparagraph 3.5.1.3, the *Contractor* shall produce and present to the *Owner* and the *Consultant* a plan demonstrating how the *Contractor* will achieve the recovery of the last accepted schedule.

3.5.3 The *Contractor* is responsible for performing the *Work* within the *Contract Time*. Any schedule submissions revised from the accepted baseline construction schedule or revised schedule accepted by the *Owner* pursuant to GC 3.5 CONSTRUCTION SCHEDULE, during construction are not deemed to be approved extensions to the *Contract Time.* All extensions to the *Contract Time* must be made in accordance with the *Contract Documents*.

GC 3.6 SUPERVISION

Delete paragraph 3.6.1 in its entirety and replace with the following:

3.6.1 The *Contractor* shall employ a competent full-time superintendent, acceptable to the *Owner* and *Consultant*, who shall be in full time attendance at the *Place of Work* while the *Work* is being performed. The superintendent shall not be changed by the *Contractor* without valid reason which shall be provided in writing and shall not be changed without prior consultation with and agreement by the *Owner* and the *Consultant*. The *Contractor* shall replace the superintendent within 7 *Working Days* of the *Owner's* written notification, if the superintendent's performance is not acceptable to the *Owner*. The *Contractor* shall provide the *Owner* and the *Consultant* with the names, addresses and telephone numbers of the superintendent referred to in this paragraph 3.6.1 and other responsible persons who may be contacted for emergency and other reasons during non-working hours.

Delete paragraph 3.6.2 in its entirely and replace with the following:

3.6.2 The superintendent, and any project manager appointed by the *Contractor*, shall represent the *Contractor* at the *Place of Work* and shall have full authority to act on written instructions given by the *Consultant* and/or the *Owner*. Instructions given to the superintendent or the project manager shall be deemed to have been given to the *Contractor* and both the superintendent and any project manager shall have full authority to act on behalf of the *Contractor* and bind the *Contractor* in matters related to the *Contract*.

3.6.3 Add new paragraph 3.6.3 , 3.6.4, 3.6.5 and 3.6.6 as follows:

The *Owner* may, at any time during the course of the *Work*, request the replacement of the appointed representative(s). Immediately upon receipt of the request, the *Contractor* shall make arrangements to appoint an acceptable replacement, which is approved by the *Owner*.

3.6.4 The supervisory staff assigned to the *Project* shall also be fully competent to implement efficiently all requirements for scheduling, coordination, field engineering, reviews, inspections and submittals defined in the *Specifications,* and have minimum 5 years documented "Superintendent/Project Management" experience.

3.6.5 The *Consultant and Owner* shall reserve the right to review the record of experience and credentials of supervisory staff assigned to the *Project* prior to commencement of the *Work*.

3.6.6 A superintendent assigned to the *Work* shall be "Gold Seal Certified" as per the Canadian Construction Association; or a superintendent that can demonstrate the requisite experience and success related to the *Project* to the sole satisfaction of the *Owner*.

GC 3.7 SUBCONTRACTORS AND SUPPLIERS

3.7.1.1 In paragraph 3.7.1.1 add to the end of the second line "including any warranties and service agreements which extend beyond the term of the *Contract*."

3.7.1.2 In subparagraph 3.7.1.2 after the words "the *Contract Documents*" insert the words "including any required surety bonding".

Delete paragraph 3.7.2. in its entirety and replace with the following:

3.7.2 Substitution of any *Subcontractor* and/or *Suppliers* after submission of the *Contractor's* bid will not be accepted unless a valid reason is given in writing to and approved by the *Owner*, whose approval may be arbitrarily withheld. The reason for substitution must be provided to the *Owner* and to the original *Subcontractor* and/or *Supplier* and the *Subcontractor* and/or *Supplier* shall be given the opportunity to reply to the *Contractor* and *Owner.* The *Contractor* shall be fully aware of the

capability of each *Subcontractor* and/or *Supplier* included in its bid, including but not limited to technical ability, financial stability and ability to maintain the proposed construction schedule.

Add new paragraphs 3.7.7 and 3.7.8 as follows:

3.7.7 Where provided in the *Contract*, the *Owner* may assign to the *Contractor*, and the *Contractor* agrees to accept, any contract procured by the *Owner* for *Work* or services required on the *Project* that has been pre-tendered or pre-negotiated by the *Owner*, and upon such assignment, the *Owner* shall have no further liability to any party for such contract.

3.7.8 The *Contractor* covenants that each subcontract or supply contract which the *Contractor* enters into for the purpose of performing the *Work* shall expressly provide for the assignment thereof to the *Owner* (at the option of the *Owner*) and the assumption by the *Owner* of the obligations of the *Contractor* thereunder, upon the termination of the *Contract* and upon written notice by the *Owner* to the other parties to such subcontracts or supply contracts, without the imposition of further terms or conditions; provided, however, that until the *Owner* has given such notice, nothing herein contained shall be deemed to create any contractual or other liability upon the *Owner* for the performance of obligations under such subcontracts or supply contracts and the *Contractor* shall be fully responsible for all of its obligations and liabilities (if any) under such subcontracts and supply contracts.

GC 3.8 LABOUR AND PRODUCTS

3.8.2 Delete paragraph 3.8.2 and substitute with the following:

Products provided shall be new and shall conform to all current applicable specifications of the Canadian Standards Association, Canadian Standards Board or General Standards Board, ASTM, National Building Code, provincial and municipal building codes, fire safety standards, and all governmental authorities and regulatory agencies having jurisdiction at the *Place of the Work*, unless otherwise specified. *Products* which are not specified shall be of a quality consistent with those specified and their use acceptable to the *Consultant*. *Products* brought on to the *Place of the Work* by the *Contractor* shall be deemed to be the property of the *Owner*, but the *Owner* shall be under no liability for loss thereof or damage thereto arising from any cause whatsoever. The said *Products* shall be at the sole risk of the *Contractor*. Workmanship shall be, in every respect, first class and the *Work* shall be performed in accordance with the best modern industry practice.

3.8.3 Amend paragraph 3.8.3 by adding the words, "…, agents, *Subcontractors* and *Suppliers*…" after the word "employees" in the first line.

Add new paragraphs 3.8.4, 3.8.5, 3.8.6, 3.8.7, 3.8.8 and 3.8.9 as follows:

3.8.4 Upon receipt of a written notice from the *Owner,* the *Contractor* shall immediately remove from the *Place of the Work*, tradesmen and labourers whose conduct jeopardizes the safety of the *Owner's* operations. Immediately upon receipt of the request, the C**ontractor** shall make arrangements to appoint an acceptable replacement.

3.8.5 Upon receipt of written notice from the *Consultant,* the *Contractor* shall remove from the *Place of Work,* tradesmen and labourers whose *Work* is unsatisfactory to the *Consultant* or who are considered by the *Consultant* to be unskilled or otherwise objectionable.

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3.86 The *Contractor* shall cooperate with the *Owner* and its representatives and shall take all reasonable and necessary actions to maintain stable and harmonious labour relations with respect to the *Work* at the *Place of the Work*, including cooperation to attempt to avoid *Work* stoppages, trade union jurisdictional disputes and other *Labour Disputes*. Any costs arising from labour disputes shall be at the sole expense of the *Contractor.*

3.8.7 The cost for overtime required beyond the normal *Working Day* to complete individual construction operations of a continuous nature, such as pouring or finishing of concrete or similar work, or *Work* that the *Contractor* elects to perform at overtime rates without the *Owner* requesting it, shall not be chargeable to the *Owner*.

3.8.8 All manufactured *Products* which are identified by their proprietary names or by part or catalogue number in the *Specifications* shall be used by the *Contractor.* No substitutes for such specified *Products* shall be used without the written approval of the *Owner* and the *Consultant*. Substitutes will only be considered by the *Consultant* when submitted in sufficient time to permit proper review and investigation. When requesting approval for the use of substitutes, the *Contractor* shall include in its submission any proposed change in the *Contract Price*. The *Contractor* shall use all proprietary *Products* in

strict accordance with the manufacturer's directions. Where there is a choice of proprietary *Products* specified for one use, the *Contractor* may select any one of the *Products* so specified for this use.

3.8.9 Materials, appliances, equipment and other *Products* are sometimes specified by reference to brand names, proprietary names, trademarks or symbols. In such cases, the name of a manufacturer, distributor, *Supplier* or dealer is sometimes given to assist the *Contractor* to find a source *Supplier*. This shall not relieve the *Contractor* from its responsibility from finding its own source of supply even if the source names no longer supplies the *Product* specified. If the *Contractor* is unable to obtain the specified *Product*, the *Contractor* shall supply a substitute product equal to or better than the specified *Product,* as approved by the *Consultant* with no extra compensation. Should the *Contractor* be unable to obtain a substitute *Product* equal to or superior to the specified *Product* and the *Owner* accepts a different Product, the *Contract Price* shall be adjusted accordingly, as approved by the *Consultant*.

GC 3.9 DOCUMENTS AT THE SITE

3.9.1 Delete paragraph 3.9.1 in its entirety and substitute the following:

The *Contractor* shall keep one copy of the current *Contract Documents*, *Supplemental Instructions*, contemplated *Change Orders*, *Change Orders*, *Change Directives*, cash allowance disbursement authorizations, reviewed *Shop Drawings*, submittals, reports and records of meeting at the *Place of the Work*, in good order and available to the *Owner* and *Consultant*.

GC 3.10 SHOP DRAWINGS

3.10.1 Delete paragraph 3.10.1 in its entirety and replace with the following:

The *Contractor* shall provide shop drawings as described in the *Contract Documents* and as the *Consultant* may reasonably request**.**

3.10.9 Delete paragraph 3.10.9 in its entirety and substitute the following:

At the time of providing *Shop Drawings*, the *Contractor* shall advise the *Consultant* in writing of any deviations in *Shop Drawings* from the requirements of the *Contract Documents*. The *Consultant* shall indicate the acceptance of such deviation expressly in writing. Where manufacturers' literature is submitted in lieu of scaled drawings, it shall be clearly marked in ink, to indicate the specific items for which review is requested.

Add new paragraphs 3.10.13, 3.10.14, 3.10.15, 3.10.16, 3.10.17 and 3.10.18 as follows:

3.10.13 Reviewed *Shop Drawings* shall not authorize a change in the *Contract Price* and/or the *Contract Time*.

3.10.14 The *Contractor* shall prepare a *Shop Drawings* schedule acceptable to the *Owner* and the *Consultant* prior to the first application for payment. A draft of the proposed *Shop Drawings* schedule shall be submitted by the *Contractor* to the *Consultant* and the *Owner* for approval. The draft *Shop Drawings* schedule shall clearly indicate the phasing of *Shop Drawings* submissions. The *Contractor* shall periodically re-submit the *Shop Drawings* schedule to correspond to changes in the construction schedule.

3.10.15 Except where the parties have agreed to a different *Shop Drawings* schedule pursuant to paragraph 3.10.3, the *Contractor* shall comply with the requirements for *Shop Drawings* submissions stated in the *Specifications*.

3.10.16 The *Contractor* shall not use the term "by others" on *Shop Drawings* or other submittals. The related trade, *Subcontractor* or *Supplier* shall be stated.

3.10.17 Certain *Specifications* sections require the *Shop Drawings* to bear the seal and signature of a professional engineer. Such professional engineer must be registered in the jurisdiction of the *Place of the Work* and shall have expertise in the area of practice reflected in the *Shop Drawings*.

3.10.18 The *Consultant* will review and return *Shop Drawings* and submittals in accordance with the schedule agreed upon in paragraph 3.10.3, The *Contractor* shall allow the *Consultant* a minimum of 10 *Working Days* to review *Shop Drawings* from the date of receipt. If resubmission of *Shop Drawings* is required, a further 10 *Working Day* period is required for the *Consultant's* review.

GC 3.11 USE OF THE WORK

3.11.1 In the second line between the words "permits and "or" add", by direction of the *Owner* or *Consultant.*

3.11.3 Add new paragraph 3.11.3 as follows:

The *Owner* shall have the right to enter or occupy the *Work* in whole or in part for the purpose of placing fittings and equipment, or for other use before *Substantial Performance of the Work*, if, in the opinion of the *Consultant*, such entry and occupation does not prevent or substantially interfere with the *Contractor* in the performance of the *Contract* within the *Contract Time.* Such entry or occupation shall neither be considered as acceptance of the *Work*, nor in any way relieve the *Contractor* from its responsibility to complete the *Contract*.

GC 3.12 CUTTING AND REMEDIAL WORK

Add new paragraphs 3.12.5 and 3.12.6 as follows:

3.12.5 Unless specifically stated otherwise in the *Specifications*, the *Contractor* shall do all cutting and making good necessary for the proper installation and performance of the *Work.*

3.12.6 To avoid unnecessary cutting, the *Contractor* shall lay out its work and advise the *Subcontractors,* when necessary, where to leave holes for installation of pipes and other work.

GC 3.13 CLEAN UP

3.13.1 At the end of the paragraph 3.13.1, add the following:

Remove accumulated waste and debris at least once a week as a minimum or as required by the nature of the *Work.*

3.13.2 In paragraph 3.13.2, in the fourth line add the word "materials" between the word "tools" and the words "*Construction Equipment*".

3.13.3 In paragraph 3.13.3, in the first and second lines add the word "materials" between the word "tools" and the words "*Construction Equipment*".

Add new paragraphs 3.13.4, 3.13.5 and 3.13.6 as follows:

3.13.4 The *Contractor* shall clean up garbage during and after construction, and maintain the site in a neat and orderly condition on a daily basis. Prior to leaving the site at the end of construction, the *Contractor* shall make good all damage to the building and its components caused by the performance of the *Work* or by any *Subcontractor* or *Supplier*. The *Contractor* shall leave the site in a clean and finished state; remove all equipment and materials; remove all paint, stains, labels, dirt, etc. from the *Work*; and touch up all damaged painted areas.

3.13.5 Without limitation to or waiver of the *Owner's* other rights and remedies, the *Owner* shall have the right to back charge to the *Contractor* the cost of damage to the site caused by transportation in and out of the site by the *Contractor*, *Subcontractors* or *Suppliers,* if not repaired before final payment.

3.13.6 The *Contractor* shall dispose of debris at location and in a manner acceptable to the *Owner*, and authorities having jurisdiction in the area of the *Work* and the disposal area, and cover containers with tarpaulins tied in place to prevent scattering of debris on site and during transport.

GC 3.14 CONTRACTOR STANDARD OF CARE

Add a new General Condition 3.14 – CONTRACTOR STANDARD OF CARE as follows:

3.14.1 In performing its services and obligations under the *Contract*, the *Contractor* shall exercise the standard of care, skill and diligence that would normally be provided by an experienced and prudent contractor supplying similar services for similar projects. The *Contractor* acknowledges and agrees that throughout the *Contract,* the performance of the *Contractor's* obligations, duties and responsibilities shall be judged against this standard. The *Contractor* shall exercise the same standard of care, skill and diligence in respect of any *Products*, personnel or procedures which it may recommend to the *Owner*.

3.14.2 The *Contractor* further represents, covenants and warrants to the *Owner* that:

.1 the personnel it assigns to the *Project* are appropriately experienced;

.2 it has a sufficient staff of qualified and competent personnel to replace any of its appointed representatives, subject to the *Owner's* approval, in the event of death, incapacity, removal or resignation; and

.3 there are no pending, threatened or anticipated claims, liabilities or contingent liabilities that would have a material effect on the financial ability of the *Contractor* to perform its work under the *Contract*.

GC 3.15 OCCUPANCY OF THE WORK

3.15.1 The *Owner* reserves the right to take possession of and use for any intended purpose any portion or all of the undelivered portion of the *Project* even though the *Work* may not be substantially performed, provided that such taking possession and use will not interfere, in any material way, with the progress of the *Work.* The taking of possession or use of any such portion of the *Project* shall not be deemed to be the *Owner's* acknowledgement or acceptance of the *Work* or the *Project*, nor shall it relieve the *Contractor* of any of its obligations under the *Contract*.

3.15.2 Whether the *Project* contemplates *Work* by way of renovations in buildings which will be in use or be occupied during the course of the *Work* or where the *Project* involves *Work* that is adjacent to a structure which is in use or is occupied, the *Contractor,* without in any way limiting its responsibilities under the *Contract*, shall take all reasonable steps to avoid interference with fire exits, building access and egress, continuity of electric power and all other utilities, to suppress dust and noise and to avoid conditions likely to propagate mould or fungus of any kind and all other steps reasonably necessary to promote and maintain the safety and comfort of the users and occupants of such structures or adjacent structures.

GC 4.1 CASH ALLOWANCES

4.1.1 Delete the second sentence in paragraph 4.1.1

4.1.4 Delete paragraph 4.1.4 in its entirety and substitute the following:

Where the actual cost of the *Work* under any cash allowance exceeds the amount of the allowance, any unexpended amounts from other cash allowances shall be reallocated, at the *Consultant's* direction, to cover the shortfall, and, in that case, there shall be no additional amount added to the *Contract Price* for overhead and profit. Only where the actual cost of the *Work* under all cash allowances exceeds the total amount of all cash allowances shall the *Contractor* be compensated for the excess incurred and substantiated, plus an amount for overhead and profit on the excess only, as set out in the *Contract Documents*.

4.1.5 Delete paragraph 4.1.5 in its entirety and substitute the following:

The net amount of any unexpended cash allowances, after providing for any reallocations as contemplated in paragraph 4.1.4, shall be deducted from the *Contract Price* by *Change Order* without any adjustment for the *Contractor's* overhead and profit on such amount.

Add new paragraphs 4.1.8 and 4.1.9 as follows:

4.1.8 The *Owner* reserves the right to call, or to have the *Contractor* call, for competitive bids for portions of the *Work*, which are to be paid for from cash allowances.

4.1.9 Cash allowances cover the net cost to the *Contractor* of services, *Products*, *Construction Equipment*, freight, unloading, handling, storage, installation, provincial sales tax, and other authorized expenses incurred in performing any *Work* stipulated under the cash allowances but does not include any *Value Added Taxes* payable by the *Owner* and the *Contractor.*

GC 5.1 FINANCING INFORMATION REQUIRED OF THE OWNER

5.1.1 Delete paragraph 5.1.1 in its entirety.

5.1.2 Delete paragraph 5.1.2 in its entirety.

GC 5.2 APPLICATIONS FOR PROGRESS PAYMENT

Delete paragraph 5.2.2 in its entirety and substitute the following:

5.2.2 Applications for payment shall be dated the last day of each payment period, which is the last day of the month or an alternative day of the month agreed in writing by the parties. The amount claimed shall be for the value, proportionate to the amount of the *Contract*, or work performed and *Products* delivered and incorporated into the *Work* at that date. No amount claimed shall include products delivered and incorporated into the work, unless the products are free and clear of all security interests, liens and other claims of third parties.

Each application for payment, except the first, shall include a statutory declaration, in the current CCDC 9A form, up to the date of the application for payment. Each application for payment (including the first the holdback upon Substantial Performance, and final payments), shall also include:

.1 A certificate, issued by an agency or firm providing workers' compensation insurance to the *Contractor*, verifying that coverage is in force at the time of making the application for payment, and that coverage will remain in force for at least sixty (60) days thereafter.

.2 A declaration by the *Contractor* verifying that the performance of the *Work* is in compliance with all applicable regulatory requirements respecting environmental protection, first safety, public safety and occupational health and safety.

.3 A pre-approved schedule of values, supplied by the *Contractor*, for Divisions 1 through 14 of the *Work*, aggregating the total amount of the *Contract Price.*

.4 A separate pre-approved schedule of values, supplied by each *Subcontractor*, for each of Division 15, 16, and 17 of the *Work*, aggregating the total amount of the *Contract Price.*

.5 Invoices to support all claims against the cash allowance.

.6 An acceptable construction schedule pursuant to GC 3.5.

5.2.3 Amend paragraph 5.2.3 by adding the following to the end of that paragraph:

No amount claimed shall include *Products* delivered to the *Place of the Work* unless the *Products* are free and clear of all security interests, liens, and other claims of third parties.

5.2.7 Delete existing paragraph 5.2.7:

Add new paragraphs 5.2.7, and 5.2.8 as follows:

5.2.7 The *Contractor* shall prepare and maintain current as-built drawings which shall consist of the *Drawings* and *Specifications* revised by the *Contractor* during the *Work*, showing changes to the *Drawings* and *Specifications*, which current as-built drawings shall be maintained by the *Contractor* and made available to the *Consultant* for review with each application for progress payment. The *Consultant* shall retain a reasonable amount for the value of the as-built drawings not presented for review.

5.2.8 Prior to each application for payment, the *Contractor* and the *Consultant* shall jointly review the progress of the *Work*.

GC 5.3 PROGRESS PAYMENT

5.3.1.2 In the first sentence amend as follows: After the words "issue to the *Owner*" delete "and copy to the *Contractor*". After the words "after the receipt of the" add "complete".

5.3.1.3 Delete subparagraph 5.3.1.3 in its entirety and substitute as follows:

the *Owner* shall make payment to the *Contractor* on account as provided in Article A-5 of the Agreement – PAYMENT no later than 20 calendar days after the date of a complete certificate of payment is issued by the *Consultant*

Add new paragraphs 5.3.2 and 5.3.3 as follows:

5.3.2 If the *Contractor* fails to provide all documentation as required by GC 5.2 – APPLICATIONS FOR PROGRESS PAYMENT, the *Contractor* or *Owner* shall be entitled to return the application for progress payment to the *Contractor* for completion. The 10 day review period by the *Consultant* and 20 day payment period by the *Owner* will commence upon receipt of a complete application for progress payment.

5.3.3 Payment will be mailed to the *Contractor.* The payment date shall be the date the cheque is mailed. Delay resulting from mail shall not be used in calculating payment date.

GC 5.4 SUBSTANTIAL PERFORMANCE OF THE WORK

5.4.2 Delete paragraph 5.4.2 in its entirety and substitute the following:

The *Consultant* will review the *Work* to verify the validity of the application and shall promptly, and in any event, no later than 30 calendar days after receipt of the *Contractor's* complete deficiency list and application, the *Consultant* shall:

.1 prepare a final deficiency list incorporating all items to be completed or corrected. Each item is to have an indicated value for correction or completion. Determination of the value is defined in GC 5.10 – DEFICIENCY HOLDBACK. The final deficiency list complete with values is to be included with the *Consultant's* draft verification and shall be reviewed with the *Owner* prior to 5.4.2.2.

.2 having completed 5.4.2.1, the *Consultant* shall:
.1 advise the *Contractor* in writing that the *Work* or the designated portion of the *Work* is not substantially performed and give reasons why, or
.2 state the date of *Substantial Performance of the Work* in a certificate and issue a copy of that certificate to each the *Owner* and the *Contractor.*

5.4.3 Delete paragraph 5.4.3 in its entirety and substitute the following:

Following the issuance of the certificate of *Substantial Performance of the Work*, the following shall apply to completing the *Work*:

.1 *Contractor* is to complete the *Work* within sixty (60) calendar days.
.2 No payments will be processed between *Substantial Performance of the Work* and the completion of the *Work*.
.3 The *Owner* reserves the right to contract out any or all unfinished *Work* if it has not been completed within sixty (60) days of *Substantial Performance of the Work* without prejudice to any other right or remedy and without affecting the warranty period. The cost of completing the *Work* shall be deducted from the *Contract Price.*

Add new paragraphs 5.4.4, 5.4.5 and 5.4.6:

5.4.4 Within the time prescribed by the construction/builder's lien legislation in force at the *Place of the Work*, or where there is no legislation or no time prescribed, within a reasonable time of receiving a copy of the certificate of *Substantial Performance of the Work* signed by the *Consultant*, the *Contractor* shall take whatever steps are required to publish or post a signed copy of the certificate, as is required by such legislation. If the *Contractor* fails to comply with this provision, the *Owner* may take the required steps pursuant to the legislation and charge the *Contractor* for any costs so incurred.

5.4.5 Prior to submitting its written application for *Substantial Performance of the Work*, the *Contractor* shall submit to the *Consultant* all:

.1 guarantees;
.2 warranties;
.3 certificates;
.4 final testing and balancing reports;
.5 distribution system diagrams;
.6 spare parts;
.7 maintenance manuals;
.8 samples;
.9 reports and correspondence from authorities having jurisdiction in the *Place of the Work*;
.10 shop drawings;

.11 inspection certificates;
.12 red-lined record drawings from the construction trailer in two copies.

and other materials or documentation required to be submitted under the *Contract*, together with written proof acceptable to the *Owner* and the *Consultant* that the *Work* has been substantially performed in conformance with the requirements of municipal, governmental, and utility authorities having jurisdiction in the *Place of the Work*. The *Consultant* shall refuse to certify *Substantial Performance of the Work* if the submittals referred to in this paragraph 5.4.5 are not provided by the *Contractor*.

5.4.6 The *Owner* shall withhold, from amounts otherwise payable to the *Contractor,* an amount not to exceed one (1) percent of the *Contract Price* as security for the obligation of the *Contractor* to deliver two copies of the red-lined record drawings.

GC 5.5 PAYMENT OF HOLDBACK UPON SUBSTANTIAL PERFORMANCE OF THE WORK

Add new subparagraph 5.5.1.3 as follows

5.5.1.3 submit a statement that no written notices of liens have been received by it

5.5.2 Amend paragraph 5.5.2 by adding the following sentence to the end of that paragraph:

A reserve fund may be retained by the *Owner* to secure the correction of deficiencies and/or warranty claims. Included in the reserve fund would be all *Consultant* and *Owner* costs related to the correction of deficiencies and/or warranty claims.

5.5.3 Delete paragraph 5.5.3 in its entirety.

5.5.5 Delete paragraph 5.5.5 in its entirety.

GC 5.6 PROGRESSIVE RELEASE OF HOLDBACK

Delete GC 5.6 in its entirety.

GC 5.7 FINAL PAYMENT

5.7.1 Delete paragraph 5.7.1 in its entirety and substitute as follows:

When the *Contractor* considers that the *Work* is completed, as defined in the lien legislation applicable to the *Place of the Work* or if such definition does not exist, in accordance with other applicable legislation, industry practice or provisions which may be agreed to between the parties, the *Contractor* shall submit an application for final payment. The *Contractor's* application for final payment shall be accompanied by any documents or materials not yet delivered pursuant to paragraph 5.4.5, together with complete and final as-built drawings and:

.1 the Contractor's written request for release of the deficiency holdback, including a statement that no written notices of lien have been received by it;

.2 a Statutory Declaration CCDC 9A-2001.

The *Work* shall be deemed not to be completed until all of the aforementioned documents have been delivered, and the *Owner* may withhold payment in respect of the delivery of any documents in an amount determined by the *Consultant* in accordance with the provisions of GC 5.8 - WITHHOLDING OF PAYMENT.

5.7.2 Delete from the first line of paragraph 5.7.2 the words, "calendar days" and substitute the words "*Working Days*".

5.7.4 Delete from the second line of paragraph 5.7.4 the words, " 5 calendar days after the issuance" and substitute the words "30 calendar days after receipt of".

GC 5.8 WITHHOLDING OF PAYMENT

Delete paragraph 5.8.1 and replace with the following:

5.8.1 If because of conditions reasonably beyond the control of the *Contractor*, there are items of work that cannot be performed, payment in full for that portion of the *Work* which has been performed as certified by the *Consultant* shall not be withheld or delayed by the *Owner* on account thereof, but the *Owner* may withhold, until the remaining portion of the *Work* is finished, only such an amount that the *Consultant* determines is sufficient and reasonable to cover the cost of performing such remaining work.

GC 5.10 DEFICIENCY HOLDBACK

Add a new General Condition 5.10 as follows:

5.10.1 Notwithstanding any provisions contained in the *Contract Documents* concerning certification and release of monies to the *Contractor*, the *Owner* reserves the right to establish a deficiency holdback, at the time of the review for *Substantial Performance,* based on a 200% dollar value of the deficiencies listed by the *Consultant*. The value of work outstanding for the calculation of *Substantial Performance of the Work* under the *Construction Lien Act* (Ontario) shall utilize the 100% dollar value. No individual deficiency will be valued at less than two hundred dollars ($200.00). The *Owner* shall retain the entire deficiency holdback amount until completion of all of the deficiencies listed by the *Consultant* to the satisfaction of the *Consultant*.

GC 6.1 OWNER'S RIGHT TO MAKE CHANGES

Add new paragraphs 6.1.3, 6.1.4, 6.1.5, 6.1.6, 6.1.7 and 6.1.8 as follows:

6.1.3 The *Contractor* agrees that changes resulting from construction coordination, including but not limited to, site surface conditions, site coordination, and *Subcontractor and Supplier* coordination are included in the *Contract Price* and the *Contractor* shall be precluded from making any claim for a change in the *Contract Price* as a result of such changes.

6.1.4 Labour costs shall be actual, prevailing rates at the *Place of the Work* paid to workers, plus statutory charges on labour including WSIB, unemployment insurance, Canada pension, vacation pay, hospitalization and medical insurance. The *Contractor* shall provides these rates, when requested by the *Consultant*, for review and/or agreement.

6.1.5 Quotations for changes to the *Work* shall be accompanied by itemized breakdowns together with detailed, substantiating quotations or cost vouchers from *Subcontractors* and *Suppliers,* submitted in a format acceptable to the *Consultant* and including any costs associated with extensions in *Contract Time.*

6.1.6 When both additions and deletions covering related *Work* or substitutions are involved in a change to the *Work*, payment, including *Overhead* and profit, shall be calculated on the basis of the net difference, if any, with respect to that change in the *Work*.

6.1.7 No extension to the *Contract Time* shall be granted for changes in the *Work* unless the *Contractor* can clearly demonstrate that such changes significantly alter the overall construction schedule submitted at the commencement of the *Work.* Extensions of *Contract Time* and all associated costs, if approved pursuant to GC 3.4.2, are to be included in the relevant *Change Order.*

6.1.8 When a change in the *Work* is proposed or required, the *Contractor* shall within 10 calendar days submit to the *Consultant* for review a claim for a change in *Contract Price* and/or *Contract Time.* Should 10 calendar days be insufficient to prepare the submission, the *Contractor* shall within 5 calendar days, advise the *Consultant* in writing of the proposed date of submission of the claim. Claims submitted after the dates prescribed herein will not be considered.

GC 6.2 CHANGE ORDER

6.2.1 Add after the last sentence in the paragraph:

The adjustment in the *Contract Time* and the *Contract Price* shall include an adjustment, if any, for delay or for the impact that the change in the *Work* has on the *Work* of the *Contractor*, and once such adjustment is made, the *Contractor* shall be precluded from making any further claims for delay or impact with respect to the change in the *Work.*

Add new paragraph 6.2.3 as follows:

6.2.3 The value of a change shall be determined in one or more of the following methods as directed by the *Consultant*.

.1 by estimate and acceptance of a lump sum;

.2 by negotiated unit prices which include the *Contractor's Overhead* and profit, or;

.3 by the actual cost to the *Owner,* such costs to be the actual cost after all credits included in the change have been deducted, plus the following ranges of mark-up on such costs:

.1 for *Change Orders* with a value of $0 to $15,000 the total *Subcontractor/Supplier* mark-up including *Overhead* and profit shall be 10% and the total *Contractor* mark-up including overhead and profit shall be 5%.

.2 For *Change Orders* in excess of $15,000, the total *Subcontractor/Supplier* mark-up including *Overhead* and profit shall be 5% and the total *Contractor* mark-up including *Overhead* and profit shall be 3%.

Add new paragraph 6.2.4 as follows:

6.2.4 All quotations will be submitted in a complete manner listing:

.1 quantity of each material,
.2 unit cost of each material,
.3 man hours involved,
.4 cost per hour,
.5 *Subcontractor* quotations submitted listing items 1 to 4 above and item 6 below.
.6 mark-up

Add new paragraph 6.2.5 as follows:

6.2.5 The *Owner* and the *Consultant* will not be responsible for delays to the *Work* resulting from late, incomplete or inadequately broken down valuations submitted by the *Contractor.*

GC 6.3 CHANGE DIRECTIVE

6.3.6.1 Amend paragraph 6.3.6.1 by deleting the final period and adding as follows:

.1 Ten percent (10%) for profit plus five percent (5%) for overhead on work by the *Contractor's* own forces up to the value of $15,000 and five percent (5%) for profit plus three percent (3%) for *Overhead* on work by the *Contractor's* own forces in excess of $15,000 and,

.2 Ten percent (10%) fee on amounts paid to *Subcontractors* or *Suppliers* under subparagraph 6.3.7.9 for changes up to the value of $15,000 and five percent (5%) on changes over $15,000.

Unless a *Subcontractor's* or *Supplier's* price has been approved by the *Owner,* the *Subcontractor* or *Supplier* shall be entitled to its actual net cost as determined in accordance with paragraph 6.3.7, plus ten percent (10%) for profit and five percent (5%) for *Overhead* on such actual net cost for changes in the *Work*, up to the value of $15,000 and five percent (5%) for profit and three percent (3%) for overhead on such actual net cost changes in the *Work* in excess of $15,000.

6.3.6.2 Delete paragraph 6.3.6.2 and replace it with the following:

If a change in the *Work* results in a net decrease in the *Contract Price* in excess of $15,000 the amount of the credit shall be the net cost, with deduction for *Overhead* and profit. If a change in the *Work* results in a net decrease in the *Contract Price* of $15,000 or less, the amount of the credit shall be the net cost, without deduction for *Overhead* or profit.

6.3.7.1 In subparagraph 6.3.7.1 insert "while directly engaged in the work attributable to the change" after the words "in the direct employ of the *Contractor*".

6.3.7 At the end of paragraph 6.3.7 add the following:

All other costs attributable to the change in the *Work* including the costs of all administrative or supervisory personnel are included in *Overhead* and profit calculated in accordance with the provisions of paragraph 6.1.5 of GC6.1 – OWNER'S RIGHT TO MAKE CHANGES.

GC 6.4 CONCEALED OR UNKNOWN CONDITIONS

6.4.1 Delete paragraph 6.4.1 and replace with the following:

6.4.1.1 Prior to the submission of the bid on which the *Contract* was awarded, the *Contractor* confirms that it carefully investigated the *Place of the Work* and carried out such tests as it deemed appropriate and, in doing so, applied to that investigation the degree of care and skill required by paragraph 3.14.1.

6.4.1.2 No claim by the *Contractor* will be considered by the *Owner* or the *Consultant* in connection with conditions which could reasonably have been ascertained by such investigation or other due diligence undertaken prior to the execution of the *Contract*.

6.4.2 Amend paragraph 6.4.2 by adding a new first sentence as follows:

Having regard to paragraph 6.4.1, if the *Contractor* believes that the conditions of the *Place of the Work* differ materially from those reasonably anticipated, differ materially from those indicated in the *Contract Documents* or were concealed from discovery notwithstanding the conduct of the investigation described in paragraph 6.4.1, it shall provide the *Owner* and the *Consultant* with *Notice in Writing* no later than five (5) *Working Days* after the first observation of such conditions.

Amend the existing second sentence of paragraph 6.4.2 in the second line, following the word "materially" by adding the words "or were concealed from discovery notwithstanding the conduct of the investigation described in paragraph 6.4.1,"

6.4.3 Delete paragraph 6.4.3 in its entirety and substitute the following:

If the *Consultant* makes a finding pursuant to paragraph 6.4.2 that no change in the *Contract Price* or the *Contract Time* is justified, the *Consultant* shall report in writing the reasons for this finding to the *Owner* and the *Contractor*.

Add new paragraph 6.4.5 as follows:

6.4.5 No claims for additional compensation or for an extension of *Contract Time* shall be allowed if the *Contractor* fails to give *Notice in Writing* to the *Owner* or *Consultant,* as required by paragraph 6.4.2.

GC 6.5 DELAYS

6.5.1 Delete the words after the word "for" in the fourth line of paragraph 6.5.1, and add the words "…reasonable direct costs directly flowing from the delay, but excluding any consequential, indirect or special damages (including, without limitation, loss of profits, loss of opportunity or loss of productivity)."

6.5.2 Delete the words after the word "for" in the fourth line of paragraph 6.5.2, and add the words "…reasonable direct costs directly flowing from the delay, but excluding any consequential, indirect or special damages (including, without limitation, loss of profits, loss of opportunity or loss of productivity)."

6.5.3 Delete paragraph 6.5.3 in its entirety and replace with the following:

If the *Contractor* is delayed in the performance of the *Work* by *Force Majeure*, then the *Contract Time* shall be extended for such reasonable time as the *Consultant* may recommend in consultation with the *Contractor*. The extension of time shall

not be less than the time lost as a result of the event causing the delay, unless the *Contractor* agrees to a shorter extension. The *Contractor* shall not be entitled to payment for costs incurred by such delays unless such delays result from the actions of the *Owner.*

Delete paragraph 6.5.4 in its entirety and replace with the following:

6.5.4 No extension or compensation shall be made for delay or impact on the *Work* unless notice in writing of a claim is given to the *Consultant* not later than ten (10) *Working Days* after the commencement of the delays or impact on the *Work*, provided however, that, in the case of a continuing cause of delay or impact on the *Work*, only one notice of claim shall be necessary.

Add new paragraphs 6.5.6, 6.5.7 and 6.5.8 as follows:

6.5.6 If the *Contractor* is delayed in the performance of the *Work* by an act or omission of the *Contractor* or anyone directly or indirectly employed or engaged by the *Contractor,* or by any cause within the *Contractor's* control, then the *Contract Time* may be extended for such reasonable time as the *Owner* may decide in consultation with the *Consultant* and the *Contractor*. The *Owner* shall be reimbursed by the *Contractor* for all reasonable costs incurred by the *Owner* as the result of such delay, including, but not limited to, the cost of all additional services required by the *Owner* from the *Consultant* or any sub-consultants, project managers, or others employed or engaged by the *Owner*, and in particular, the costs of the *Consultant's* services during the period between the date of *Substantial Performance of the Work* stated in Article A-1 herein, as the same may be extended through the provision of these General Conditions, and any later or actual date of *Substantial Performance of the Work* achieved by the *Contractor*.

6.5.7 Without limiting the obligations of the *Contractor* described in GC 3.2 – CONSTRUCTION BY OWNER OR OTHER CONTRACTORS or GC 9.4 – CONSTRUCTION SAFETY, the *Owner* or *Consultant* may, by notice in writing, direct the *Contractor* to stop the *Work* where the *Owner* or *Consultant* determines that there is an imminent risk to the safety of persons or property at the *Place of the Work*. In the event that the *Contractor* receives such notice, it shall immediately stop the *Work* and secure the site. The *Contractor* shall not be entitled to an extension of the *Contract Time* or to an increase in the *Contract Price* unless the resulting delay, if any, would entitle the *Contractor* to an extension of the *Contact Time* or the reimbursement of the *Contractor's* costs as provided in paragraphs 6.5.1, 6.5.2 or 6.5.3.

6.5.8 No claim for delay shall be made and the *Contract Time* shall not be extended due to climatic conditions or arising from the *Contractor's* efforts to maintain the *Contract* schedule.

GC 6.6 CLAIMS FOR A CHANGE IN THE CONTRACT PRICE

Delete GC 6.6 in its entirety.

GC 7.1 OWNER'S RIGHT TO PERFORM THE WORK, TERMINATE THE CONTRACTOR'S RIGHT TO CONTINUE WITH THE WORK OR TERMINATE THE CONTRACT

Revise the heading to read **"OWNER'S RIGHT TO PERFORM THE WORK, TERMINATE THE CONTRACTOR'S RIGHT TO CONTINUE WITH THE WORK, SUSPEND THE WORK OR TERMINATE THE CONTRACT"**

Add a new subparagraph 7.1.3.4 as follows:

7.1.3.4 An "acceptable schedule" as referred to in subparagraph 7.1.3.2. means a schedule approved by the *Consultant* and the *Owner* wherein the default can be corrected within the balance of the *Contract Time* and shall not cause delay to any other aspect of the *Work* or the work of other contractors, and in no event shall it be deemed to give a right to extend the *Contract Time*.

7.1.4.1 Delete sentence and replace with the following:

Correct such default and deduct the cost, including *Owner's* expenses, thereof from any payment then or thereafter due the *Contractor*.

7.1.5.3 In subparagraph 7.1.5.3 delete the words: "however, if such cost of finishing the *Work* is less than the unpaid balance of the *Contract Price*, the *Owner* shall pay the *Contractor* the difference;"

Delete paragraph 7.1.6 in its entirety and add new paragraphs 7.1.6, 7.1.7, 7.1.8, 7.1.9 and 7.1.10 as follows:

7.1.6 In addition to its right to terminate the Contract set out herein, the *Owner* may terminate this *Contract* at any time for any other reason and without cause upon giving the *Contractor* fifteen (15) *Working Days Notice in Writing* to that effect. In such event, the *Contractor* shall be entitled to be paid for all *Work* performed including reasonable profit, for loss sustained upon *Products* and *Construction Equipment*, and such other damages as the *Contractor* may have sustained as a result of the termination of the *Contract*, but in no event shall the *Contractor* be entitled to be compensated for any loss of profit on unperformed portions of the *Work*, or indirect, special, or consequential damages incurred.

7.1.7 The *Owner* may suspend *Work* under this *Contract* at any time for any reason and without cause upon giving the *Contractor Notice in Writing* to that effect. In such event, the *Contractor* shall be entitled to be paid for all *Work* performed to the date of suspension and be compensated for all actual costs incurred arising from the suspension, including reasonable profit, for loss sustained upon *Products* and *Construction Equipment*, and such other damages as the *Contractor* may have sustained as a result of the suspension of the *Work*, but in no event shall the *Contractor* be entitled to be compensated for any indirect, special, or consequential damages incurred. In the event that the suspension continues for more than thirty (30) calendar days, the *Contract* shall be deemed to be terminated and the provisions of paragraph 7.1.6 shall apply.

7.1.8 In the case of either a termination of the *Contract* or a suspension of the *Work* under GC 7.1 - OWNER'S RIGHT TO PERFORM THE WORK, TERMINATE THE CONTRACTOR'S RIGHT TO CONTINUE WITH THE WORK, SUSPEND THE WORK, OR TERMINATE THE CONTRACT or GC 7.2 - CONTRACTOR'S RIGHT TO SUSPEND THE WORK OR TERMINATE THE CONTRACT, the *Contractor* shall use its best commercial efforts to mitigate the financial consequences to the *Owner* arising out of the termination or suspension, as the case may be.

7.1.9 Upon the resumption of the *Work* following a suspension under GC 7.1 - OWNER'S RIGHT TO PERFORM THE WORK, TERMINATE THE CONTRACTOR'S RIGHT TO CONTINUE WITH THE WORK, SUSPEND THE WORK OR TERMINATE THE CONTRACT or GC 7.2 - CONTRACTOR'S RIGHT TO SUSPEND THE WORK OR TERMINATE THE CONTRACT, the *Contractor* will endeavour to minimize the delay and financial consequences arising out of the suspension.

7.1.10 The *Contractor's* obligations under the *Contract* as to quality, correction, and warranty of the *Work* performed by the *Contractor* up to the time of termination or suspension shall continue after such termination of the *Contract* or suspension of the *Work*.

GC 7.2 CONTRACTOR'S RIGHT TO SUSPEND THE WORK OR TERMINATE THE CONTRACT

7.2.3.1 Delete subparagraph 7.2.3.1 in its entirety.

7.2.3.4 In subparagraph 7.2.3.4, delete the words "except for GC 5.1 - FINANCING INFORMATION REQUIRED OF THE OWNER".

Renumber paragraph 7.2.5 as paragraph 7.2.6. Add a new paragraph 7.2.5 as follows:

7.2.5 If the default cannot be corrected within the 5 *Working Days* specified in paragraph 7.2.4, the *Owner* shall be deemed to have cured the default if it:

.1 commences correction of the default within the specified time;

.2 provides the *Contractor* with an acceptable schedule for such correction; and,

.3 completes the correction in accordance with such schedule.

Delete paragraph 7.2.6 entirely and replace with the following:

7.2.6 If the *Contractor* terminates the *Contract* under the conditions described in GC 7.2 – CONTRACTOR'S RIGHT TO SUSPEND THE WORK OR TERMINATE THE CONTRACT, the *Contractor* shall be entitled to be paid for all *Work* performed to the date of termination, as determined by the *Consultant*. The *Contractor* shall also be entitled to recover the

direct costs associated with termination, including the costs of demobilization and losses sustained on *Products* and *Construction Equipment*. The *Contractor* shall not be entitled to any recovery for any special, indirect or consequential losses, including loss of profit.

Add new paragraphs 7.2.7, 7.2.8 and 7.2.9 as follows

7.2.7 The *Contractor* shall not be entitled to give notice of the *Owner's* default or terminate the *Contract* in the event the *Owner* withholds certificates or payment or both in accordance with the *Contract* because of:

(a) the *Contractor's* failure to pay all legitimate claims promptly, or
(b) the failure of the *Contractor* to discharge construction liens which are registered against the title to the *Place of the Work.*

7.2.8 The *Contractor's* obligations under the *Contract* as to quality, correction and warranty of the *Work* performed by the *Contractor* up to the effective date of termination shall continue in force and shall survive termination by the *Contractor* in accordance with paragraph 7.2.4.

7.2.9 If the *Contractor* suspends the *Work* or terminates the *Contract* as provided for in GC 7.2 – CONTRACTOR'S RIGHT TO SUSPEND THE WORK OR TERMINATE THE CONTRACT, the *Contractor* shall ensure the site and the *Work* are left in a safe, secure condition as required by authorities having jurisdiction at the *Place of the Work* and the *Contract Documents*.

GC 8.2 NEGOTIATION, MEDIATION AND ARBITRATION

8.2.1 Amend paragraph 8.2.1 by changing part of the second line from "shall appoint a *Project Mediator*" to "may appoint a *Project Mediator,* except that such an appointment shall only be made if both the *Owner* and the *Contractor* agree."

8.2.4 Amend paragraph 8.2.4 by changing part of the second line from "the parties shall request the *Project Mediator"* to "and subject to paragraph 8.2.1 the parties may request the *Project Mediator".*

Delete paragraphs 8.2.6, 8.2.7 and 8.2.8 in their entirety.

Add new paragraph 8.2.6 as follows:

8.2.6 The dispute may be finally resolved by arbitration under the Rules for Arbitration of Construction Disputes as provided in CCDC 40 in effect at the time of bid closing, provided that both the *Contractor* and the *Owner* agree. If the *Contractor* and the *Owner* agree to resolve the dispute by arbitration, the arbitration shall be conducted in the jurisdiction of the *Place of the Work*.

GC 9.1 PROTECTION OF WORK AND PROPERTY

Delete subparagraph 9.1.1.1 in its entirety and substitute the following:

9.1.1.1 errors in the *Contract Documents* which the *Contractor* could not have discovered applying the standard of care described in paragraph 3.14.1;

Delete paragraph 9.1.2 in its entirety and substitute as follows:

9.1.2 Before commencing any *Work*, the *Contractor* shall determine the locations of all underground or hidden utilities and structures indicated in or inferable from the *Contract Documents*, or that are inferable from an inspection of the *Place of the Work* exercising the degree of care and skill described in paragraph 3.14.1.

Add new paragraph 9.1.5 as follows:

9.1.5 With respect to any damage to which paragraphs 9.1.3 or 9.1.4 apply, the *Contractor* shall neither undertake to repair or replace any damage whatsoever to the work of other contractors, or to adjoining property, nor acknowledge that the same was caused or occasioned by the *Contractor*, without first consulting the *Owner* and receiving written instructions as to the course of action to be followed from either the *Owner* or the *Consultant*. Where, however, there is danger to life, the environment, or public safety, the *Contractor* shall take such emergency action as it deems necessary to remove the danger.

GC 9.2 TOXIC AND HAZARDOUS SUBSTANCES

Add a new subparagraph 9.2.5.5 as follows:

9.2.5.5 in addition to the steps described in subparagraph 9.2.5.3, take any further steps it deems necessary to mitigate or stabilize any conditions resulting from encountering toxic or hazardous substances or materials.

9.2.6 Add the following to paragraph 9.2.6, after the word "responsible" in the second line:

…or whether any toxic or hazardous substances or materials already at the *Place of the Work* (and which were then harmless or stored, contained or otherwise dealt with in accordance with legal and regulatory requirements) were dealt with by the *Contractor* or anyone for whom the *Contractor* is responsible in a manner which does not comply with legal and regulatory requirements, or which threatens human health and safety or the environment, or material damages to the property of the *Owner* or others**,…**

9.2.8 Add the following to paragraph 9.2.8, after the word "responsible" in the second line:

…or whether any toxic or hazardous substances or materials already at the *Place of the Work* (and which were then harmless or stored, contained or otherwise dealt with in accordance with legal and regulatory requirements) were dealt with by the *Contractor* or anyone for whom the *Contractor* is responsible in a manner which does not comply with legal and regulatory requirements, or which threatens human health and safety or the environment, or material damages to the property of the *Owner* or others**,…**

Add new paragraph 9.2.10 as follows:

9.2.10 The *Contractor*, *Subcontractors* and *Suppliers* shall not bring on to the *Place of the Work* any toxic or hazardous substances and materials except as required in order to perform the *Work*. If such toxic or hazardous substances or materials are required, storage in quantities sufficient to allow work to proceed to the end of any current work week only shall be permitted. All such toxic and hazardous materials and substances shall be handled and disposed of only in accordance with all laws and regulations that are applicable at the *Place of the Work*.

GC 9.4 CONSTRUCTION SAFETY

Delete paragraph 9.4.1 in its entirety and substitute as follows:

9.4.1 The *Contractor* shall be solely responsible for construction safety at the *Place of the Work* and for compliance with the rules, regulations, and practices required by the applicable construction health and safety legislation and shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the *Work.*

Add new paragraphs 9.4.2 to 9.4.10 as follows:

9.4.2 Prior to the commencement of the *Work*, the *Contractor* shall submit to the *Owner*:

.1 the evidence of workers' compensation compliance required by GC 10.4.1;

.2 copies of the *Contractor's* insurance policies having application to the *Project* or certificates of insurance, at the option of the *Owner*;

.3 documentation setting out the *Contractor's* in-house safety programs;

.4 copies of any documentation or notices to be filed or delivered to the authorities having jurisdiction for the regulation of occupational health and safety at the *Place of the Work*.

9.4.3 The *Contractor* shall indemnify and save harmless the *Owner*, its agents, trustees, officers, directors, employees, consultants, successors, appointees, and assigns from and against the consequences of any and all safety infractions committed by the *Contractor* under the occupational health and safety legislation in force at the *Place of the Work* including the payment of legal fees and disbursements on a substantial indemnity basis.

9.4.4 The *Owner* undertakes to include in its contracts with other contractors and in its instructions to its own forces the requirement that the other contractor or its own forces, as the case may be, comply with the policies and procedures of and the directions and instructions from the *Contractor* with respect to occupational health and safety and related matters.

9.4.5 If the *Owner* is of the reasonable opinion that the *Contractor* has not taken such precautions as are necessary to ensure compliance with the requirements of paragraph 9.4.1, the *Owner* may take any remedial measures which it deems necessary, including stopping the performance of all or any portion of the *Work,* and the *Owner* may use its employees, the *Contractor*, any *Subcontractor* or any other contractors to perform such remedial measures.

9.4.6 The *Contractor* shall file any notices or any similar document required pursuant to the *Contract* or the safety regulations in force at the *Place of the Work*. This duty of the *Contractor* will be considered to be included in the *Work* and no separate payment therefore will be made to the *Contractor*.

9.4.7 Unless otherwise provided in the *Contract Documents*, the *Contactor* shall develop, maintain and supervise for the duration of the *Work* a comprehensive safety program that will effectively incorporate and implement all required safety precautions. The program shall, at a minimum, respond fully to the applicable safety regulations and general construction practices for the safety of persons or property, including, without limitation, any general safety rules and regulations of the *Owner* and any workers' compensation or occupational health and safety statutes or regulations in force at the *Place of the Work*.

9.4.8 The Contractor shall provide a copy of the safety program described in paragraph 9.4.7 hereof to the *Consultant* for delivery to the *Owner* prior to the commencement of the *Work*, and shall, ensure, as far as it is reasonably practical to do so, that every employer and worker performing work in respect of the *Project* complies with such program.

9.4.9 The *Contractor* shall arrange regular safety meetings, and shall supply and maintain, at its own expense, at its office or other well-known place at the job site, safety equipment necessary to protect the workers and general public against accident or injury as prescribed by the authorities having jurisdiction at the *Place of the Work*, including, without limitation, articles necessary for administering first-aid to any person and an emergency procedure for the immediate removal of any inured person to a hospital or a doctor's care.

9.4.10 The *Contractor* shall promptly report in writing to the *Owner* and the *Consultant* all accidents of any sort arising out of or in connection with the performance of the *Work*, whether on or adjacent to the job site, giving full details and statement of witnesses. If death or serious injuries or damages are caused, the accident shall be promptly reported by the *Contractor* to the *Owner* and the *Consultant* by telephone or messenger in addition to any reporting required under the applicable safety regulations.

GC 10.1 TAXES AND DUTIES

10.1.2 Amend paragraph 10.1.2 by adding the following sentence to the end of the paragraph:

For greater certainty, the *Contractor* shall not be entitled to any mark-up for overhead or profit on any increase in such taxes and duties and the *Owner* shall not be entitled to any credit relating to mark-up for overhead or profit on any decrease in such taxes. The *Contractor* shall provide a detailed breakdown of additional taxes if requested by the *Owner* in a form satisfactory to the Owner.

Add new paragraph 10.1.3 as follows:

10.1.3 Where the *Owner* is entitled to an exemption or a recovery of sales taxes, customs duties, excise taxes or *Value Added Taxes* applicable to the *Contract*, the *Contractor* shall, at the request of the *Owner*, assist with the application for any exemption, recovery or refund of all such taxes and duties and all amounts recovered or exemptions obtained shall be for the sole benefit of the *Owner*. The *Contractor* agrees to endorse over to the *Owner* any cheques received from the federal or provincial governments, or any other taxing authority, as may be required to give effect to this paragraph.

GC 10.2 LAWS, NOTICES, PERMITS, AND FEES

10.2.5 Amend paragraph 10.2.5 by addition the words "Subject to paragraph 3.4" at the beginning of the paragraph. Add the following to the end of the second sentence:

…and no further *Work* on the affected components of the *Contract* shall proceed until these directives have been obtained by the *Contractor* from the *Consultant*.

10.2.6 Amend paragraph 10.2.6 by adding the following sentence to the end of the paragraph:

In the event the *Owner* suffers loss or damage as a result of the *Contractor's* failure to comply with paragraph 10.2.5 and notwithstanding any limitations described in paragraph 12.1.1, the *Contractor* agrees to indemnify and to hold harmless the *Owner* and the *Consultant* from and against any claims, demands, losses, costs, damages, actions suits or proceedings resulting from such failure by the *Contractor*.

Add new paragraph 10.2.8 as follows:

10.2.8 The *Contractor* shall furnish all certificates that are required or given by the appropriate governmental authorities as evidence that the *Work* as installed conforms with the laws and regulations of authorities having jurisdiction, including certificates of compliance for the *Owner's* occupancy or partial occupancy. The certificates are to be final certificates giving complete clearance of the *Work*, in the event that such governmental authorities furnish such certificates.

GC 10.4 WORKERS' COMPENSATION

10.4.1 Delete paragraph 10.4.1 and replace with the following:

Prior to commencing the *Work*, and with each and every application for payment thereafter, including the *Contractor's* application for payment of the holdback amount following *Substantial Performance of the Work* and again with the *Contractor's* application for final payment, the *Contractor* shall provide evidence of compliance with workers' compensation legislation in force at the *Place of the Work*, including payments due thereunder.

GC 11.1 INSURANCE

Delete entirety of general condition and CCDC 41 and replace with the following**:**

11.1 Without restricting the generality of GC 12 – INDEMNIFICATION, the *Contractor* shall provide, maintain, and pay for the insurance coverages specified in GC 11.1 – INSURANCE. Unless otherwise stipulated, the duration of each insurance policy shall be from the date of commencement of the *Work* until the expiration of the warranty periods set out in the *Contract Documents*. Prior to commencement of the *Work* and upon the placement, renewal, amendment, or extension of all or any part of the insurance, the *Contractor* shall promptly provide the *Owner* with confirmation of coverage and, if required, a certified true copy of the policies certified by an authorized representative of the insurer together with copies of any amending endorsements.

.1 **General Liability Insurance**

General liability insurance shall be in the name of the *Contractor,* with the *Owner* and the *Consultant* named as additional insureds, with limits of not less than $5,000,000.00 inclusive per occurrence for bodily injury, death, and damage to property, including loss of use thereof, for itself and each of its employees, *Subcontractors* and/or agents. The insurance coverage shall not be less than the insurance required by IBC Form 2100, or its equivalent replacement, provided that IBC Form 2100 shall contain the latest edition of the relevant CCDC endorsement form. To achieve the desired limit, umbrella, or excess liability insurance may be used. All liability coverage shall be maintained for completed operations hazards from the date of *Substantial Performance of the Work*, as set out in the certificate of *Substantial Performance of the Work,* on an ongoing basis for a period of 6 years following *Substantial Performance of the Work*. Where the *Contractor* maintains a single, blanket policy, the addition of the *Owner* and the *Consultant* is limited to liability arising out of the *Project* and all operations necessary or incidental thereto. The policy shall be endorsed to provide the *Owner* with not less than 30 days' notice, in writing, in advance of any cancellation and of change or amendment restricting coverage.

.2 **Automobile Liability Insurance**

Automobile liability insurance in respect of licensed vehicles shall limits of not less than $2,000,000.00 inclusive per occurrence for bodily injury, death and damage to property, covering all licensed vehicles *owned* or leased by the *Contractor*,

and endorsed to provide the *Owner* with not less than 30 days' notice, in writing, in advance of any cancellation, change or amendment restricting coverage. Where the policy has been issued pursuant to a government-operated automobile insurance system, the *Contractor* shall provide the *Owner* with confirmation of automobile insurance coverage for all automobiles registered in the name of the *Contractor.*

.3 **Aircraft and Watercraft Liability Insurance [NTD: This can come out if N/A]**

Where determined necessary by the *Contractor*, acting reasonably, aircraft and watercraft liability insurance will be obtained in accordance with the provisions of paragraph 11.1.3. Aircraft and watercraft liability insurance with respect to owned or non-owed aircraft and watercraft if used directly or indirectly in the performance of the *Work*, including use of additional premises, shall be subject to limits of not less than $2,000,000.00 inclusive per occurrence for bodily injury, death and damage to property, including loss of use thereof and limits of not less than $2,000,000.00 for aircraft passenger hazard. Such insurance shall be in a form acceptable to the *Owner*. The policies shall be endorsed to provide the *Owner* with not less than 30 days' notice, in writing, in advance of cancellation, change or amendment restricting coverage.

.4 Property and Boiler and Machinery Insurance

(1) Builder's Risk property insurance shall be in the name of the *Contractor* with the *Owner* and the *Consultant* named as additional insureds. The policy shall insure against all risks of direct physical loss or damage to the property insured which shall include all property included in the *Work*, whether owned by the *Contractor* or the owner or owned by others, so long as the property forms part of the *Work*. The property insured also includes all materials and supplies necessary to complete the work, whether installed in the work temporarily or permanently, in storage on the project site, or in transit to the project site, as well as temporary buildings, scaffolding, falsework forms, hoardings, excavation, site preparation and similar work. The insurance shall be for not less than the sum of the amount of the contract price and the full value of products that are specified to be provided by the owner for incorporation into the work, if applicable, with the deductible of $10,000.00 payable by the contractor. The insurance shall include the foregoing and, otherwise, shall not be less than the insurance required by IBC Form 4042 or its equivalent replacement provided that the IBC Form 4042 shall include the latest addition of the relevant CCDC endorsement form. The coverage shall be based on a completed value form and shall be maintained continuously until ten (10) days after the date of the final certificate of payment.

(2) Boiler and machinery insurance shall be in the name of the *Contractor*, with the *Owner* and the *Consultant* named as additional insureds, for not less than the replacement value of the boilers, pressure vessels and other insurable objects forming part of the *Work*. The insurance provided shall not be less than the insurance provided by the "Comprehensive Boiler and Machinery Form" and shall be maintained continuously from commencement of use or operation of the property insured and until 10 days after the date of the final certificate for payment.

(3) The policies shall allow for partial or total use or occupancy of the *Work.*

(4) The policies shall provide that, in the case of a loss or damage, payment shall be made to the *Owner* and the *Contractor* as their respective interests may appear. The *Contractor* shall act on behalf of the *Owner* for the purpose of adjusting the amount of such loss or damage payment with the insurers. When the extent of the loss or damage is determined, the *Contractor* shall proceed to restore the *Work*. Loss or damage shall not affect the rights and obligations of either party under the *Contract* except that the *Contractor* shall be entitled to such reasonable extension of the *Contract Time,* relative to the extent of the loss or damage, as determined by the *Owner*, in its sole discretion.

(5) The *Contractor* shall be entitled to receive from the *Owner*, in addition to the amount due under the *Contract*, the amount at which the *Owner's* interest in restoration of the *Work* has been appraised, such amount to be paid as the restoration of the *Work* proceeds and as provided in GC 5.2 – APPLICATIONS FOR PROGRESS PAYMENT and GC 5.3 – PROGRESS PAYMENT. In addition, the *Contractor* shall be entitled to receive from the payments made by the insurer the amount of the *Contractor's* interest in the restoration of the *Work*.

(6) In the case of loss or damage to the *Work* arising from the work of other contractors, or the *Owner's* own forces, the *Owner*, in accordance with the *Owner's* obligations under paragraph 3.2.2.4 of GC 3.2 – CONSTRUCTION BY OWNER OR OTHER CONTRACTORS, shall pay the *Contractor* the cost of restoring the *Work* as the restoration of the *Work* proceeds and as provided in GC 5.2 – APPLICATIONS FOR PROGRESS PAYMENT and GC 5.3 – PROGRESS PAYMENT.

.5 Contractors' Equipment Insurance

"All risks" contractors' equipment insurance covering construction machinery and equipment used by the *Contractor* for the performance of the *Work*, excluding boiler insurance, shall be in a form acceptable to the *Owner* and shall not allow subrogation claims by the insurer against the *Owner.* The policies shall be endorsed to provide the *Owner* with not less than 30 days' notice, in writing, in advance of cancellation, change or amendment restricting coverage. Subject to satisfactory proof of financial capability by the *Contractor* for self-insurance of his equipment, the *Owner* agrees to waive the equipment insurance requirement.

11.1.2 The *Contractor* shall be responsible for deductible amounts under the policies except where such amounts may be excluded from the *Contractor's* responsibility by the terms of GC 9.1 - PROTECTION OF WORK AND PROPERTY and GC 9.2 - DAMAGES AND MUTUAL RESPONSIBILITY.

11.1.3 Where the full insurable value of the *Work* is substantially less than the *Contract Price*, the *Owner* may reduce the amount of insurance required to waive the course of construction insurance requirement.

11.1.4 If the *Contractor* fails to provide or maintain insurance as required by the *Contract Documents*, then the *Owner* shall have the right to provide and maintain such insurance and provide evidence of same to the *Contractor*. The *Contractor* shall pay the costs thereof to the *Owner* on demand, or the *Owner* may deduct the amount that is due or may become due to the *Contractor*.

11.1.5 All required insurance policies shall be with insurers licensed to underwrite insurance in the jurisdiction of the *Place of the Work*.

GC 11.2 CONTRACT SECURITY

11.2.2 Delete paragraph after the word "provided" and replace with the following:

Such bonds shall be issued by a duly licensed surety company, which has been approved by the *Owner*, authorized to transact a business of suretyship in the province or territory of the *Place of the Work* and shall be maintained in good standing until the fulfillment of the *Contract*, including all warranty and maintenance periods set out in the *Contract Documents.*

Add new paragraph 11.2.3 as follows:

11.2.3 It is the intention of the parties that the performance bond shall be applicable to all of the *Contractor's* obligations in the *Contract Document* and, wherever a performance bond is provided with language which conflicts with this intention, it shall be deemed to be amended to comply. The *Contractor* represents and warrants to the *Owner* that it has provided its surety with a copy of the *Contract Documents* prior to the issuance of such bonds.

GC 12.1 INDEMNIFICATION

Delete General Condition 12.1 – INDEMNIFICATION in its entirety and substitute as follows:

12.1.1 The *Contractor* shall indemnify and hold harmless the *Owner*, its parent, subsidiaries and affiliates, their respective partners, trustees, officers, directors, agents and employees and the *Consultant* from and against any and all claims, liabilities, expenses, demands, losses, damages, actions, costs, suits, or proceedings (hereinafter called "claims"), whether in respect of claims suffered by the *Owner* or in respect of claims by third parties, that directly or indirectly arise out of, or are attributable to, the acts or omissions of the *Contractor*, its employees, agents, *Subcontractors*, *Suppliers* or any other persons for whom it is in law responsible (including, without limitation, claims that directly or indirectly arise out of, or are attributable to, loss of use or damage to the *Work*, the *Owner's* property or equipment, the *Contractor's* property or equipment or equipment or property adjacent to the *Place of the Work* or death or injury to the *Contractor's* personnel).

12.1.2 The provisions of GC 12.1 - INDEMNIFICATION shall survive the termination of the *Contract,* howsoever caused and no payment or partial payment, no issuance of a final certificate of payment and no occupancy in whole or in part of the *Work* shall constitute a waiver or release of any of the provisions of GC 12.1.

GC 12.2 WAIVER OF CLAIMS

12.2.1 In the fourth line, add the words "claims for delay pursuant to GC 6.5 DELAYS" after the word "limitation". Add the words "(collectively "Claims")" after "*Substantial Performance of the Work*" in the sixth line.

12.2.1.1 Change the word "claims" to "Claims" and change the word "claim" to "Claim".

12.2.1.2 Change the word "claims" to "Claims".

12.2.1.3 Delete paragraph in its entirety.

12.2.1.4 Change the word "claims" to "Claims".

12.2.2 Change the words "in paragraphs 12.2.1.2 and 12.2.1.3" to "in paragraph 12.2.1.2".Change the word "claims" to "Claims" in both instances and change the word "claim" to "Claim".

12.2.3 Delete paragraph in its entirety.

12.2.4 Delete paragraph in its entirety.

12.2.5 Delete paragraph in its entirety.

12.2.6 Change the word "claim" to "Claim" in all instances in the paragraph.

12.2.7 Change "The party" to "The *Contractor*. Change the word "claim" to "Claim" in all instances in the paragraph.

12.2.8 Change "under paragraphs 12.2.1 or 12.2.3" to "under paragraph 12.2.1". Change both instances of the words "the party" to "the *Contractor*". Change the word "claim" to "Claim" in all instances in the paragraph.

12.2.9 Delete paragraph 12.2.9 in its entirety.

12.2.10 Delete paragraph 12.2.10 in its entirety.

GC 12.3 WARRANTY

12.3.2 Delete from the first line of paragraph 12.3.2 the word, "The" and substitute the words "Subject to paragraph 3.4.1, the…"

Add new paragraphs 12.3.7 to 12.3.12 as follows:

12.3.7 Where required by the *Contract Documents*, the *Contractor* shall provide a maintenance bond as security for the performance of the *Contractor's* obligations as set out in GC 12.3 WARRANTY.

12.3.8 The *Contractor* shall provide fully and properly completed and signed copies of all warranties and guarantees required by the *Contract Documents*, containing:

.1 the proper name of the *Owner*;
.2 the proper name and address of the *Project*;
.3 the date the warranty commences, which shall be at the "date of *Substantial Performance of the Work*" unless otherwise agreed upon by the *Consultant* in writing.
.4 a clear definition of what is being warranted and/or guaranteed as required by the *Contract Documents*; and
.5 the signature and seal (if required by the governing law of the *Contract*) of the company issuing the warranty, countersigned by the *Contractor*.

12.3.9 Should any *Work* be repaired or replaced during the time period for which it is covered by the specified warranty, a new warranty shall be provided under the same conditions and for the same period as specified herein before. The new warranty shall commence at the completion of the repair or replacement.

12.3.10 The *Contractor* shall ensure that its *Subcontractors* are bound to the requirements of GC 12.3 – WARRANTY for the *Subcontractor's* portion of the *Work.*

12.3.11 The *Contractor* shall ensure that all warranties, guarantees or other obligations for *Work*, services or *Products* performed or supplied by any *Subcontractor, Supplier* or other person in connection with the *Work* are obtained and available for the direct benefit of the *Owner.* In the alternative, the *Contractor* shall assign to the *Owner* all warranties, guarantees or other obligations for *Work*, services or *Products* performed or supplied by any *Subcontractor, Supplier* or other person in connection with the *Work* and such assignment shall be with the consent of the assigning party, where required by law, or by the terms of that party's contract. Such assignment shall be in addition to, and shall in no way limit, the warranty rights of the *Owner* under the *Contract Documents*.

12.3.12 The *Contractor* shall commence or correct any deficiency within 2 Working Days after receiving a notice from the *Owner* or the *Consultant*, and shall complete the *Work* as expeditiously as possible, except in the case where the deficiency prevents maintaining security or where basic systems essential to the ongoing business of the *Owner* and/or its tenants cannot be maintained operational as designed. In those circumstances all necessary corrections and/or installations of temporary replacements shall be carried out immediately as an emergency service. Should the *Contractor* fail to provide this emergency service within 8 hours of a request being made during the normal business hours of the *Contractor*, the *Owner* is authorized, notwithstanding GC 3.1, to carry out all necessary repairs or replacements at the *Contractor's* expense.

PART 13 OTHER PROVISIONS

Add new Part 13 OTHER PROVISIONS as follows:

GC 13.1 OWNERSHIP OF MATERIALS

13.1.1 Unless otherwise specified, all materials existing at the *Place of the Work* at the time of execution of the *Contract* shall remain the property of the *Owner*. All *Work* and *Products* delivered to the *Place of the Work* by the *Contractor* shall be the property of the *Owner.* The *Contractor* shall remove all surplus or rejected materials as its property when notified in writing to do so by the *Consultant*.

GC 13.2 CONSTRUCTION LIENS

13.2.1 In the event that a claim for lien is registered against the *Project* by a *Subcontractor, Sub-subcontractor* or *Supplier*, and provided the *Owner* has paid all amounts properly owing under the *Contract*, the *Contractor* shall, at its own expense:

.1 within 10 calendar days, ensure that any and all claims for lien and certificates of action are discharged, released, or vacated by the posting of security or otherwise; and

.2 in the case of written notices of lien, ensure that such notices are withdrawn, in writing.

13.2.2 In the event that the *Contractor* fails to conform with the requirements of paragraph 13.2.1, the *Owner* may fulfil those requirements without *Notice in Writing* to the *Contractor* and set off and deduct from any amount owing to the *Contractor*, all costs and associated expenses, including the costs of posting security and all legal fees and disbursements associated with discharging or vacating the claim for lien or certificate of action and defending the action. If there is no amount owing by the *Owner* to the *Contractor*, then the *Contractor* shall reimburse the *Owner* for all of the said costs and associated expenses.

13.2.3 Notwithstanding any other provision in the *Contract*, the *Consultant* shall not be obligated to issue a certificate and the *Owner* shall not be obligated to make payment to the *Contractor* if, at the time such certificate or payment was otherwise due:

.1 a claim for lien has been registered against the *Project* lands, or

.2 if the *Qwner* or mortgagee of the *Project* lands has received written notice of a lien.. or

.3 the *Owner* or *Consultant* reasonably believe that any party has purported to retain title to *Products* or materials in respect of which an application for payment has been made.

13.2.4 Without limiting the foregoing, the *Contractor* shall, if requested by the *Owner*, defend, indemnify and save the *Owner* harmless from the amount of all such claims and the costs of defending any and all actions commenced against the *Owner* pursuant to the construction/builder's lien legislation in force at the *Place of the Work*, including the legal costs of the *Owner*,

unless the lien was a direct result of a breach of the *Contract* by the *Owner* or the non-payment by the *Owner* of a valid charge or claim under the *Contract*.

13.2.5 GC 13.2 – CONSTRUCTION LIENS does not apply to construction/builder's liens claimed by the *Contractor.*

END OF AMENDMENTS TO CCDC 2 - 2008

GYM ROOFTOP UNIT

ST. PHILIP CATHOLIC SCHOOL

PETROLIA ONTARIO

ST. CLAIR CATHOLIC DISTRICT SCHOOL BOARD

G E N E R A L I N D E X

1 General

1.1 **GENERAL REQUIREMENTS**

1.1.1 This Section and Division 1 - General Requirements applies to and governs the work of all Sections of Division 15.

1.2 **MECHANICAL SYSTEMS COMMISSIONING**

1.2.1 The mechanical systems of this project will be thoroughly commissioned by a Third Party Commissioning Agent engaged by the Owner. Assist and cooperate with the commissioning agent as required. Include all related costs in the Base Bid.

1.3 **VISITING SITE**

1.3.1 Visit the site and be familiar with working conditions and work involved before submitting Bids. No extras will be granted due to lack of a thorough preliminary investigation of the site.

1.3.2 Remove and replace existing ceiling tile to inspect ceiling space for existing Mechanical, Electrical and Structural obstructions. Include cost of all necessary changes in Bid Price. No extras will be granted due to lack of a thorough preliminary investigation of accessible ceiling spaces.

1.3.3 Contractors visiting for site investigation must sign in at the main office. Upon arrival, review and sign the on-site Designated Substances Report prior to site investigation.

1.4 **CONTRACT DRAWINGS**

1.4.1 Mechanical Drawings show Mechanical work only and are not intended to show Structural details, Electrical details or Architectural features. Take building dimensions and details from Architectural or Structural Drawings or from job measurements.

1.4.2 Only the general location and route of piping and ductwork is shown. Install all piping and ductwork neatly to conserve headroom. All piping and ductwork to be installed parallel to building lines unless shown otherwise.

1.4.3 The Consultant reserves the right to revise the locations of equipment and outlets within any given room without altering the Contract Price provided notice of change is given prior to roughing-in.

1.4.4 In case of conflict between work of other trades and work of this Division, clarify the location of these items with the Consultant before roughing-in.

1.4.5 In the event of any discrepancies or ambiguity of any symbol, note, abbreviation, etc., used in this Specification or on the Contract Drawings, obtain clarification, in writing, from the Consultant prior to submitting Bid. No allowance will be made for additional costs arising from failure to obtain proper clarification of conflicting information before Bid.

1.4.6 Quantities or lengths indicated in any of the Contract Documents are approximate only and will not be held to gauge or limit the work. No adjustment to the Contract Price will be allowed to complete the work.

1.4.7 Verify equipment access and coordinate with equipment supplier to ensure equipment can be physically transported to installation location. Under no circumstances will any claim be allowed for extra cost to disassemble and/or assemble equipment at the final location which will be considered as part of equipment installation.

1.4.8 Provide labour, products and services specified, but not shown on Drawings and vice versa, and all other labour, products and services necessary for completion of the work.

1.4.9 All dimensions and sizes are in SI units. Generally, units are in millimetres. All exceptions to this are noted. Pipe sizes are in accordance with ANSI Standards. See Detail Sheet at end of this Section.

1.5 SHOP DRAWINGS

1.5.1 Submit Manufacturers' Shop Drawings, Electrical Wiring Diagrams and Control System Drawings to the Consultant. Provide title sheet for Shop Drawing submitted. Include project name, Shop Drawing item (including Specification paragraph reference) and approval stamps. The Consultant reserves the right to have samples submitted of any specified products.

1.5.2 Before submitting shop drawings, provide a complete list of shop drawings to be submitted in Microsoft Excel format. List all shop drawings and approximate date of submission.

1.5.3 Submit all shop drawings electronically in Adobe Acrobat PDF format. File attachments to an email must total no more than 5 MB and must be submitted unzipped. If multiple items are submitted in single PDF file, each individual piece of equipment must be “book marked” using equipment labels as per Design Drawings. All shop drawings submitted electronically must be checked and stamped by Contractor as specified below.

1.5.4 Catalogues, manuals or price lists will not be accepted as Shop Drawings. Before submission, check Shop Drawings, make necessary corrections, apply stamp “Checked and Certified Correct”, sign and date.

1.5.5 Submit one reviewed set of Shop Drawings with each set of Maintenance and Operating Instructions.

1.5.6 The review of Shop Drawings by Chorley + Bisset Ltd. is for the sole purpose of ascertaining conformance with the general design concept. This review does not mean that Chorley + Bisset Ltd. approves the detail design inherent in the Shop Drawings, responsibility for which remains with the Contractor. Such review does not relieve the Contractor of his responsibility for errors or omissions in the Shop Drawings or of his responsibility for meeting all requirements of the Construction and Contract Documents. The Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation, and for coordination of the work of all subtrades.

1.5.7 The Contractor is to review each shop drawing and document the differences between the shop drawing submission and the description listed in the specification. If there are no differences listed, the Contractor implicitly declares the shop drawing meets all requirements of the Specification.

1.5.8 Ensure at least one copy of the reviewed Shop Drawings is kept on site at all times for reference.

1.5.9 Prepare all Drawings in SI units.

1.6 **FIELD DRAWINGS**

1.6.1 Submit, to the General Contractor, Drawings accurately showing all openings for ducts, pipes, etc. Drawings must include the size of openings and their locations by dimensions, including the location of the structural members framing these openings. Each trade will be responsible for detail layout of their own work.

1.6.2 Assume full responsibility for the detailed coordination of all Division 15 work. Prepare Field Drawings to determine the exact location of each service. On these Drawings, include all mechanical and electrical services, architectural features, and structural details. If a conflict becomes apparent after the installation of services, pay all costs associated with removing and reinstalling these services.

1.7 **AS-BUILT DRAWINGS**

1.7.1 The Contractor will be provided with Mechanical and Electrical Files used to produce the contract documents. The following digital formats were used and are to be maintained: AutoCAD and PDF. The Contractor is to print Drawings from the PDF files provided.

1.7.2 Revise and maintain the prints as work progresses. Show all revisions, relocations and changes, to scale. Use colour markings.

1.7.3 Transfer information from the marked prints to AutoCAD files on a monthly basis to match the software that version the original files were created in.. Have the marked prints and updated CAD prints on site for review by the Consultant at all times. Monthly draws will not be approved unless all changes have been shown.

1.7.4 Prior to testing, balancing and final commissioning, complete the transfer of marked prints to the AutoCAD files. Fill in the Owner’s equipment numbering system in the Schedules on the Drawings and on the plans where blank placeholder tags have been shown.

1.7.4.1 AutoCAD format files are to match exactly the layering system and symbology of the Consultant. Bind all external references.

1.7.5 Mark Drawings "As-Built Drawings" and insert name and logo of Contractor. Submit one set of printed "As-Built Drawings" for review by the Consultant. Remove Engineers Stamp. Include Contractors name and Logo.

1.7.6 Submit completed As Built Drawings on disks in same digital data software program, and version as original contract documents. Also provide one set of Drawings with the Operating and Maintenance Manuals.

1.7.7 For the purposes of Contract payments, As Built Drawings will be assumed to have a value of $2,000.00. This will not be released until As Built Drawings have been accepted as complete and acceptable by the Consultant. This amount is in addition to the normal 10% holdback required by the Construction Lien Act, 2018.

1.8 **SIMULTANEOUS PROJECTS**

1.8.1 Other projects may be under construction simultaneously on this site during the course of this construction project. The Owner will not be the "constructor" as defined by The Ontario Health & Safety Act & Regulations. This Contractor is to maintain a separation between this project and all other Contractors, by time or space, as defined by The Ontario Health & Safety Act & Regulations.

1.9 **CONFLICTS AND PRECEDENCE**

1.9.1 Immediately upon discovery of any conflict, ambiguity, error or omission in the Contract Documents, request clarification in writing from Consultant prior to starting the work in questions.

1.9.2 Failure to give such written notice will constitute an irrevocable waiver and release of any claim for additional compensation or delays incurred.

1.9.3 Where work fails to conform to Contract Documents, as clarified by Consultant, promptly remove and replace such work as directed, without adjustment to Contract price.

1.10 **FIRESTOPPING**

1.10.1 Before starting any work on site, submit detailed Shop Drawings to the Consultant for review and comments. Include:

1.10.1.1 Manufacturer's technical product data and installation instructions for each specific type and location of penetration.

1.10.1.2 Certification that proposed firestopping materials and assemblies comply with CAN-ULC S115 “Standard Method of Fire Test for Firestop Systems”.

1.10.1.3 For each specific type and location of penetration, provide installation instructions from a recognized independent testing agency.

1.10.2 Mark penetration types and locations on set of white prints. At completion of project, transfer this information to “Record” Drawings.

1.10.3 Comply with all requirements of Ontario Building Code, Clause “Building Services in Fire Separations and Fire Rated Assemblies”.

1.11 **MAINTENANCE AND OPERATING INSTRUCTIONS**

1.11.1 Assemble one set of equipment literature (cuts), operating instructions, maintenance instructions, pressure test results, certificate, other pertinent data and Letter of Warranty. Place in three ring binders, complete with index pages, indexing tabs and cover identification at front and side. Submit to Consultant for approval.

1.11.2 Make changes or submit additional information as required to obtain approval. Final Certificate of Completion will not be issued until the Consultant possesses three approved sets. Include copies of approved Shop Drawings and name and address of Spare Parts' Suppliers with manuals.

1.11.3 Provide one electronic copy of the maintenance and operating manual in Adobe Acrobat PDF format on a USB Drive and submit with the final version of manuals. Electronic copy of manual to be provided as one folder per section or piece equipment. Files are to be formatted with bookmarks in accordance with the sections of the manuals listed in clauses above. Divide the maintenance manuals into sections which correspond with Specification Sections.

1.11.4 The following information is to be contained within the Sections:

1.11.4.1 A list of names, addresses and telephone numbers of the Consultants, General Contractor and Mechanical Contractor. Written warranty of the Mechanical systems. A copy of the valve directory, giving number, valve location, normal valve position and purpose of valve. Copy of all natural gas fitter tags.

1.11.4.2 A copy of all pressure tests and operational tests for pumping systems. A list of names, addresses and telephone numbers of all suppliers. A copy of all approved Shop Drawings.

1.11.4.3 A complete and comprehensive lubrication, maintenance and operating instructions details D (daily), W (weekly), M (monthly), SA (semi-annually), A (annually) schedule for maintenance and lubrication.

1.11.4.4 A complete list of all air filter sizes, quantities and types, corresponding with unit designations.

1.11.4.5 Copies of warranties.

1.11.4.6 Complete control diagrams, wiring diagrams and description of control system and the functioning of the system.

1.11.4.7 Copy of the project Testing and Balancing Report.

1.12 REGULATIONS AND PERMITS

1.12.1 Carry out all work in accordance with the latest editions of applicable municipal and provincial codes, regulations, bylaws, and requirements of local Authority Having Jurisdiction. In no instance, however, is the standard established by the Drawings and Specifications to be reduced by the codes referred to above. Apply for and obtain any necessary permits. Pay any necessary fees.

1.12.2 Enforce all prevailing Provincial and local safety regulations at all times. Abide by all Owner’s safety and security policies and procedures and conform to all regulations of the current Occupational Health and Safety Act.

1.12.3 Submit copies of CRN Certificates for all boilers and registered pressure vessels. Arrange and pay for TSSA certification of all boilers with a heating surface area greater than 2.78 m^2 (30 ft^2).

1.12.4 Fill out TSSA forms and pay all costs associated with removal of existing boilers and other equipment, wherever equipment is currently registered with TSSA

1.12.5 Arrange and pay for TSSA inspection and certification for all piping systems and equipment regulated by TSSA.

1.12.6 TSSA will forward certificates and invoice for certificates to Owner. Owner will forward certificates and invoice to certificates to this contractor. Pay TSSA invoice for the certificates. Insert a copy of each certificate in to the Operating and Maintenance Manual. Frame and hang the original certificates in the Utility Room near the equipment.

1.13 MATERIAL AND EQUIPMENT

1.13.1 Where an item of material or any equipment is specifically identified by a manufacturer's trade name and/or catalogue number, make no substitution except as provided for in paragraphs 3, 4 and 5 below.

1.13.2 In the case of some items of equipment, one or more additional names of acceptable equal manufacturers are listed in the Clause describing an item or a group of items. The design, layout, space allocation, connection details, etc., are based on the products named first in the description of each item. The products named first in the description of each item establish the quality of manufacture and design standards for all other manufacturers of that item. The general approval indicated by listing the names of other manufacturers is subject to final review of Shop Drawings, performance data, test reports, production samples (if required) by Consultant, and equipment shipped to site. Ensure that the products used meet the requirements specified and as shown on the Contract Drawings.

1.13.3 Suppliers wishing to submit other items of equipment for approval as an equal to those specified must apply to the Consultant at least 10 working days before Bid closing date. Requests must be accompanied by complete description and technical data on the items proposed. Approval for substitution of equipment will only be given on the understanding that all details, accessories, features and performance meet the Specifications unless otherwise stated. Deviations from the Specifications must be stated in writing at time of application for approval.

1.13.4 Include in the Bid, the equipment named in the Specifications or approved as an equal as in paragraph 3 above. This will form the Base Bid. Any number of alternative bids, as defined below, may be included in addition to the Base Bid.

1.13.5 Items of equipment by Manufacturers not named in the Specifications may be offered as alternatives to the manufacturers named in the Specifications. The alternative proposals must be accompanied by full descriptive and technical data, together with the statement of amount of addition or deduction from the Base Bid, if the alternative is accepted. Prior approval by the Consultant is **not** required on items submitted as alternative bids.

1.13.6 After execution of the Contract, substitution of equipment will be considered only if equipment accepted cannot be delivered in time to complete the work in proper sequence, or if the manufacturer has stopped production of the accepted item. In such cases, requests for substitution must be accompanied by proof of equality and difference in price and delivery, in the form of Certified Quotations from Suppliers of both specified and proposed equipment. Credit any decrease in price involved in substitution to the Owner by reduction of the Contract Price. The Contractor will **not** be reimbursed for any such increase in price.

1.13.7 Where equipment other than the equipment used as a basis for design, layout and space allocation is used, produce and submit revised layouts of equipment, pipes, ducts, etc., in the areas affected. Submit these Drawings with the Shop Drawings. Failure to produce these Drawings is indication by the Contractor that they are not required and the original space allocations are adequate for the substituted equipment.

1.13.8 Name the Subcontractors and Manufacturers in the Bid as indicated in Clause “List of Mechanical Subcontractors and Manufacturers”.

1.14 INTERPRETATION OF CONTRACT DOCUMENTS

1.14.1 The decision as to which trade provides required labour or materials rests solely with the Contractor. Extra payments will not be considered based on a difference in interpretation of the Contract Documents as to which trade involved provides materials or labour for specific items of work. The Consultant will not enter into such discussions.

1.15 SITE VISITS

1.15.1 The Mechanical Contractor shall have an office representative (not site personnel) at each site meeting and deficiency review. Attendance at these meetings is mandatory.

1.16 PROGRESS DRAWS

1.16.1 Mechanical Contractor shall review all supplier and subcontractor draws submitted to their office to ensure they are fair and reasonable for the amount of work completed on site to date prior to submitting to the General Contractor. Mechanical Contractor will be responsible for the validity of supplier and subcontractor draw claims.

1.17 WARRANTY

1.17.1 Warranty all workmanship and make good any defects for one year after Owner's takeover except where specifically specified otherwise. Warranty material and equipment supplied by the manufacturers for one year after Owner's takeover. Make good damage caused due to defects and workmanship.

1.17.2 Where equipment specified in Sections of Division 15 to have an extended warranty period, e.g. five years, the first year of the warranty period will be governed by the terms and conditions of the warranty in the Contract Documents, and the remaining years of the warranty will be direct from the manufacturer and/or supplier to the Owner. Submit signed and dated copies of the extended warranties to the Consultant before applying for a Certificate of Substantial Performance of the Work.

1.18 **CONSTRUCTION SCHEDULE**

1.18.1 Within one week of Award of Contract, submit to the Consultant a Construction Schedule. Show in the Work Schedule, a complete breakdown of the work of the Contract, together with planned progress dates.

1.18.2 Compare progress of work with the Work Schedule at every job meeting.

1.18.3 Provide a construction schedule with each monthly progress draw, even if there are no revisions. Prior to making any schedule revision dates from original construction schedule, obtain Consultant approval.

2 Products

2.1 **MATERIALS**

2.1.1 Use materials specified herein or approved equal as defined in Clause “Material and Equipment”.

2.2 **BACKFILL**

2.2.1 Use backfill material in accordance with the requirements of Division 2 unless specified or shown otherwise.

2.3 **CONCRETE**

2.3.1 Use concrete in accordance with the requirements of Division 3 unless specified or shown otherwise.

2.4 **SLEEVES**

2.4.1 In general, sleeves are not required through walls or floors except for penetrations through Service Room walls or floors, foundation walls, or for steam and condensate piping system wall or floor penetrations.

2.4.2 For all pipes passing through foundation walls, use Link-Seal pre-engineered mechanical seals between sleeves and pipes.

2.4.3 For sleeves through mechanical room floors, use Schedule 40 steel pipes with annular fins continuously welded at midpoint.

2.4.4 For rated separation requiring a FT firestopping rating, use materials in conformance with manufacturer's recommendations.

2.5 **FIRESTOPPING**

2.5.1 Use only service penetration firestop components and assemblies tested in accordance with CAN-ULC-S115 “Standard Method of Fire Test for Firestop Systems” and listed in most recent ULC “List of Equipment and Materials” or by another recognized independent testing and certification agency acceptable to the Consultant.

2.5.2 All pipe insulation passing through the fire separation to be approved with the listing of the firestop system.

2.5.3 Pipe sleeves through fire separations requiring an F rating are to be installed as per firestopping manufacturer's recommendations, as some firestopping manufacturers do not allow pipe sleeves within their approved system. Confirm pipe sleeve compatibility prior to starting work on site.

2.5.4 The following manufacturers of the above equipment will be considered equal subject to requirements of Clause “Material and Equipment”:

Tremco

2.6 FIRE CLOSURES

2.6.1 Use only fire damper assemblies tested in accordance with CAN/ULC S115 Fire Tests of Firestop Systems and listed in most recent ULC “List of Equipment and Materials” or by another recognized independent testing and certification agency acceptable to the Consultant.

2.7 ESCUTCHEON PLATES

2.7.1 Use chrome or nickel-plated brass, solid type, with set screws for ceiling or wall mounting.

2.8 ACCESS DOORS

2.8.1 Access doors to be flush to edge of frame, concealed continuous hinge with screwdriver operated cam latch. Non fire-rated door construction to be minimum 14 gauge, with 16 gauge frame. Fire-rated door construction to be a minimum 20 gauge insulated door with 16 gauge frame. Insulation thickness to provide required rating.

2.8.2 Size doors to allow adequate operating/maintenance clearance for devices. Doors to be a minimum 600 mm x 600 mm (24″ x 24″) for body entry, and 300 mm x 300 mm (12″ x 12″) for hand entry, unless noted otherwise. Use the following access doors:

Masonry Walls	-	Acudor UF-5000
Drywall Walls	-	Acudor DW-5040
Drywall Ceilings	-	Acudor BP58, match ceiling thickness

2.8.3 The following manufacturers of the above equipment will be considered equal subject to requirements of Clause “Material and Equipment”:

Adam
Price

2.9 ELECTRIC MOTORS

2.9.1 Provide motors of adequate size and type for intended service. Use CSA approved motors with the following characteristics:

250 watts (1/3 hp) and under	-	115 volt, 60 hertz, single phase
370 watts (1/2 hp) and over	-	60 hertz, three phase, voltage as shown on Drawings.

2.9.2 Motors are to be the voltage specified. Step down or step up transformers will not be accepted.

2.9.3 Motors 250 watts (1/3 hp) and under: Use continuously rated squirrel cage induction type with capacitor start, NEMA Design Class “B” with NEMA “N” or better starting characteristics and a minimum of Class "B" insulation, unless specified otherwise.

2.9.4 Motors 370 watts (1/2 hp) and over: Use continuously rated squirrel cage induction type, NEMA Design Class “B” with NEMA “B” or better starting characteristics and a minimum of Class “B” insulation.

2.9.5 Use open drip-proof type motor with a 1.15 service factor for motors located in dry locations indoors, unless specified or required otherwise by the motor location.

2.9.6 Use totally enclosed motors outdoors and in locations subject to water spray. Totally enclosed motors must be fan cooled and have a 1.0 service factor.

2.9.7 Use totally enclosed explosion-proof (TEXP) motors where indicated to prevent ignition of external gas.

2.9.8 All enclosures shall be rolled steel band or cast iron construction. Motor nameplate shall be mounted on enclosure with stainless steel fastening pins and shall have, as a minimum, all information as described in CSA C22.2 No 100-04 (R2009).

2.9.9 Unless specified otherwise, starters for electric motors will be provided by Division 16. Where multi-speed motors are specified, ensure that motors are compatible with starters supplied under Division 16.

2.9.10 All two speed motors to be single winding, unless specified otherwise. Provide inverter duty motors where indicated on drawings.

2.9.11 All motors 0.75 kW (1 hp) and above, use premium efficiency type motors in accordance with NEMA Premium efficiency standard.

2.10 ELECTRICAL WIRING

2.10.1 Meet all requirements of Division 16 for all wiring included in Division 15 and pre-wired equipment provided by Division 15.

2.10.2 Ensure all pre-wired electrical equipment is CSA approved. Where this is not possible, arrange and pay for special Electrical Safety Authority approval.

2.10.3 All electrical wiring, both line voltage and low voltage, for equipment supplied by Division 15 is the responsibility of Division 15. Line voltage wiring from power panels to starters and from starters to motors will be supplied and installed by Division 16.

2.11 **IDENTIFICATION NAME LABELS**

2.11.1 Identification name labels, directional arrows and colour bands for ductwork and piping to be plastic coated pressure sensitive “Brady” or “Westline” selfstick labels, waterproof, colourfast, dirt and grease resistant. For pipes up to and including 65 mm (2-1/2″) diameter, use markers 28 mm (1-1/8″) high. For pipes 80 mm (3″) diameter and over, and all ductwork, use markers 57 mm (2-1/4″) high. For all piping exposed to view, use Smillie McAdams Summerlin Coil - Mark pipe covers.

2.11.2 The following manufacturers of the above equipment will be considered equal subject to requirements of Clause “Material and Equipment”:

Visionmarker

2.12 **VALVE AND CONTROLLER TAGS**

2.12.1 Use brass valve and controller tags with 32 mm (1-1/4″) stamped code lettering and numbers filled with black paint. Hang a copy of the valve chart in Mechanical Room.

2.13 **EQUIPMENT NAMEPLATES**

2.13.1 Use minimum size 90 mm x 40 mm x 2.4 mm (3-1/2″ x 1-1/2″ x 3/32″) thick laminated phenolic plastic nameplates with black face and white lettering. Lettering to be minimum 6 mm (1/4″) high.

2.14 **BELT AND MACHINE GUARDS**

2.14.1 Provide OSHA compliant expanded metal guards in steel frames to protect drives of all belt driven equipment and all equipment with exposed rotating or moving parts. Firmly bolt guards in place and make easily removable for servicing. Provide openings in metal guards to permit use of a tachometer without removing the guard.

2.15 **FLASHING**

2.15.1 For locations with roof penetrations serving a piece of equipment, such as for roof mounted, split system condensing units, etc, use Portals Plus, Inc. Alumi-Flash system consisting of 330 mm (13″) high, one piece spun aluminum base with deck flange and EPDM rubber cap. Use caps suitable fore required number and diameter of service penetrations. Flashing is for Division 15 and 16 use only. Coordinate with Division 16 to minimize the number of flashings required.

2.15.2 For plumbing vent roof penetrations, use Thaler SJ-38 "Stack Jack" insulated flashing consisting of 330 mm (13″) high, one piece spun aluminum base with deck flange, urethane insulation line and EPDM base seal. Size seals to suit pipe diameter.

3 Execution

3.1 **GENERAL**

3.1.1 Instruct and supervise other Sections doing related work.

3.1.2 Supply the measurements of equipment to other Sections to allow for necessary openings to be left in the work of other Sections.

3.1.3 Install pipes, ducts and tubing, which are to be concealed, neatly and close to building structure so that the necessary furring can be kept as small as possible.

3.1.4 Install all ceiling components in direct accordance with reflected ceiling plans.

3.1.5 Mechanical Drawings show approximate locations for wall-mounted devices. Clarify exact location and mounting height with Consultant prior to roughing-in.

3.1.6 All serviceable equipment installed on the roof (including boiler vents) to be installed minimum 3m (10′-0″) from roof edge.

3.2 DISSIMILAR METALS

3.2.1 Separate dissimilar metals by means of gaskets or shims of approved material or use dielectric unions or flanges in order to prevent electrolytic action. Where piping of dissimilar metals is connected, use approved dielectric unions or couplings. A brass fitting or brass valve may also be used in making connections between copper and steel piping.

3.3 STORAGE OF MATERIALS

3.3.1 Provide proper weatherproof storage for the protection of materials and equipment on site. Blank off openings in all equipment until required for use. Consultant may require materials which are not properly stored to be discarded and removed from the site.

3.4 EXCAVATION AND BACKFILL

3.4.1 Be responsible for any excavation and backfill required for work of Division 15. Slope or shore all trenching in accordance with all current regulations and safety standards. Where any pipes pass under building footings, backfill under footings with lean concrete.

3.4.2 Use materials and standards of compaction for backfill in accordance with Division 2 unless specified otherwise.

3.4.3 If changes are required in locations, depth of excavating or related data, advise the Consultant in reasonable time to avoid disruption of work sequence.

3.5 SUPPORTS AND BASES

3.5.1 Provide structural work required for installation of equipment provided under this Division.

3.5.2 Where piping and/or equipment is to be supported by steel stud walls, use brackets and supports which attach to steel studs. Support equipment independently of wall sheathing.

3.5.3 Set all floor-mounted equipment on concrete bases at least 100 mm (4″) high Provide bases, anchor bolts and any special isolation bases. Concrete bases for air handling equipment are to be sized to suit unit drain air seal requirements, but 100 mm (4″) to remain as minimum. Size concrete equipment bases to suit the equipment actually supplied and in accordance with the Shop Drawings of such equipment. Do not start concrete work until anchor bolts and other embedded parts required for the complete installation, as well as Shop Drawings, are available at the site.

3.5.4 Carry out all concrete work in accordance with requirements of Division 3. Provide wire mesh, rebar and all necessary reinforcing.

3.5.5 For new concrete bases or pads on existing floors, first scrape and remove existing floor finish. Scarify existing floor so that new concrete adheres to it. Dowel new pads to existing floors.

3.6 CONCRETE INSERTS

3.6.1 General

3.6.1.1 Anchors for the support of pipes, ducts and equipment from the underside of suspended structural concrete systems may be by cast-in-place inserts placed prior to the pouring of concrete or by the use of inserts placed in holes drilled after the forms are stripped. The use of inserts cast into the concrete is the preferred option.

3.6.1.2 The safe load capacity of concrete anchors is affected by a number of variables such as specific anchor type, embedment, spacing between individual anchors, edge distances, direction of loading, concrete strength and “prying action”. Refer to the manufacturer's recommendations for each specific insert proposed, including any dynamic or vibratory loads.

3.6.1.3 Be responsible for the proper selection and installation of inserts, including number, type, spacing and accurate placement to provide the necessary safe load capacity and satisfactory long term performance.

3.6.2 **Installation of Cast in Place Inserts**: Ensure that anchors are accurately placed and "fixed" in position with sufficient rigidity to maintain their position during the placement of concrete. Do not displace reinforcing to install anchors without the prior permission of the Consultant.

3.6.3 **Installation of Inserts in Hardened Concrete**:

3.6.3.1 Use inserts placed in pre-drilled holes. Do not use powder driven inserts or self-drilling inserts. Before drilling holes, accurately locate all reinforcing bars in the affected areas using an electro-magnetic locator.

3.6.3.2 Do not drill through or otherwise damage reinforcing bars. If reinforcing is encountered, the inserts must be relocated. Ensure that hole diameter, depth of penetration, spacing, etc., are in strict accordance with the insert manufacturer's recommendations for the specific insert type and load condition.

3.6.3.3 Due to the relatively close spacing of reinforcing bars in the bottom of many of the beams and girders, the preferred location of drilled-in-place anchors in beams and girders is into the sides of these members, rather than upwards into the bottom.

3.6.4 **Sleeves Embedded in Concrete**: Except as approved otherwise by the Consultant, install sleeves embedded in concrete in accordance with the following general guidelines:

3.6.4.1 Centre to centre spacing to be not less than 3 diameters of the maximum size adjacent sleeve.

3.6.4.2 Provide additional reinforcing at points of congestion as directed by the Consultant.

3.6.5 Sleeves through beams will be permitted only as directed by the Consultant.

3.6.6 The reinforcing in beams, slabs and columns must not be displaced from its intended position under any circumstances unless prior written approval is obtained from the Consultant.

3.7 SLEEVES

3.7.1 Provide sleeves for insulated pipe large enough to permit free movement of pipe without crushing the insulation.

3.7.2 Provide sheet metal framing around ducts through masonry walls in exposed areas to ensure a clean finish around ducts.

3.8 FIRESTOPPING

3.8.1 Provide a listed firestop system in accordance with the Ontario Building Code to seal around all piping, tubing, ducts, conduits, electrical wires and cables, and other similar mechanical services which penetrate part of a building assembly required to have a fire resistance rating or a fire separation. Refer to Architectural Drawings and Specifications Section “Firestopping and Smoke Seals” for building assembly and fire separation types and locations.

3.8.2 For all penetrations through fire separations required to have a fire resistance rating, use firestop systems with an F rating not less than the fire resistance rating for the fire separation. This includes the sealing of any sleeves provided for future uses. Provide an FT rating where required by the Ontario Building Code. For all penetrations through a Mechanical Room floor, provide a minimum W rating - Class 1 in addition to the fire resistance rating.

3.8.3 At each fire stopping penetrating location, provide a fire stopping identification label indicating the system number installed, products used, date installed and the installer’s name. Locate label on penetrating service at the penetration location.

3.8.4 All firestopping must be thoroughly reviewed by the Technical Representative of the systems manufacturer on site before any firestopping is concealed and submit a report of compliance with the rating requirements. Technical Representative to complete 3 destructive tests to confirm compliance with ULC listing, minimum one floor test and one wall test, third test to be Contractors choice. Contractor to replace fire stopping system after destructive test has been completed. Submit a copy of the report to the Consultant. Report to include as a minimum, confirmation fire stopping shop drawings were used during review, locations where destructive testing was completed, confirmation all fire stopping locations were reviewed and installed systems meet the manufacturer requirements.

3.8.5 Install duct fire damper assemblies in strict accordance with manufacturer's instructions provided with each assembly.

3.9 CUTTING AND PATCHING

3.9.1 Do not cut or drill holes through floors, roof or structural members before obtaining permission from the Consultant. All cutting and patching to be done by the trade specializing in the materials to be cut.

3.9.2 Flash holes through walls and roof to make weatherproof.

3.9.3 For penetrations through walls not required to have a fire rating, seal all spaces between pipe or pipe and surrounding wall construction with a fire-rated foam sealant. Use 3M Fire Barrier, Metacaulk, or Dow Fire Stop UL Classified fire rated foam sealants. Do this as the work progresses, to avoid leaving inaccessible holes at completion of the job. For penetrations through parts of the building assembly required to have a fire resistance rating or acting as a fire separation, see Clause “Firestopping” in this Section.

3.9.4 Where pipes and ducts are shown on the Mechanical Drawings passing through existing walls, floors, and roof, cut and patch the necessary openings. Include the cost of all cutting and patching in the Lump Sum Contract Price for the work of Division 15. Before drilling holes through floors or roof slabs, accurately locate and note sizes for each required hole. Get approval of Consultant before any cutting is started. Electrical conduits with live wiring may be embedded in concrete floor slabs.

3.9.5 Remove and replace ceiling where necessary to complete the work of this Division unless this work is specifically included in another Division.

3.10 ELECTRICAL WORK

3.10.1 Perform all electrical work included in the work of this Division in accordance with the requirements of Division 16.

3.11 PAINTING

3.11.1 Touch up minor damage to finish on equipment supplied with factory applied baked enamel finish. Completely refinish items suffering damage which, in the opinion of the Consultant, is too extensive to be remedied by touchup.

3.11.2 Paint all steel framework provided by this Division with a chromium oxide primer. All steel framework outside the building is to be hot dipped galvanized.

3.11.3 Exposed non-galvanized hangers, racks, strut and fasteners to be thoroughly degreased and primed.

3.11.4 Paint all exterior piping. Use two coats of paint. Use colours as selected by the Consultant.

3.11.5 Paint all new and existing gas piping. Use two coats of paint. Use colours as selected by the Consultant.

3.11.6 Where walls are cut and patched for mechanical work, paint walls to match existing. For walls less than 9.3m^2 (100 sq ft), paint entire wall. For walls larger than 9.3m^2 (100 sq ft), paint area of patch. Painting to be completed by painting contractor.

3.11.7 Include the cost of all painting in the Lump Sum Contract Price for the work of Division 15.

3.12 ACCESS DOORS

3.12.1 Supply access doors wherever equipment, valves, dampers, life safety devices, etc., are concealed behind walls or inaccessible ceilings. All devices installed requiring periodic maintenance to be made accessible. Doors will be installed by Division 9.

3.13 IDENTIFICATION

3.13.1 Identify all new piping and ductwork using name labels. Apply labels at 7 m (24′) intervals and at all branch connections, valves, and access panel locations. Identify fan system number at each ductwork label. Mark each pipe in a space or area less than 7 m (24′) at least once with a name label. Apply arrows indicating flow direction beside each name label.

3.13.2 To ensure permanent bond, apply 3M Adhesive EC-1341 to the surface of the insulation or pipe material. Apply the label with its own adhesive on this surface. Remove any labels “lifting” or “peeling”. Clean the surface and repeat the procedure specified with a new label. Where labels do not adhere, use pipe banding tape spirally wrapped for full length of label. Apply label over the banding tape.

3.13.3 Use colour bands on all piping in accordance with Detail Sheet at end of this section. Where not indicated in Detail Sheet, use colours in accordance with current CGSB Publication for identification of piping systems. Submit list with all proposed colours and materials to the Consultant for review before ordering any materials.

3.13.4 Provide nameplate identifying equipment type, identification number, service and area served on each piece of mechanical equipment. For heat pumps, exhaust fans, condensing units, roof top air handling units, etc. list the rooms served by each piece of equipment.

3.13.5 Identify all manual and automatic control valves on all systems using brass tags attached with non-ferrous chains. Prepare a schedule of all tags for each system showing designating number, service and function. Include these schedules in the Operating and Maintenance Manuals and in the Mechanical Room.

3.13.6 Provide identification of all duct balancing dampers. Identify both support points of balancing damper and bottom of duct. Fluorescent orange spray paint is acceptable.

3.13.7 Where equipment is concealed above accessible ceilings, indicate location using coloured-coded marking devices, approved by Consultant, fastened to the ceiling components.

3.14 PIPING

3.14.1 General

3.14.1.1 Conceal all piping except in equipment rooms, unfinished areas, and where specifically noted. Unless shown otherwise, install all above ground piping parallel to building walls and partitions.

3.14.1.2 Install escutcheon plates at walls, floors and ceilings where piping is exposed. Install piping to conserve headroom.

3.14.1.3 In locations where space is provided for future or other equipment requiring connection to systems installed under this Contract, install services with shutoff valves and caps to allow connection to the system without interruption.

3.14.2 **Drain Hose Connections**: Provide drain hose connections at the base of all risers, on the suction side of all pumps and in all locations shown on Drawings.

3.14.3 Supports and Hangers

3.14.3.1 Provide all hangers, supports and sway braces in accordance with ANSI B31.1 and the Ontario Building Code. Support all piping in accordance with the Ontario Building Code.

3.14.3.2 Use Anvil beam clamps.

3.14.3.3 Use line size adjustable wrought steel clevis type hangers for horizontal piping 32 mm and less (1-1/4″ and less). For copper pipe, wrap pipe with tape at all hangers or use Anvil Figure CT-99C adjustable tubing ring hangers.

3.14.3.4 For piping 40 mm and over (1-1/2″ and over) use adjustable wrought steel clevis type hangers large enough for pipe insulation. See Section 15260 for insulation shields.

3.14.3.5 Where specified and/or shown on Drawings and in schedules, use spring hangers. See Drawings for details.

3.14.3.6 Unless specified otherwise, support piping at maximum spacing as shown and within 460 mm (18″) of each side of all valves and bends.

3.14.3.7 Support all plumbing piping in accordance with the Ontario Plumbing Code.

3.14.3.8 Support horizontal cast iron drainage piping at 1.5 m (5′) maximum spacing. Where the drain has successive fittings with no pipes between the fittings exceeding 800 mm (1′)in length, support the drain at intervals not exceeding 1 m (3′). Where mechanical joints are used, provide double hangers and sway bracing.

3.14.3.9 Where cast iron pipe with mechanical joints is used, support piping at both sides of all joints in horizontal runs, at all branch ends, and at all points where there is a change in direction. Where the pipe is 150 mm (6″) or larger in horizontal runs, brace to prevent horizontal movement at each branch or change in direction. Use braces, blocks, rodding or other suitable method recommended by the joint manufacturer. Provide Inspection Report from the manufacturer's representative certifying the installation is in accordance with their published installation data.

3.14.3.10 Do not support piping from other piping or equipment, or from metal roof decking.

3.14.3.11 **Schedule**:

Pipe Size mm	**20**	**25**	**32**	**40**	**50**	**65**	**80**	**100 to 200**	**250 & Over**
Max. Span m	1.8	2.1	2.4	2.4	3	3.4	3.7	4.3	6.1

3.14.4 **Anchors**: Install anchors where shown and where required. Use "U" bolts for piping 80 mm (3″) in diameter and less. For piping over 80 mm (3″) diameter, use steel fabricated anchors welded directly to pipe.

3.14.5 **Provision for Expansion**: Make proper allowance for thermal expansion and contraction whether shown on the Drawings or not. Use adequate offsets on all takeoffs to allow for expansion and contraction of mains. Weld all steel pipe forming an expansion loop regardless of size. Silver solder all copper pipe forming an expansion loop regardless of size. Use Flexonics or Anvil pipe alignment guides where shown and where required. Provide pipe guides for piping on either side of expansion loops, expansion joints and expansion compensators in accordance with "Standards of the Expansion Joint Manufacturers Association, Inc.".

3.15 USE OF FANS

3.15.1 Do not use any fan supplied under this Contract for ventilation while the building is under construction. The building must be "broom clean" and all painting finished before permission will be granted for testing fans.

3.15.2 The Consultant reserves the right to use any piece of equipment, device, or material for such reasonable lengths of time and at such times as may be required to make a complete and thorough test of the same before final completion and acceptance of the work. Such tests are not to be construed as evidence of acceptance of the work, and it is agreed and understood that no claim for damage will be made for injury or breakage to any part or parts of the equipment and/or materials due to the aforementioned tests, where such injuries or breakage are caused by a weakness or inaccuracy of parts, or by defective materials and/or workmanship of any kind. Supply all labour and equipment required for such tests. Trial usage will not initiate or affect in any way the warranties required for devices being tested.

3.16 INSPECTION AND TESTING

3.16.1 **General**: Inspect and test all piping. Repair any leaks and retest until satisfactory. Do not cover or close in piping until inspection and tests are completed. Thoroughly test all systems before making arrangements for the final demonstration in the presence of the Owner's staff. At the completion of the work, demonstrate operation of all systems to the Owner's representative and the Consultant. Promptly rectify any malfunction found and retest.

3.16.2 **Soil, Waste, Vent and Building Drains**: Seal all openings in section under test, then fill with water to a height of 3 m (10′) above top of section. Maintain water level for at least two hours. Test in sections as the work progresses. After all fixtures have been placed, apply a smoke test to the satisfaction of the local Plumbing Inspector.

3.16.3 **Natural Gas**: Test in accordance with latest CSA B149.1.

3.17 **PERFORMANCE VERIFICATION**

3.17.1 All systems must be thoroughly tested by the Technical Representative of the system manufacturers before arrangements are made for the final demonstration in the presence of the Owner's staff.

3.17.2 At the completion of the work, demonstrate operation of all systems to the Owner's representative and the Consultant. Promptly rectify any malfunction found.

3.17.3 Systems to be tested are: Rooftop Unit, Building Control System.

3.17.4 The manufacturer's representative must be present for the test period and submit a Certificate of Operation to the Consultant.

3.18 **START-UP SERVICES**

3.18.1 Provide the services of a qualified person to be in the building daily from 0800 hours to 1700 hours Monday through Friday for two weeks after work of this Contract is taken over by the Owner. Assist Owner's staff to become familiar with the system operation. Provide a similar service for week after switchover to the opposite air conditioning cycle (heating or cooling).

3.19 **PLACING IN OPERATION**

3.19.1 Upon completion of all work and before turning over the job, test each system for proper operation.

3.19.2 Flush through all drains and properly adjust flush valves and other fixtures.

3.19.3 Open and clean all new and existing traps, strainers and scale pockets after two weeks' operation.

3.19.4 Clean out all room heating units, terminal heating units and all air handling equipment with a vacuum cleaner when building is completed.

3.19.5 For each new filter bank, provide one extra set of filters.

3.19.6 Steam clean all existing convectors and wall-fin elements in the rooms where changes have been made. Do this after all other work has been completed.

3.20 **COOPERATION BETWEEN TRADES**

3.20.1 Cooperate and coordinate with other trades as required for satisfactory and expeditious completion of work. Take field dimensions relative to work. Fabricate and erect work to suit field dimensions and field conditions. Pay cost of extra work caused by and make up time lost as result of failure to provide necessary cooperation information or items to be fixed to or built-in, in adequate time.

3.21 **MAINTENANCE OF EXISTING SERVICES**

3.21.1 Take every precaution to locate and protect existing services so that no unscheduled interruption occurs. If any existing service is damaged due to the work of this

Division, arrange and pay for repair. Bear any costs due to interruption of existing services.

3.21.2 The operation of the building by the Owner for day-to-day activities takes precedence over all construction related scope of work. The Contractor may be asked to cease work immediately in these instances and directed to work at another time. Assume all construction related activities which will impact the day-to-day operations of the facilities will be done after hours. Include all costs associated with after hours and overtime hours in the Base Bid. Additional costs related to after hours or overtime hours after Award of Contract will not be entertained.

3.21.3 Permission from the Owner is required before making any connections to or rerouting of existing services. Before any interruptions of service or restriction of use of any service, provide seven days prior written notice to the Consultant and Owner.

3.22 **PROTECTING AND MAKING GOOD**

3.22.1 Be responsible for protection of Owner's property, as well as finished and unfinished work, from damage due to execution of work under this Contract. Repair damage resulting from failure to provide such protection to the satisfaction of the Consultant, at no expense to the Owner.

3.22.2 Attach and fasten fixture and fittings in place in safe, sturdy, secure manner so that they cannot work loose or fall or shift out of position during occupancy of building, as the result of vibrating or other causes in normal use of building.

3.23 **REMOVAL OF EXISTING MATERIAL AND EQUIPMENT**

3.23.1 Remove existing material and equipment where shown or specified. Unless noted or specified otherwise, all material and equipment which is removed becomes the property of the Contractor and must be immediately removed from the site.

3.24 **EXAMINATION OF EXISTING EQUIPMENT**

3.24.1 Report all damaged, defective and non-functioning equipment shown for reinstallation or relocation to the Consultant prior to removal and storage. All equipment will be assumed to be fully functional unless reported otherwise prior to removal.

3.24.2 Devices and equipment damaged during removal, storage or reinstallation will be replaced at no cost to the Owner.

3.25 **ALTERNATIVE, SEPARATE, UNIT AND IDENTIFIED PRICES**

3.25.1 Refer to Division 1 Specifications.

3.26 **FIRE SAFETY IN EXISTING BUILDINGS**

3.26.1 Where temporary shutdown of sprinkler systems, standpipe systems or other fire protection systems is required, do all work in compliance with Article 1.1.1.2, Clause 2.8.2.1.1.G and Subsections 6.4.1 and 6.5.2 of the Fire Code.

3.27 DEFICIENCY REVIEW

3.27.1 The Mechanical Contractor shall confirm in writing that the work is complete and ready for inspection. The Consultant will schedule a site visit to review the work and provide a written deficiency list. Once deficiencies have been corrected, the Mechanical Contractor shall confirm in writing to the Consultant that all deficiencies have been corrected. The Consultant will schedule a second site visit to review the correction of noted deficiencies. Should any noted deficiencies be found to be still outstanding, the Mechanical Contractor shall correct them and again notify the Consultant in writing. Charges to the Mechanical Contractor may result from repeat visits after the second visit.

3.27.2 The Mechanical Contractor is required to complete all work above ceilings and allow time for deficiency reviews and correction of noted deficiencies in a timely manner in order to accommodate the current Construction Schedule. This includes time for reinspection as required prior to concealing (drywall enclosures, drywall ceilings and acoustic tile ceilings) of any service. The Mechanical Contractor will be responsible for uncovering any concealed services for inspection.

3.28 HOURLY LABOUR RATE

3.28.1 Hourly labour rate shall be the actual rate paid to the worker as posted by the local Union Agreement plus a burden mark-up of 100% to compensate for contributions, assessments, employment insurance, health insurance, pension plans, WSIB, taxes, vacation pay, travel, parking, welfare, union package and membership dues, supervision, material handling, training, rest periods, down time, breaks, personal hygiene, small tools, clean up time, profit, other benefits paid to the worker and all other costs incurred by the Company including meetings, office time. Travel time to and from the site shall be at no charge to the Owner. For the purpose of mechanical work, the journeyman plumber union rate will be used for all trades completing any mechanical work.

3.29 TEMPORARY WATER SERVICE

3.29.1 Provide a Reduced Pressure type backflow preventer at each temporary water service connection used for construction purposes. Completely remove all temporary facilities once permanent systems are tested and operational.

3.30 LIST OF MECHANICAL SUBCONTRACTORS AND MANUFACTURERS

3.30.1 In the Bid documents, name the Subcontractors and Manufacturers for the items listed below. Use only one name for each item. See Clause “Material and Equipment”. Where the name of a manufacturer is not entered on the Bid Form, the Contractor will be required to use the base specified manufacturer.

3.30.2 **Subcontractors**

Controls
Insulation
Sheet Metal
Testing and Balancing

3.30.3 **Manufacturers**

Grilles, Registers and Diffusers
Rooftop Units

END OF SECTION

1 General

1.1 **GENERAL REQUIREMENTS**

1.1.1 Conform to the requirements of Section 15001, “Mechanical General Provisions”.

1.2 **MECHANICAL SYSTEMS COMMISSIONING**

1.2.1 The mechanical systems of this project will be thoroughly commissioned by a Third Party Commissioning Agent engaged by the Owner. Assist and cooperate with the commissioning agent as required. Include all related costs in the Base Bid.

1.3 **DESCRIPTION OF SYSTEMS**

1.3.1 **Supply Air, Return Air and Exhaust Air Systems:**

1.3.1.1 Existing heat pumps serving gymnasium are being removed. A new rooftop unit is being installed to serve the gymnasium. Most of the existing ductwork is being reused.

2 Products

2.1 **GENERAL**

2.1.1 Furnish all test equipment. All equipment will remain the property of the testing and balancing company. Use recently calibrated instruments. Provide verification of calibration to the Consultant when requested.

2.1.2 Approved testing and balancing companies for this project are:

Accu-Air Windsor
C. J. Zettler & Associates Ltd. London
Caltab, Windsor

2.2 **MATERIALS**

2.2.1 Use materials specified herein or approved equal as defined in Section 15001, “Mechanical General Provisions”, Clause “Material and Equipment”.

2.3 **DUCT ACCESS HOLE PLUGS**

2.3.1 Use Duro Dyne Type IP 4 duct access hole plugs.

3 Execution

3.1 **GENERAL**

3.1.1 Include all labour, engineering and test equipment required to adjust and balance all heating, ventilating, air conditioning and exhaust systems installed or altered under this Contract.

3.1.2 Check rotation of all fans and pumps. Advise appropriate trade if any corrections are needed. Ensure corrections are made before starting any testing or balancing.

3.1.3 Ensure that all control valves, devices and equipment interlocks are operating in the manner required for the correct performance of the systems.

3.1.4 Where existing systems are modified, balance only the section or branches which serve the renovated areas.

3.1.5 Carry out testing and balancing under both extreme summer and extreme winter conditions. If you wish to simulate these conditions, obtain approval from the Consultant before beginning work.

3.2 JOB CONDITIONS

3.2.1 Schedule this work in cooperation with other trades involved.

3.2.2 Do not begin testing and balancing until the systems have been completely installed, tested and put in running order. Correct operation of equipment and system components and cleanliness of piping and ductwork is the responsibility of the appropriate trade.

3.3 SUBMITTALS

3.3.1 Record all test data and submit in pdf format to the Consultant. A copy of the reviewed final report is to be included in each of the Operation and Maintenance Manuals.

3.3.2 Use data sheets which are approved by the Consultant to record measurements. Include schematic diagrams of all systems identifying branches, inlets, outlets and equipment. Submit sample sheets for review using same procedure as for Shop Drawings.

3.3.3 Provide a Deficiency List to the Contractor for all materials and installation methods which are found not to be complying with the Specifications and, where specified, quantities could not be achieved within the required tolerances. Submit copy of Deficiency List to the Consultant at the same time it is issued to the Contractor.

3.3.4 Record all test data in SI units.

3.4 AIR SYSTEMS

3.4.1 Test and adjust fan speeds and dampers to deliver the required air quantities. For belt driven fans, determine size of sheaves required to properly balance systems and operate systems at minimum static pressures. Install selected sheaves. Sheaves will be supplied by fan supplier.

3.4.2 For each indoor and rooftop air handling unit provide static pressure profile including pressure drop across each individual unit component (i.e. coils, filter banks, fans, energy recovery wheels, etc) as well as static pressure in intake plenums, discharge supply ducts and return air ducts. Include return fan pressure differential whether return fan is located within air handling unit or not.

3.4.3 **Constant Volume Systems**: Make pitot tube traverse of main supply and return air ducts to measure total air quantities.

3.4.4 Seal duct access holes with plugs. Do not use duct tape to seal access holes.

3.4.5 Test and adjust each diffuser, grille, register and volume box to within 10% of design requirements, and also adjust so as to minimize drafts in all areas.

3.4.6 Record data as specified in Clause “Balancing Data”.

3.5 **BALANCING DATA**

3.5.1 Include the following information in the test report:

3.5.1.1 **Motors**:

Manufacturer
Model and/or Serial Number
Rated amperage and voltage
Rated kW (hp)
Rated rpm
Corrected full load amperage
Measured amperage and voltage
Calculated kW (hp)
Measured rpm
Sheave size, type and manufacturer

3.5.1.2 **Fans**:

Manufacturer
Model and/or Serial number
Rated L/s (cfm)
Rated rpm
Rated pressure rise
Measured L/s (cfm)
Measured rpm
Measured pressure rise
Pulley size, type and manufacturer
Belt size and quantity
Performance curve by manufacturer

3.5.1.3 **Air Systems (including inlets and outlets)**:

Unit Ventilators (minimum flow and maximum flow)
Grille, register or diffuser reference number and manufacturer
Grille, register or diffuser location
Design air quantity
Effective area factor and size
Measured air quantity
Static Pressure Setpoint (VAV Systems)

3.5.1.4 **Testing and Balancing Instruments**:

Types
Serial Numbers
Dates of calibration

3.6 DUCT LEAK TESTING

3.6.1 Perform leakage testing on representative sections, as selected by the Consultant, involving at least 25% of the duct distribution systems. Include all ductwork types (rectangular, round) and pressure classifications in the leak testing.

3.6.2 Test duct systems to the following SMACNA standards.

Pressure Class	Seal Class	Leakage Class
All	A	6

3.6.3 Refer to Section 15800, Clause “Duct Leak Testing”.

3.6.4 Test ductwork before ducts are insulated painted or concealed.

3.6.5 Immediately advise Contractor of any defects discovered during test. Retest systems after defects have been corrected.

3.7 FINAL INSPECTION AND ACCEPTANCE

3.7.1 After submission of balancing report, arrange a final inspection with the Consultant.

3.7.2 At final inspection recheck points or areas selected by the Consultant.

3.7.3 For each system, if more than 10% of the measurements at the selected recheck stations deviate by 10% or more from those in the Report, then the Report for that system will be rejected as unacceptable.

3.7.4 If Report is rejected, rebalance systems deemed to be unacceptable, submit new Reports, and make reinspection at no extra cost to the Owner.

3.7.5 Permanently mark settings of dampers and other adjustment devices so that adjustment can be restored if disturbed. Type of marking and method of application to be approved by the Consultant.

END OF SECTION

1 General

1.1 **GENERAL REQUIREMENTS**

1.1.1 Conform to the requirements of Section 15001, “Mechanical General Provisions”.

1.2 **MECHANICAL SYSTEMS COMMISSIONING**

1.2.1 The mechanical systems of this project will be thoroughly commissioned by a Third Party Commissioning Agent engaged by the Owner. Assist and cooperate with the commissioning agent as required. Include all related costs in the Base Bid.

1.3 **DESCRIPTION OF SYSTEMS**

1.3.1 **Supply Air, Return Air and Exhaust Air Systems:**

1.3.1.1 Existing heat pumps serving gymnasium are being removed. A new rooftop unit is being installed to serve the gymnasium. Most of the existing ductwork is being reused.

1.4 **SHOP DRAWINGS**

1.4.1 Submit Shop Drawings in accordance with Section 15001, Clause “Shop Drawings” for the following equipment and materials:

- access doors
- duct sealer
- ductwork gauges, material and methods of support for each pressure type, shape (i.e. round, rectangular) and size range.
- grilles, registers and diffusers

2 Products

2.1 **MATERIALS**

2.1.1 Use materials specified herein or approved equal as defined in Section 15001, “Mechanical General Provisions”, Clause “Material and Equipment”.

2.2 **DUCTWORK**

2.2.1 **Standards**: Construct all ductwork in accordance with the Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) Manual “HVAC Duct Construction Standards - Metal and Flexible”.

2.2.2 **Materials**: Unless specified otherwise, fabricate all ductwork from galvanized steel. Use SMACNA recommended thicknesses except where specified otherwise.

2.2.3 **Rectangular - Low Pressure**: Use SMACNA 2″ W.G. pressure class. Use SMACNA recommended sheet metal thicknesses.

2.2.4 **Rectangular - Medium Pressure**: Fabricate according to current SMACNA standards for static pressures in duct up to 1490 Pa (6″ W.G.).

2.2.5 **Round and Oval - Medium Pressure**: Fabricate according to current SMACNA standards for static pressures in duct up to 1490 Pa (6″ W.G.). Use United Sheet Metal Spiral UniSeal round and oval ducts. Use United Sheet Metal UniForm machine formed fittings in all sizes up to and including 200 mm (8″). In larger sizes also use UniForm, but they may be either machine formed or shop fabricated. For shop fabricated fittings, make sample fittings and get approval of the Consultant before proceeding with fabrication of job fittings. The Consultant may require the Contractor to arrange and pay for testing of selected fittings by a recognized independent testing laboratory. Where round ductwork is shown internally lined, use Alpha or Plascad acoustic thermal duct consisting of Alpha free-flow spiral duct lined with 50 mm fibreglass insulation and 28 gauge steel perforated interior liner.

2.2.5.1 Where round ductwork is exposed to view, a decorative grade installation is required. Arrange for special handling and shipping to avoid dents and minimize scratches.

2.3 INTERNAL DUCT LINING

2.3.1 Use Schuller/Manville “Permacote Linacoustic” fibreglass duct liner with air stream surface protected with “Permacote”, acrylic coating. Coating to be treated with anti-microbial agent so as not to support growth of fungus or bacteria as determined by ASTM G21 and G22. Liner to meet or exceed Life Safety Standards as established by NFPA 90A and 90B, have a NRC not less than 0.7, and a thermal conductivity of 0.36 W/m.K (0.0208 Btuh/ft/°F) at 23.9°C (75°F).

2.3.2 The following manufacturers of the above equipment will be considered as equal, subject to requirements of Clause “Material and Equipment”:

Knauf
Manson
Fiberglas

2.4 DUCT ACCESS DOORS

2.4.1 Use Nailor Industries Inc. 0800 Series duct access doors. For duct dimension up to 300 mm (12″) use 250 mm x 150 mm (10″ x 6″) door. For duct dimension up to 600 mm (24″), use 380 mm x 250 mm (15″ x 10″) door. For all larger ducts, use 660 mm x 510 mm (26″ x 20″) door.

2.4.2 For insulated ducts, use doors factory insulated with 25 mm (1″) thick fibreglass insulation.

2.4.3 The following manufacturer of the above equipment will be considered as equal, subject to requirements of Clause "Material and Equipment":

Acudor
Ductmate
Nailor
Ruskin

2.5 FLEXIBLE DUCT CONNECTORS

2.5.1 Use Duro Dyne “Durolon” or Ventfabrics “Ventlon” pre-assembled flexible duct connectors with 150 mm (6″) fabric width.

2.6 GRILLES, REGISTERS AND DIFFUSERS

2.6.1 Use Price Limited grilles, registers and diffusers. Provide types, accessories and finishes as noted in the Equipment Schedules. See Drawings for sizes.

2.6.2 The following manufacturers of the above equipment will be considered as equal, subject to requirements of Clause “Material and Equipment”:

Kreuger
MetalAire
Nailor
Titus
Tuttle & Bailey

2.7 BALANCING DAMPERS

2.7.1 For ducts 930 cm² (144 in²) and less in cross sectional area, use single blade dampers with locking quadrant and pin on far side. For larger ducts use, multi-blade, opposed blade dampers with external operator and locking quadrant. Provide spacers to maintain clearance between duct and damper blades.

2.8 DUCT SEALER

2.8.1 Use Duro Dyne DWN water based high pressure duct sealer.

2.8.2 The following manufacturers of the above material will be considered as equal, subject to requirements of Clause “Material and Equipment”:

Childers
Multi-Purpose
3M Canada Inc.
United Sheet Metal
Hardcast

2.9 ROOFTOP HEATING AND COOLING UNIT (Drawing Reference RTU-101)

2.9.1 Use Carrier Weathermaster 48 HC Series unit, capacity and cooling efficiency as indicated on Schedule on Drawings.

2.9.2 Unit must include either an etched metal nameplate, or a UV resistant sticker nameplate that is protected by an external accessible metal enclosure. Nameplate must include the natural gas approval marking for the unit.

2.9.3 General

2.9.3.1 Outdoor, rooftop mounted, electrically controlled, heating and cooling unit utilizing a fully hermetic scroll compressor(s) for cooling duty and gas combustion for heating duty.

2.9.3.2 Factory assembled, single-piece heating and cooling rooftop unit. Contained within the unit enclosure to be all factory wiring, piping, controls, and special features required prior to field start-up.

2.9.3.3 Unit shall use environmentally sound, Puron refrigerant.

2.9.4 **Quality Assurance**

2.9.4.1 Unit to meet ASHRAE 90.1 minimum efficiency requirements. 3-phase units to be Energy Star certified.

2.9.4.2 Unit to be rated in accordance with AHRI Standards 210/240 and 340/360. Unit to be designed to conform to ASHRAE 15, 2001.

2.9.4.3 Unit to be UL-tested and certified in accordance with ANSI Z21.47 Standards and UL-listed and certified under Canadian standards as a total package for safety requirements.

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

2.9.4.5 Unit casing to be capable of withstanding 500-hour salt spray exposure per ASTM B117 (scribed specimen).

2.9.4.6 Unit to be subjected to a completely automated run test on the assembly line. The data for each unit will be stored at the factory, and must be available upon request.

2.9.4.7 Unit to be designed in accordance with UL Standard 1995, including tested to withstand rain.

2.9.4.8 Unit to be constructed to prevent intrusion of snow and tested to prevent snow intrusion into the control box up to 40 mph.

2.9.4.9 Unit shake tested to assurance level 1, ASTM D4169 to ensure shipping reliability.

2.9.5 **Operating Characteristics**

2.9.5.1 Unit to be capable of starting and running at 125°F (52°C) ambient outdoor temperature, meeting maximum load criteria of AHRI Standard 210/240 or 340/360 at ± 10% voltage.

2.9.5.2 Compressor with standard controls to be capable of operation down to 35°F (2°C), ambient outdoor temperatures.

2.9.5.3 Unit to be configured for vertical or horizontal supply and return configurations as shown on the Drawings.

2.9.6 **Unit Cabinet**

2.9.6.1 Unit cabinet to be constructed of galvanized steel, and to be bonderized and coated with a pre-painted baked enamel finish on all externally exposed surfaces.

2.9.6.2 Unit cabinet exterior paint to be: film thickness, (dry) 0.003 inches minimum, gloss (per ASTM D523, 60°F / 16°C): 60, Hardness: H-2H Pencil hardness.

2.9.6.3 Evaporator fan compartment interior cabinet insulation shall conform to AHRI Standards 210/240 or 340/360 minimum exterior sweat criteria. Interior surfaces to be insulated with a minimum 1/2-in. thick, 1 lb density, flexible fiberglass insulation, neoprene coated on the air side. Aluminum foil-faced fiberglass insulation to be used in the gas heat compartment.

2.9.6.4 Base of unit shall have a minimum of four locations for thru-the-base gas and electrical connections (factory installed or field installed), standard.

2.9.6.5 **Base Rail**: Unit shall have base rails on a minimum of 4 sides. Holes to be provided in the base rails for rigging shackles to facilitate manoeuvring and overhead rigging. Holes to be provided in the base rail for moving the rooftop by fork truck. Base rail to be a minimum of 16 gauge thickness.

2.9.6.6 **Condensate Pan and Connections**: to be an internally sloped condensate drain pan made of a non-corrosive material. Comply with ASHRAE Standard 62. Use a 3/4-in. -14 NPT drain connection, possible either through the bottom or side of the drain pan.

2.9.6.7 **Top Panel**: To be a single piece top panel on 04 thru 12 sizes, two piece on 14 size.

2.9.6.8 **Gas Connections**: All gas piping connecting to unit gas valve shall enter the unit cabinet at a single location on side of unit (horizontal plane). Standard unit shall have a thru-the-base gas-line location using a raised, embossed portion of the unit basepan. Optional, factory-approved, water-tight connection method must be used for thru-the-base gas connections. No base pan penetration, other than those authorized by the manufacturer, is permitted.

2.9.6.9 **Electrical Connections**: All unit power wiring shall enter unit cabinet at a single, factory-prepared, knockout location. Standard unit shall have a thru-the-base electrical location (s) using a raised, embossed portion of the unit basepan. Optional, factory-approved, water-tight connection method must be used for thru-the-base electrical connections. No base pan penetration, other than those authorized by the manufacturer, is permitted.

2.9.6.10 **Component Access Panels:** Cabinet panels to be easily removable for servicing. Unit shall have one factory installed, tool-less, removable, filter access panel. Panels covering control box, indoor fan, indoor fan motor, gas components (where applicable), and compressors shall have a molded composite handles. Handles to be UV modified, composite. They to be permanently attached, and recessed into the panel. Screws on the vertical portion of all removable access panel shall engage into heat resistant, molded composite collars. Collars to be removable and easily replaceable using manufacturer recommended parts.

2.9.7 **Gas Heat**

2.9.7.1 Heat exchanger to be an induced draft design. Positive pressure heat exchanger designs shall not be allowed. Incorporate a direct-spark ignition system and redundant main gas valve. Gas supply pressure at the inlet to the rooftop unit gas valve must match that required by the manufacturer.

2.9.7.2 The heat exchanger to be controlled by an integrated gas controller (IGC) microprocessor. IGC board shall notify users of fault using an LED (light-emitting diode). The LED to be visible without removing the control box access panel. IGC board shall contain algorithms that modify evaporator-fan operation to prevent future cycling on high temperature limit switch. Unit to be equipped with anti-cycle protection with one short cycle on unit flame rollout switch or 4 continuous short cycles on the high temperature limit switch. Fault indication to be made using an LED.

2.9.7.3 **Stainless Steel Heat Exchanger**

2.9.7.3.1 Heat exchanger to be of the tubular-section type constructed of a minimum of 20-gauge type 409 stainless steel. Burners to be of the in-shot type constructed of aluminum-coated steel. Burners shall incorporate orifices for rated heat output up to 2000 ft (610m) elevation. Each heat exchanger tube shall contain multiple dimples for increased heating effectiveness.

2.9.7.3.2 Induced draft combustion motor and blower to be direct-drive, single inlet, forward-curved centrifugal type, made from steel with a corrosion-resistant finish. Use permanently lubricated sealed bearings, with inherent thermal overload protection, automatic reset feature.

2.9.8 **Coils:** Standard evaporator and condenser coils shall have aluminum lanced plate fins mechanically bonded to seamless internally grooved copper tubes with all joints brazed. Evaporator coils to be leak tested to 150 psig, pressure tested to 450 psig, and qualified to UL 1995 burst test at 1775 psig. Condenser coils to be leak tested to 150 psig, pressure tested to 650 psig, and qualified to UL 1995 burst test at 1980 psig.

2.9.9 **Refrigerant Components**

2.9.9.1 Refrigerant circuit shall include the following control, safety, and maintenance features:

- Thermostatic Expansion Valve (TXV) shall help provide optimum performance across the entire operating range. Shall contain removable power element to allow change out of power element and bulb without removing the valve body.
- Refrigerant filter drier - Solid core design.
- Service gauge connections on suction and discharge lines.
- Pressure gauge access through a specially designed access port in the top panel of the unit.

2.9.9.2 Provide gauge line access port in the skin of the rooftop, covered by a black, removable plug. Plug to be easy to remove and replace. When the plug is removed, the gauge access port shall enable maintenance personnel to route their pressure gauge lines. This gauge access port shall facilitate correct and accurate condenser pressure readings by enabling the reading with the compressor access panel on. The plug to be made of a leak proof, UV-resistant, composite material.

2.9.9.3 Unit shall use fully hermetic, scroll compressor for each independent refrigeration circuit. Models to be available with single compressor/single stage cooling designs on 04 - 07 sizes models, and 2 compressor/2-stage cooling models on 08 - 14 sizes. Compressor motors to be cooled by refrigerant gas passing through motor windings.

Compressors to be internally protected from high discharge temperature conditions. Compressors to be protected from an over-temperature and over-amperage conditions by an internal, motor overload device. Compressor to be factory mounted on rubber grommets. Compressor motors shall have internal line break thermal, current overload and high pressure differential protection. Crankcase heaters shall not be required for normal operating range, unless provided by the factory.

2.9.10 **Filter Section**: Filters access is specified in the unit cabinet section of this specification. Filters to be held in place by a pivoting filter tray, facilitating easy removal and installation. Use 2″ thick Camfill Farr 30/30 pleated filters with MERV 8a rating. Filters to be standard, commercially available sizes. Only one size filter per unit is allowed. Provide a spare set of filters for each unit.

2.9.11 **Evaporator Fan and Motor**

2.9.11.1 Evaporator Fan Motor to be NEMA premium efficient, with permanently lubricated bearings, inherent automatic-reset thermal overload protection or circuit breaker, and a maximum continuous bhp rating for continuous duty operation.

2.9.11.2 Belt-driven Evaporator Fan to include an adjustable-pitch motor pulley, sealed, permanently lubricated ball-bearing type bearings. Blower fan to be double-inlet type with forward-curved blades, assembly constructed from steel with a corrosion resistant finish and dynamically balanced.

2.9.12 **Condenser Fans and Motors**

2.9.12.1 Condenser Fan Motors to be a totally enclosed motor with permanently lubricated bearings, inherent thermal overload protection with an automatic reset feature. Use a shaft-down design on 04 to 12 models and shaft-up on 14 size with rain shield.

2.9.12.2 Condenser Fans to be a direct-driven propeller type fan with aluminum blades riveted to corrosion-resistant steel spiders, dynamically balanced.

2.9.13 **EnergyX and Economizer**

2.9.13.1 One-piece EnergyX (Energy Recovery Ventilation) unit is an electrically controlled ventilation air pre-conditioner utilizing an ARI 1060 certified Energy Recovery Cassette to reduce the cooling and heating loads placed on the primary HVAC unit by untreated outdoor air. Building exhaust air to be introduced to the EnergyX unit through ductwork. Unit to be designed as a factory-installed option to be used with WeatherMaster 48HC units for use in vertical return applications only.

2.9.13.2 Unit to be designed in accordance with UL Standard 1995. Energy Recovery unit to be ETL tested and certified. Rooftop unit and Energy Recovery unit to be ETL certified as one single system. Roof curb or curb extension to be designed to conform to NRCA Standards. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation. Unit casing to be capable of withstanding ASTM No. 141 (Method 6061) 500-hour salt spray test. Unit shall contain ARI 1060 certified Energy Recovery Cassette. Unit shall leakage rates to be capable of meeting ASHRAE Standard 62.1 requirements for use of class-2 exhaust with class-1 ventilation air.

2.9.13.3 The EnergyX unit to be a factory assembled, single piece unit. Contained within the unit enclosure to be all factory wiring with a single, pre-determined point of power input and a single point of 24-volt control wiring.

2.9.13.4 Unit cabinet to be constructed of galvanized steel coated with a pre-painted baked enamel finish. All models shall have hoods installed over outside air intake and exhaust openings. Outside air hood shall have aluminum water entrainment filters. All models have 1-in., 2 pound density fiberglass insulation. Hinged access doors with compression latches to be provided on all units for access to fans and filters. Hinged doors to be provided with at least one handle capable of being locked. Exhaust air stream shall have back-draft dampers to prevent air penetration during off cycles. Holes to be provided in the base rails for rigging shackles to facilitate overhead rigging.

2.9.13.5 Blowers to be direct drive with variable speed motors. Blower wheel to be made of steel with a corrosion resistant finish. It to be dynamically balanced, double-inlet type with backward-curved blades. Blower to be mounted on neoprene vibration isolation pads. Motor to be high efficiency and have thermal overload protection.

2.9.13.6 Standard filter section shall accept commercially available, 2″ pleated filter(s). Use Camfill Farr 30/30 filters. Provide a spare set of filters with each unit.

2.9.13.7. **Controls and Safeties**: The EnergyX unit shall operate in conjunction with rooftop unit fan.

2.9.13.8 All unit power wiring shall enter unit cabinet at a single location.

2.9.13.9 **Energy Recovery Cassette**: The energy recovery media shall have a minimum of 70% effectiveness at nominal unit airflow. Energy wheel performance to be ARI Standard 1060 Certified and bear the ARI Certified Product Seal. The energy recovery cassette to be an UL Recognized component for electrical and fire safety. The wheel to be coated with silica gel desiccant, permanently bonded without the use of binders or adhesives. Coated wheels to be washable with detergent or alkaline coil cleaner and water. The silica gel shall not dissolve or deliquesce in the presence of water or high humidity. The substrate to be made of a lightweight polymer and shall not degrade or require additional coatings for application in coastal environments. The wheel polymer layers to be wound continuously with one flat and one structured layer in an ideal parallel plate geometry providing laminar flow and minimum pressure drop. The polymer layers to be captured in a stainless steel wheel frame or aluminum and stainless steel segment frames that provide a rigid and self-supporting matrix. Energy recovery wheels greater than 19″ in diameter to be provided with removable wheel segments. Wheel frame to be a welded hub, spoke and rim assembly of stainless, plated, and or coated steel and to be self supporting without the wheel segments in place. Wheel segments to be removable without the use of tools to facilitate maintenance and cleaning. Wheel rim to be continuous rolled stainless steel and the wheel to be connected to the shaft by means of taper locks. Wheel bearings shall provide an L-10 life of 400,000 hours. Drive belts of stretch urethane to be provided for wheel rim drive without the need for external tensioners or adjustment.

2.9.13.10 **Supply and Exhaust Air Frost Control Option**: Factory-installed frost protection module shall sense pressure differential across the energy recovery cassette. Supply blower to be shut-off if the pressure differential across the energy recovery cassette

exceeds an adjustable set point. Blower shall remain off for an adjustable time period. Exhaust blower and wheel shall remain in operation in order to remove any frost build-up on the wheel.

2.9.13.11 **Energyx Free Cooling with Enthalpy and Stop/jog Control:** An enthalpy sensor shall prevent the wheel from rotating if the outside air conditions are acceptable for free cooling. Both exhaust and supply blowers will remain on. Stop-Jog-Control shall energize the wheel periodically during the free cooling operation of the EnergyX to prevent dirt build-up on the wheel.

2.9.13.12 **Economizer Option**: The economizer to be integrated in the energy recovery module and shall allow air to bypass the energy recovery wheel for free cooling and fail safe operation. Tilting wheel mechanisms shall not be allowed. The economizer damper to be motorized with factory installed, 24-volt Belimo actuator. The EnergyX to be capable of using the economizer in a free cooling operation. The economizer shall utilize enthalpy sensor controls when in the economizer mode.

2.9.14 **Flue Discharge Deflector:** Flue discharge deflector shall direct unit exhaust vertically instead of horizontally. Deflector to be defined as a "natural draft" device by the National Fuel and Gas (NFG) code.

2.9.15 **Roof Curb**: Provide a custom prefabricated insulated roof curb with vibration isolation to provide continuous support of the air handling unit. Insulate with 40 mm (1-1/2″) board insulation on inner faces of curb. Use spring isolators with 25 mm (1″) static deflection.

2.9.16 **Controls and Safeties**

2.9.16.1 Units to be completely factory wired with necessary controls and contactor pressure lugs or terminal block for power wiring. Provide onboard comfortlink controller to control EnergyX unit and defrost functions, fans, cooling, economizer and heating when externally commanded on by BCS. Comfortlink controller to Include compressor anti-short cycle protection, and provide enthalpy economizer control.

2.9.16.2 Provide terminal strip for BCS connection. Coordinate with control system supplier and refer to Section 15900 “Controls”. Terminal strip to include the following points:

- supply fan start/stop
- heating enable
- cooling enable
- economizer damper override (close outside air damper)

2.9.16.3 Provide BacNET communication card with each unit. Card is to allow BCS to read only the following points:

- unit alarm status
- wheel alarm status
- filter status
- economizer damper position
- heating stage 1 status
- heating stage 2 status
- wheel speed
- wheel status

2.9.17 **Warranty:** In addition to the one year warranty specified in Section 15001 “Mechanical General Provisions”, provide an additional four year warranty to cover compressors and condenser coil leaks.

2.9.18 The following manufacturers of the above equipment will be considered as equal, subject to requirements of Clause “Material and Equipment”:

AAON
Carrier
Daikin
Greenheck
Lennox
Trane
York

3 Execution

3.1 **DUCTWORK**

3.1.1 **General**

3.1.1.1 Construct ALL ductwork located inside Mechanical Equipment Rooms to Medium Pressure duct standards. Unless specified otherwise, construct ALL other ductwork to Low Pressure duct standards. Construct all ducts designated on Drawings as round or oval to Medium Pressure duct standards.

3.1.1.2 Fabricate and install ductwork in accordance with the Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) Manual “HVAC Duct Construction Standards - Metal and Flexible”.

3.1.1.3 Pay particular attention to Section 15001 “Mechanical General Provisions”, Clause “Cutting and Patching”. This will be strictly enforced on this project. Coordinate work with trades responsible for floor and wall construction to reduce difficulty of making tight seals.

3.1.1.4 Fabricate all ductwork to the clear inside dimensions shown on the Drawings. Where internal lining is specified, dimensions shown are inside insulation.

3.1.1.5 Do not suspend ducts from metal roof deck.

3.1.1.6 Make duct connections to fans with flexible duct connectors.

3.1.1.7 Install access doors for easy access to each damper, thermostat, coil, valve, or other concealed device which requires servicing. Use at least 1 m (36″) of removable duct on inlet and outlet of axial return air fans.

3.1.1.8 Provide backdraft dampers where shown or specified.

3.1.1.9 Install fire damper assemblies in strict accordance with manufacturer's instructions provided with each fire damper.

3.1.1.10 Where ductwork has to be altered from dimensions shown due to construction conditions, use the same effective cross sectional areas, without exceeding a 4 to 1 aspect ratio. Carry out such changes at no additional cost to the Owner.

3.1.1.11 Install ductwork to maximize clear floor to ceiling heights.

3.1.1.12 Transitions are described in the direction of air flow. For converging transitions, use a maximum slope of 1 in 4 and, for diverging transitions, use a maximum slope of 1 in 7.

3.1.1.13 Apply one coat zinc chromate primer over all welded surfaces.

3.1.1.14 If there is a conflict between the duct sizes shown on the floor plans and the duct sizes shown on sections, elevations or details, the floor plans will govern.

3.1.1.15 Seal all transverse joints, longitudinal seams and duct wall penetrations to SMACNA Seal Class A standards.

3.1.2 **Low Pressure - Rectangular Ductwork**

3.1.2.1 Fabricate and install according to current SMACNA standards. Use 2″ W.G. pressure class. Use SMACNA recommended sheet metal thicknesses. Fabricate with all flat surfaces wider than 450 mm (18″) either cross broken or transverse beaded, regardless of whether the duct is insulated, lined or bare.

3.1.2.2 Use elbows in the following order of preference:

3.1.2.2.1 Full radius elbows with inside radius equal to duct width.

3.1.2.2.2 Square elbows with turning vanes.

3.1.2.2.3 For duct takeoff to a single register, diffuser, grille or branch, use balancing damper located at the branch takeoff. Do **NOT** use splitter dampers.

3.1.3 **Medium Pressure Ductwork**

3.1.3.1 Fabricate and install according to current SMACNA standards for 1490 Pa (6″ W.G.) pressure class.

3.1.3.2 Pressurize duct systems to normal maximum operating pressures. Locate and seal all audible leaks and those leaks which can be detected by hand.

3.2 **INTERNAL DUCT LINING**

3.2.1 Install lining in accordance with liner manufacturer's published recommendations and SMACNA “HVAC Duct Construction Standards - Metal and Flexible”. Use only Armaflex Low VOC adhesive. Prepare and clean all internal duct surfaces and install insulation in accordance with manufacturer’s instructions.

3.2.2 Internally line ducts where shown on drawings. Where shown or noted on Drawings, line return air and exhaust air ducts. Use 25 mm (1″) thickness.

3.2.3 Where acoustic plenums are not specified, internally line outside air intake ducts and plenums with 40 mm (1-1/2″) thickness.

3.3 GRILLES, REGISTERS AND DIFFUSERS

3.3.1 Cooperate on the job with other trades so that grilles, registers and diffusers do not conflict with lights, etc. Bring any conflict between grilles, registers and diffusers and the work of other trades to the attention of the Consultant before any ductwork is installed. See Architect's reflected ceiling plan for location of grilles, registers and diffusers.

3.3.2 Install frame for each grille, register and diffuser to suit the type of building construction.

3.4 FLEXIBLE DUCT CONNECTORS

3.4.1 Make all duct connections to fans, fan cabinets and heat pump units with preassembled duct connectors. On all return air fans, fabricate an acoustic seal over flexible connectors. See Drawings for details.

3.5 ROOFTOP UNITS

3.5.1 Provide the services of the unit manufacturer's service representative to supervise startup. Manufacturer's representative to provide written report to the Consultant certifying that the unit assembly and installation is done in accordance with the manufacturer's recommendation. Provide 610 mm x 610 mm (24" x 24") patio stone at condensate drain discharge.

3.6 ROOF CURB INSULATION

3.6.1 Provide attenuation on roof deck inside rooftop unit roof curbs. Use two layers of 25 mm (1″) thick, 72 kg/m³ (4.5 lb) density insulating board on roof deck. Stagger board joints. Board to be butted tightly to sides of ductwork and curb.

3.6.2 Seal all joints and edges with acoustic sealant.

3.6.3 Advise Consultant when this work is complete and ready for review. Seal joints to satisfaction of Consultant.

3.7 FILTER GAUGES

3.7.1 Install filter gauge across each filter bank.

3.8 TESTING AND BALANCING

3.8.1 Cooperate with the Testing and Balancing trade. See Section 15200, “Testing and Balancing”. Make any changes deemed necessary by the Testing and Balancing trade to permit proper testing and balancing of the systems.

3.8.2 Provide additional balancing dampers where required by the Testing and Balancing Company.

3.8.3 Be responsible for the initial alignment and tension of all fan pulleys and belts.

3.8.4 Provide any changes to fan drives, pulleys and belts as required to allow a proper air balance as recommended by the Testing and Balancing Company for equipment supplied under this Contract.

3.9 **DUCT LEAK TESTING**

3.9.1 Duct leakage tests are specified in Section 15200, "Testing and Balancing".

3.9.2 Cap and seal ducts for the test sections as directed by the Testing and Balancing trade. Provide all necessary fittings and duct connections as required for the leak testing procedure.

3.9.3 Ensure all required duct access doors are installed before tests are started.

3.9.4 Immediately correct defects discovered during test and arrange for retesting until satisfactory results are obtained.

END OF SECTION

1 General

1.1 **REQUIREMENTS**

1.1.1 Conform to the requirements of Section 15001, "Mechanical General Provisions".

1.1.2 Conform to the requirements of “Master Specifications for DDC Control System Upgrades prepared for SCCDSB”, July 2004. These specifications are available from the SCCDSB on request. Follow all requirements of the following Sections of the Master Specification:

Section 13820 - General Profile of the Work
Section 13830 - Hardware Specifications
Section 13840 - Software Specifications
Section 13850 - Execution of the Contract General Specifications
Section 13860 - Acceptance of Work
Section 13870 - Documentation and Training
Section 13880 - Warranty

1.2 **SCOPE OF WORK**

1.2.1 Provide an electronic/electric, direct digital control (DDC) system to make the mechanical and electrical systems controls completely operational.

1.2.2 **General Description of System Architecture**: DDC system shall incorporate a system interface panel and primary (master) control panel to be located in the Primary Mechanical Room, complete with necessary interface hardware and software to allow communication over the SCCDSB intranet via Web Browser using TCP/IP protocol. Provide a UPS for the interface panel and primary control panel to condition power and provide 20 minutes of uninterrupted power to avoid loss of communication during temporary power outage. The UPS shall be Power Ware Model3115 420-650-Va. The UPS and all DDC equipment shall be powered through dedicated circuit(s) from the nearest power panel. The primary panel shall communicate to field panels and terminal equipment controllers through a vendor supplied Local Area Network (LAN). All controllers shall be capable of standalone operation on loss of communication with the primary panel and/or the interface panel. The interface panel’s sole purpose shall be the conversion of controller communication to TCP/IP - no points shall reside on this panel.

1.2.3 Coordinate installation of an ethernet connection to school’s server with the Owner’s IT Department. This connection to be used to connect to School Board’s WAN system.

1.2.4 The Controls Subcontractor is responsible for arranging, coordinating and supervising the installation of the above devices in a suitable manner and location.

1.2.5 Wire components of temperature control system in accordance with the requirements of Division 16. Include wiring between control components and electrical circuits of fans, pumps, and any other equipment or apparatus as indicated in this section or required for the proper functioning of controls as described in this section. Provide necessary transformers, relays, etc. to accomplish specified control function. All controls provided by this Section to be wired by this Section.

1.2.6 For each controller, choose a unit that will provide a minimum of 10% spare points of the total available points, for each type of point, for future use. If these additional points will necessitate the installation of an expansion module for the controller, which will otherwise not include any connected points, seek Consultant's direction and provide expansion modules where directed by Consultant.

1.2.7 Controls Contractor must attend site meetings twice monthly to review progress of the work for the construction period 5 months prior to substantial completion through to the completion of the project.

1.2.8 Remove all redundant control systems in areas of work. Turn over existing controllers to SCCDSB.

1.2.9 Where existing systems are modified, the existing control system serving these systems should be updated to provide control of these new components to provide a fully functional and independent existing control system.

1.3 MANUFACTURER/INSTALLER CERTIFICATION

1.3.1 Use only Durell Control Systems Inc. (Delta), Control Systems Ontario (Invensys), Ainsworth, Johnson Controls (Johnson Controls), or Convergint Technologies.

1.3.2 The work of this project is to be performed only by skilled factory-trained technicians under the direction of experienced engineers, all of whom shall be properly trained and qualified for this work and who are employed directly by the firms listed above.

1.4 COMMISSIONING

1.4.1 Commission the entire system as described in Section 15990, "Building Control System Commissioning". Work is to be performed only by skilled factory-trained technicians under the direction of experienced engineers, all of whom shall be properly trained and qualified for this work and who are employed directly by the firms listed above.

1.5 SHOP DRAWINGS AND SUBMITTALS

1.5.1 Controls Contractor must submit a list of schedule milestones with the project shop drawings, indicating phasing of controls installation, e.g. at substantial completion of mechanical room piping, controls contractor requires X additional days for terminations, testing and commissioning, etc.

1.5.2 Direct Digital Control System Hardware

1.5.2.1 A complete bill of materials of equipment to be used indicating quality, manufacturer, model number, and other relevant technical data.

1.5.2.2 Manufacturer's description and technical data, such as performance curves, product specification sheets, and installation/maintenance instructions for the items listed below and other relevant items not listed below:

Direct Digital Controller (Controller panels)
Transducers/Transmitters
Sensors (Including Accuracy Data)
Actuators

Control Valves
Control Dampers
Switches

1.5.2.3 Wiring Diagrams and layouts for each control panel. Show all termination numbers.

1.5.2.4 Schematic diagrams for all field sensors and controllers. Provide floor plans of all sensor locations and control hardware.

1.5.3 **Central System Hardware and Software**

1.5.3.1 Complete Bill of material and equipment used, indicating quantity, manufacturer, model number, and other relevant technical data.

1.5.3.2 Schematic Diagrams for all control, communication, and power wiring. Provide a schematic drawing of the central system installation. Label all cables and ports with computer manufacturers model numbers and functions. Show all interface wiring to the control system.

1.5.3.3 Riser diagrams of wiring between central control unit and all control panels.

1.5.4 **Controlled Systems**

1.5.4.1 A complete description of the operation of the control system, including sequences of operation. The description shall include a reference to the schematic diagram of the controlled system.

1.5.4.2 A point list for each system controller including both inputs and outputs (I/O), point number, the controlled device associated with the I/O point, and the location of the I/O device. Software flag points, alarm points, etc.

1.5.5 **Maintenance Data**

1.5.5.1 In addition to requirements specified in 15001 “Mechanical General Provisions”, upon completion of the work, the control manufacturer shall provide three sets of Maintenance Data to the Mechanical Contractor for inclusion in Project Maintenance Manuals and affix a fourth, plastic coated set near or at the appropriate control panel. Maintenance Data to include the following:

1.5.5.2 Copies of the complete, approved, Shop Drawings

1.5.5.3 Copy of the Electrical Safety Final Inspection Certificate

1.5.5.4 Project Record Drawings

1.5.5.5 As-built versions of the submittal Shop Drawings

1.5.5.6 Operations Manual with procedures for operating the control systems, including logging on/off, alarm handling, producing point reports, trending data, overriding computer control, and changing set points and other variables

1.5.5.7 Licences, guarantees, and warranty documents for all equipment and systems.

1.6 ACCEPTANCE PROCEDURES

1.6.1 Refer to SCCDSB Master Specification. Upon completion of the system, the Control Contractor to indicate in writing to the Consultant that the acceptance procedure can commence.

1.7 TRAINING

1.7.1 Refer to SCCDSB Master Specification.

1.8 WARRANTY

1.8.1 Refer to SCCDSB Master Specification. All controls, equipment and material to be unconditionally warranted for a period of one year from the date of acceptance by the Owner. The warranty period is to commence when the building is turned over for occupancy.

1.8.2 Provide warranty service at no cost to the Owner for the warranty period. This to include, but not limited to the following:

- Emergency repair service on regular working hour basis during warranty.
- Replacing defective parts and components as required.
- Servicing by factory trained and employed service representatives of system manufacturer.

1.9 WIRING, CONDUIT AND CABINETRY

1.9.1 All of the installation requirements, be they temporary or permanent, to comply with the Canadian Electrical Code and all local and Provincial codes.

1.9.2 For future expansion purposes, the Contractor to ensure that wires are available in all conduits to accommodate the addition of possible future points to maximum capability of panel.

1.9.3 The Contractor to supply, install and connect all conduits, boxes and wiring between the different components related to the Control System, including all required line voltage to the equipment. All power to be from appropriately sized dedicated circuits from the nearest electrical panel with space provided by the Contractor. Circuits to be identified inside each control panel and on Shop Drawings using the same code. Provide circuit breaker lock-offs and clearly mark breaker(s) with "BCS".

1.9.4 All high voltage wiring, 50 volts or more, to be a minimum of #12 gauge copper stranded TNN, run in conduit. All low voltage wiring, less than 50 volts, to be a minimum of #18 gauge copper stranded TEW-105.

1.9.5 All signal and communications wiring for the local field panels to be multi conductor, shielded twisted pairs, with ground drain wire. All drain wires to be grounded at the panel end. The other end to be protected from grounding with a dielectric material/electrical tape.

1.9.6 If wiring picks up unwanted noise, correct problem by replacing or rerouting wire at no additional expense to the Board.

1.9.7 Wiremold and/or raceway may not be used unless specifically approved by the Consultant and as specified in Division 16100.

1.9.8 FT6 wiring is to be acceptable in all rooms except Mechanical and Electrical Rooms, and exposed areas (refer to reflected ceiling plans). Wiring to be installed parallel to building lines or approved by the Consultant. In areas where cable tray or other raceway has been provided by other trades for communications, coordinate with other trade and locate wiring in raceway.

1.9.9 Use thin-walled Electrical Metallic Tubing (EMT) conduit complete with T & B 5120 Series watertight steel ring couplings and connectors in all Mechanical Rooms and Electrical Rooms, and set screw connectors and couplings in all other exposed installations in finished areas. OZ/Gedney 7000 Series/Crouse Hinds 600 Series equals.

1.9.10 Flexible conduit to be used only in areas where vibrations and/or expansion joints are present. The length of any run of flexible conduit not to exceed 2 m.

1.9.11 All conduit to be supported at least every 1.525 m, and in accordance with the Ontario Electrical Safety Code. Supports to also be located at all connectors along the length of the conduit.

1.9.12 In damp or weather exposed areas, the conduit and related equipment to be suitable for the application.

1.9.13 All conductors to be continuous from device to panel.

1.9.14 High and low voltage wire to not be run in the same conduit.

1.9.15 Sensor, power and control wiring to be run in separate conduit.

1.9.16 Where wiring penetrates fire separation, use firestop sealant to maintain fire wall ratings.

1.10 PULL BOXES AND JUNCTION BOXES

1.10.1 All boxes to comply with the Canadian Electrical Code in reference to size, capacity, etc.

1.10.2 All boxes to be fabricated of galvanized metal, unless otherwise warranted.

1.10.3 A pull box to be located every 30 m. The Contractor is responsible for the location and for obtaining any required approvals from the Consultant.

1.10.4 In suspended ceilings, all boxes to be installed on the structure.

1.10.5 All boxes to be clearly marked with "BCS" as part of the energy management system.

1.11 WIRING IDENTIFICATION

1.11.1 The two extremities of all wiring to be identified using the same code and cross referenced to the Record Drawings.

1.11.2 The terminal strips to be numbered. All Drawings to show wire identification codes and terminal numbers.

1.11.3 The identification to be done using plastic ring or band type. Paper with adhesive backing or Type C plastic labels are not acceptable.

1.11.4 The following colour code to apply to all wiring:

Power	
White	Neutral
Red, Yellow, Blue	Phase leads
Black	Switch travellers, for single pole switched circuits, the phase colour shall be carried through the switch to the outlet.

1.11.4.1 All ground wiring to be green.

1.11.4.2 All 24 VAC wiring to be brown - load side; yellow - neutral side of transformer.

1.12 **NAMEPLATES**

1.12.1 Identify each piece of equipment and panel with nameplate identifying equipment and functions in plain English, using the local naming convention.

1.12.2 Use laminated plastic nameplates of at least 75 mm x 25 mm x 3 mm (3″ x 1″ x 1/8″) with black face and white centre and 6 mm (1/4″) high engraved lettering. To be securely attached to equipment by screws. Dymo tape name tags are not acceptable. Provide black phenolic nameplates engraved with white letters for all electrical equipment, panels, disconnect switches, etc., as directed.

1.12.3 Identify motorized equipment as follows:

Pumps	Pump 301, etc.
Heat Pump Units	HP-401, etc.

1.12.4 Identify the motor, starter and branch circuit breaker and disconnecting means.

1.12.5 Index terminal strips and tag wires. Label exposed junction boxes including function and nature of service. Tag all wires within the junction boxes including purpose and nature of service.

1.12.6 Use self adhesive strip or clip on style plastic markers for wire tags. Secure tags to each individual wire at both ends.

2 Products

2.1 **CONTROL ELEMENTS**

2.1.1 **Controllers**

2.1.1.1 Refer to SCCDSB Master Specification.

2.1.1.2 For each heat pump, etc. as required, provide a unitary controller module complete with mounting enclosure.

2.1.1.3 Provide individual local control panels to control fluid cooler, air handling equipment, boilers, pumps, rooftop unit and all other equipment.

2.1.1.4 Where controller is NEMA 1 rated, a separate NEMA 1 enclosure is not required for the controller.

2.1.2 **Space Temperature Sensors**

2.1.2.1 Space temperature sensors in classrooms, offices and other regularly occupied rooms to be equipped with LCD display, limited setpoint adjustment and pushbutton for occupancy override. Sensors to be programmed not to display the room temperature.

2.1.2.2 In change rooms, washrooms, corridors, vestibules, gymnasiums, LAN rooms, mechanical rooms and other regularly unoccupied rooms, use only Greystone blank stainless steel coverplate style sensors.

2.1.2.3 All space sensors are to be located away from any direct influence from air diffusers or areas affected by drafts.

2.1.3 **Temperature Sensors, Thermostats, Freezestats and Firestats**

2.1.3.1 All temperature sensors to be k OHM thermistors, with a suitable range to match the application. For hot water loop, use RTD sensors. The accuracy to be ± 0.2°C maximum.

2.1.3.2 **Only Greystone sensors will be accepted for water temperature sensors and air temperature sensors.**

2.1.3.3 All temperature sensors shall be mounted in an enclosure suitable for the application.

2.1.3.4 Outdoor temperature sensor is to be mounted in an enclosure complete with sunshield and shall be thermally isolated from all indoor conditions. Conduit entrance to sensor must be sealed with duct seal or equivalent sealant and mounted on a North wall, in a serviceable location, away from any building exhaust/intake vents.

2.1.3.5 All mixed air temperatures to be sensed with averaging sensors having a minimum active length of at least three duct cross sector.

2.1.3.6 Sensor averaging elements are to be mounted in straight sections of duct, in serpentine fashion, equally spaced to provide adequate coverage of duct cross section to prevent stratification. Furthermore, sensor's installation must not present a safety hazard nor impede access to fan compartments.

2.1.3.7 All return and supply air temperatures to be sensed with duct-mounted sensors having a minimum probe length sufficient to reach the middle third of the duct space.

2.1.3.8 All liquid temperature sensors to be mounted in wells.

2.1.3.9 Freezestats to be low limit, normally closed DPDT, manual reset thermostats complete with cover and case. Switch to open on temperature fall. Provide 6.1 m (20′) capillary sensing element. Provide on all air handling units and wire to starter 120 volt control circuit. Wire second pole to DDC panel for indication of status.

2.1.3.10 Firestats shall be high limit, normally closed DPDT, manual reset thermostats complete with cover and case. Switch to open on temperature rise. Provide on all air handlers and exhaust fans and wire one pole to starter 120 volt control circuit. Wire second pole to DDC panel for indication of status.

2.1.3.11 Provide wire guards in all public areas.

2.1.4 **Relays and Contactors**

2.1.4.1 All interfacing/control relays and contactors to be sized to match the application. Low voltage coils to be used wherever possible, except where it is financially beneficial to use high voltage coils.

2.1.4.2 Mount interfacing relays in control cabinets, where possible. Do not locate relays within electrical starter enclosure. If necessary, use separate enclosure to house interface relays.

2.1.4.3 Contactors to be equipped with auxiliary contacts wherever such status indication is required.

2.1.4.4 All contactors are to be mounted in a NEMA 1 cabinet, enclosing contactor, transformer, protection, etc.

2.1.5 **Current Sensing Relays:** All equipment status monitoring to be accomplished though the use of a current monitoring sensor. This device should output a 4-20 mA or 0 - 10 V signal proportional to measured current. Provide sensors to monitor status of all new electrically driven, mechanical equipment. (Include all new unit ventilators, fans, pumps and rooftop units). Wire to the BCS.

2.1.6 **Carbon Dioxide Sensors**: Use nondispersive infrared sensors, 0-2000 ppm range, ±3% of full scale non linearity, ±40 ppm accuracy at 72F, capable of field calibration. Output analog indication of carbon dioxide level to BCS. Use units without display. Provide outside sensor as a reference.

3 Execution

3.1 **GENERAL**

3.1.1 Use competent tradesmen regularly employed by the manufacturer of the control equipment to install control system.

3.1.2 Unless noted otherwise, mount all room sensors and thermostats at 1200 mm (47″) above floor or in the classroom control module.

3.1.3 DDC controller to be mounted in same room as equipment being controlled. Where this is not practical, provide a communication interface at equipment location for communication to DDC panel. Provide Points List on inside of DDC panels.

3.1.4 Nomenclature in DDC programming to match Control Shop Drawing nomenclature. DDC panels to be labelled as per Shop Drawings.

3.1.5 Provide a copy of all graphical interfaces to Consultant for review at completion of programming.

3.1.6 Remove all redundant controls and return control components to the Owner.

3.2 **WIRING**

3.2.1 Conceal wiring in all finished areas.

3.2.2 Provide an installation which follows horizontal and perpendicular lines to fit into the layout of the area. Properly support and install in a neat and workmanlike manner throughout.

3.3 **NAMEPLATES**

3.3.1 Install nameplates at all duct mounted devices including transmitters, controllers, gauges, etc. Similarly label manual switches, unless they are delivered with standard nameplates.

3.4 **CONTROL PANELS**

3.4.1 Mount all equipment inside the cabinet. Mount a plasticized "as-built" control diagram for water system, complete with control piping and wiring layout, on the face of door section. Locate panels in main Mechanical Rooms. Do not locate in ceiling spaces.

3.5 **ELECTRICAL WORK**

3.5.1 Provide all wiring from power supplies to valves, dampers, thermostats, sensors, etc., and all necessary control transformers and relays required for the control system. Provide power from nearest panel.

3.5.2 Coordinate electrical requirements with the electrical trade. Arrange and pay for any modifications necessary to complete the work of this section.

3.5.3 Provide all necessary control wiring for equipment specified under Division 15.

3.5.4 Conceal all wiring. Install wiring in conduit within block walls. In unfinished areas exposed to view, install wiring in conduit. Tie-wrap fire-rated cable elsewhere. Wire in accordance with Division 16 requirements.

3.6 **DDC CONTROL SYSTEM**

3.6.1 Vendor's representatives to install complete control system providing adjustment of all controlled systems.

3.6.2 Vendor's representatives to provide full startup, calibration and commissioning of complete system. Connect all mechanical equipment in accordance with the Specifications.

3.7 PERFORMANCE VERIFICATION

3.7.1 Provide verification check sheets for all new control points and all associated control sequences. This work must be done, submitted and approved by the consultant prior to the commissioning agent being engaged and final payment being released. The approved reports are to be included in the maintenance manuals.

3.7.2 Verification check sheets for each piece of equipment must contain list of all control points associated with this piece of equipment. Proper operation of each sensor, actuator, terminal unit, or any other control point must be confirmed in the field by direct observation (if possible) and through the graphical user interface. Each verification sheet must be dated and signed by controls contractor.

3.7.3 Setup and verify trends for all new equipment and all control points. Provide trend verification sheets and sample sheets indicating trended points for consultant's approval

3.7.4 One month after these checks and commissioning are complete, setup a meeting with mechanical contractor, Owner and consultant to confirm the operation of all new equipment. At this meeting all trends will be reviewed and confirmed with the Owner. Prior to the meeting the Controls contractor will be required to provide trend graphs or numerical data in Excel spread sheet form, for all monitored systems for the last month of operation. If numerical data is provided the date/time data must follow Excel formatting.

3.7.5 Controls contractor will be responsible for correcting of all deficiencies found during this process and will be required to submit trends to verify operation of all equipment after making corrections.

3.8 EXISTING BUILDING CONTROL SYSTEM

3.8.1 A complete new control system is to be provided for the school. Refer to paragraph 1.2.9. Refer to Appendix A for existing control system information. The existing control system is a KMC building control system. All existing equipment currently connected to the BCS which is not replaced as part of this contract, must be reconnected and controlled by the new BCS in identical fashion to existing. Remove all existing redundant controls and components.

3.9 ROOFTOP AIR HANDLING UNIT RTU-101 (GYM)

3.9.1 General

3.9.1.1 This system is a constant volume recirculating type unit which provides heating, cooling and ventilation for the Gym. The unit will be off during scheduled unoccupied hours, except as required for unoccupied heating and cooling.

3.9.1.2 Provide a dedicated unitary controller for the rooftop unit. Connect to a terminal strip provided within the unit.

3.9.2 **Control Devices**

3.9.2.1 Provide unitary controller for rooftop unit. Provide all temperature sensors and devices required to provide control functions described below using provided interface. Connect to terminal strip provided with unit. Coordinate with Section 15800, “Air Distribution”.

3.9.2.2 Refer to Section 15800 specifications for list of terminals. Connect to and operate or monitor all listed terminals.

3.9.2.3 Provide a discharge air temperature sensor in the supply air duct. Provide return air and mixed air temperature sensors. Provide a new space temperature sensor and carbon dioxide sensor. Provide clear plastic locking cover for each of these sensors.

3.9.2.4 Provide start/stop for supply and exhaust fans. Provide current sensors and monitor each fan status. Schedule ON/OFF operation of unit.

3.9.2.5 Connect to terminal in rooftop unit and provide analog output for cooling. Provide current sensors and monitor compressor status (two).

3.9.2.6 Connect to terminal in rooftop unit and provide analog output for heating.

3.9.2.7 Coordinate with the unit manufacturer. Provide relays and other devices as required to suit operational sequences below.

3.9.3 **Schedule and Startup**

3.9.3.1 Schedule occupied/unoccupied operation of unit and enable/disable through the terminal on the rooftop unit controller.

3.9.3.2 Provide adjustable heating and cooling occupied and unoccupied temperature setpoints. Provide minimum 5F deadband between heating and cooling operation.

3.9.3.3 Operate the unit continuously during occupied hours, for provision of ventilation air.

3.9.3.4 During unoccupied hours, cycle the unit as required to maintain space unoccupied heating temperature setpoint.

3.9.3.5 Provide adaptive optimum start/stop sequence for unit.

3.9.4 **Occupied Mode**

3.9.4.1 Operate supply fan continuously. Modulate heating, economizer, energy recovery ventilator and cooling as required to maintain supply air temperature setpoint. Reset supply air temperature setpoint with space temperature as required to maintain space temperature setpoint. Minimum supply air temperature is 13C (55F). Operate power exhaust whenever economizer position exceeds 50% (adjustable).

3.9.5 **Ventilation Control**

3.9.5.1 Provide a demand control ventilation system for Gym. Minimum outside air damper position is 5%. Reset damper position upward to a maximum of 50% open if required to maintain Gym carbon dioxide level at a maximum of 900 ppm. Alarm to BCS at 1,000 ppm. Program an annual maintenance inspection alarm for this sensor.

3.9.6 **Unoccupied Mode:** Cycle unit with outside and exhaust air dampers closed in order to meet unoccupied heating space temperature setpoint. Mechanical cooling and energy recovery unit to be locked out during unoccupied and holiday hours.

3.9.7 **Safeties and Miscellaneous Controls**

3.9.7.1 Shut down unit and alarm to BCS if supply air discharge temperature drops below 5°C (40°F) (adjustable) or rises above 60°C (140°F) (adjustable) .

3.9.8 **Graphic Display**: Provide graphic display of energy recovery wheel and fans and equipment internal components such as supply fans, exhaust fan, heating and cooling stages, etc. Display must include unit off/on command status, occupied/unoccupied status, supply fans status, exhaust fan status, ERV commanded on/off, supply air temperature, return air temperature, outside air temperature, space temperature(s), space temperature setpoints (heating and cooling, occupied and unoccupied), stages of heating or cooling commanded on, economizer dampers position, unit general alarm status, filter change indicator status (where applicable). Display must also include a unit specific summary of how unit is controlled.

3.10 CONTROL SYSTEM ACCEPTANCE

3.10.1 A complete system check-out is required. Before starting this, provide a detailed step-by-step checkout plan.

3.10.2 Demonstrate to the Owner's satisfaction at job site, the methods, test gear and simulation equipment to be used in check-out of each part of control system. Demonstrate the actual hook-up of test gear, exercise of inputs, trouble isolation and correction technique, and final operation test of a typical remote panel. Owner may check the operation of all sensors, transducers with own equipment to ensure proper operation.

3.10.3 After completion of the check-out, make all necessary corrections and repeat the check. When the system is fully operational, demonstrate in full detail, all functions/indications to the Owner.

3.10.4 Submit a checkout list to the Owner documenting that each point has been checked and is operating satisfactorily. The check should include field wiring, relay operation and HAND/OFF/AUTO checkout.

3.11 PROGRAM START AND STOP TIMES

3.11.1 Provide optimal start and stop times programming to compensate for outside temperature. Provide morning warm up routine.

3.11.2 For all systems using hot water or heat pump loop for cooling or heating, program an individual, dedicated warm-up or cool-down cycle to bring space temperature from night setback to occupied temperature setpoint. During that cycle all outside air dampers must remain closed. Program each system individually with optimum temperature recovery time. Follow Standard ASHRAE 90.1.

3.11.3 Program various system operational times based on the normally occupied periods of the building. Program a yearly calendar to allow for daylight savings time and standard time changes. Provide separate weekly time schedules for heat pumps, exhaust fans, and each air handler.

3.11.4 Provide graphical links to fan systems including display of operating schedule, Timed Overrides and Event Mode programming. Timed override shall allow for operation of the fan systems for a 2 hour (adjustable by super user) period, mechanical cooling shall be locked out. Event mode shall allow fans to operate in normal daytime operation for a user adjustable, defined period of operation using a calendar type function. Upon entry of an Event, a report shall be generated and sent to the school board indicating the date, duration, user, and permit number. Event mode shall be linked to associated heat pumps within the building, refer to heat pump sequences above.

3.12 TREND LOGS

3.12.1 Set up trend logs to continuously monitor critical parameters for each system. Consultant will assist in determining critical parameters.

3.13 ENVIRONMENTAL ALARMS

3.13.1 Provide digital outputs to the building security alarm panel for environmental alarms listed below. Wiring to panel is the responsibility of this Division. Final terminations will be provided by the Security System Contractor.

3.13.2 Provide the individual alarms to the security system listed below. Alarms are listed with the Security System label to be used shown in brackets:

- No flow in heat pump loop (“Loop Pump”)
- High or low heat pump water temperature (“Tower Temp”)
- Low space temperature in any room (“Low Space”)
- Low heating system water temperature (“Low Header”)
- Utility phase loss (“Phase Loss”)

3.13.3 For heat pump loop flow alarm, base alarm on status of main heat pump loop circulating pumps.

3.13.4 For low space temperature alarm and heating system water temperature alarm, coordinate setpoint with SCCDSB. Alarms are to be active only for ambient temperatures below 5°C.

3.13.5 Submit proposed setpoints for each alarm for Owner approval. Provide graphic displaying settings so that Owner can easily modify.

END OF SECTION

SECTION 15900

A P P E N D I X ‘A’

Existing Controls Information

EF1A

Mechanical Inventory: April 2015

EF114A JENAIR 71CRO N/A roof 114A

Facility	Appliance	Make & Model #	Serial #	Location
	EF 121	Greenheck SP127	15235	121
3L200	Exhaust Fan 1	Greenheck GB-071-4X-BD-R2	05120505	WR Storage 2 Roof above 120
DD EF2A	Exhaust Fan 2	90C150H Cook	not readable	Custodian 827 Roof above 105
Rangehood	Exhaust Fan 3	BROAN 5800-B Cook	NOT LISTED	Staff 832 101
DD	Exhaust Fan 4	70C1DH Cook	272S56150500000 025010799	RM 821 113 roof
	Exhaust Fan 5	COOK GEMINI 140 SONE bluster ~~NOT LISTED~~	NOT LISTED	WR 822 113A
DD	Exhaust Fan 6 EF3B	90C10DH Cook ~~CANT read~~	272S56150500000 016020799	Change Room 806 125C
DD	Exhaust Fan 7 EF3A	90C10DH Cook ~~can't read~~	272S56150500000 016010799	Change Room 807 125B
	Exhaust Fan 8	GREEN HECK SP127 ~~Cook~~	14058	WR 799 123
	Exhaust Fan 9	COOK Gemini 140 sonebuster Cook	Not listed	Work Room Washroom 133
Make Eng Air	Forced Flow Heater 1	CUH-1AU-11	L-4068	Main Entrance
	Forced Flow Heater 2	CUH-1AUU-11	L-4068	Rear Entrance BY 127
	Forced Flow Heater 3	CUH-1AUU-11	L-4068	South Entrance
	Forced Flow Heater 4	CUH-1AUU-11	L-4068	Daycare Entrance
St Philip 420 Queen St Petrolia	Forced Flow Heater 5 ~~FH2~~	CUH-1AUU-11	L-4068	East Entrance ~~BY 127~~ 101
	~~Forced Flow Heater 6~~			
	Gym Heat Pump 5	50HQA060S CC521	2499V73489	Gym RM 803 ~~Gym North~~ 127
	Gym Heat Pump 5	50HQA060S CC521	2469V73460	Gym RM 803 ~~Gym South~~ 125A
All heat pumps are Carrier	Heat Pump 3	50VQA048L-CC521	3099V74922	RM 801 Hall 120
	Heat Pump 4	50VQA048L-CC521	2699V73933	RM 805 116
	Heat Pump 5	50VQA048L-CC521	2699V73932	RM 813 112A
	Heat Pump 6	50VQA048L-CC521	3999V76750	RM 814 110
	Heat Pump 7	50VQA048L-CC521	3999V76751	RM 818 115
	Heat Pump 8	50VQA048L-CC521	4199V77545	RM 819 106
	Heat Pump 9	50HQA04024S CC521	3799V76356	RM 826 111A
	Heat Pump 10	50HQA060S CC521	2499V73491	Adj to RM 829 102
	Heat Pump 11	50HQA036Z CC521	3499V75651	Adj to RM 830 103
	Heat Pump 12	50HQA036S CC521	5099V80341	Adj to RM 832 101
	Heat Pump 13	50VQA048L CC521	3599V75733	RM 833 129
	Heat Pump 14	50VQA048L CC521	3599V75734	RM 835 122

Mechanical Inventory: April 2015

	Appliance	Make & Model #	Serial #	Location
Facility				
	Heat Pump 15	50VQA0482CC521	2699V73931	RM 836 135
	Heat Pump 16	50VQA0482CC521	2699V73929	RM 837 127
	Heat Pump 17	50VQA0482CC521	3999V76753	RM 838 137
	Heat Pump 18	50VQA0482CC521	3999V76754	RM 839 126
Mekie Venmar St Philip	Heat Recovery Unit 1 HRV1A	HRV6001EAWXRN	6L82990700022	Adj to RM ~~839~~ 137
	Heat Recovery Unit 2 HRV1B	HRV6001EAWXRN	6L82990700027	Storage RM 2 131
	Heat Recovery Unit 3 HRV3A	HRV6001EAWXRN	6L82990700023	Mechanical RM 828 107A
	Heat Recovery Unit 4 HRV2E	HRV6001EAWXRN	6L82990700024	Mechanical RM 828 107A
	Heat Recovery Unit 5 HRV2D	HRV6001EAWXRN	6L82990700027	Adj to RM ~~814~~ 120
	Heat Recovery Unit 6 ~~HRV2A~~ HRV2C	~~6L82990700027~~ 6L82990700025	<--> HRV6001EAWXRN	Adj to ~~Work Room 1~~ 125
	Heat Recovery Unit 7 HRV2A	S/N 6L82990700007	<--> HRV6001EAWXRN	RM 802 127
	Heat Recovery Unit 8 HRV2B	HRV6001EAWXRN	6L82990700026	RM 804 125A
CARRIER	A/C 1 N	48HJF005-551HQ	2906G40504	RM 840 139 roof
	A/C 2 C	48HJF005-551HQ	2906G40503	RM 845 134 roof
	A/C 3 S	48HJF005-551HQ	2906G40502	RM 844 141 roof
	~~Unit Heater~~			~~RM 828~~
	N/A			120
	N/A			125A
Eng Air	unit heater #1	H11L	L4068	127
	unit heater #2	H11L	L4068	125A
	unit heater	H11L	L4068	107A
	Rangehood RH108	Reversomatic 2000-200		108
	EF 106B	Greenheck SP-B90-QD	28396843	106B
	EF 106C	Greenheck SP-B90-QD	32508943	106C

	MAKE/MODEL	S/N	Location
Boiler 1	Weil McLain GV-C Series 2	CP3657630	107A
Boiler 2	Weil McLain GV-C Series 2	CP3657627	107A
DHW	GIANT UG75-75ME-N20	A8523503	107A

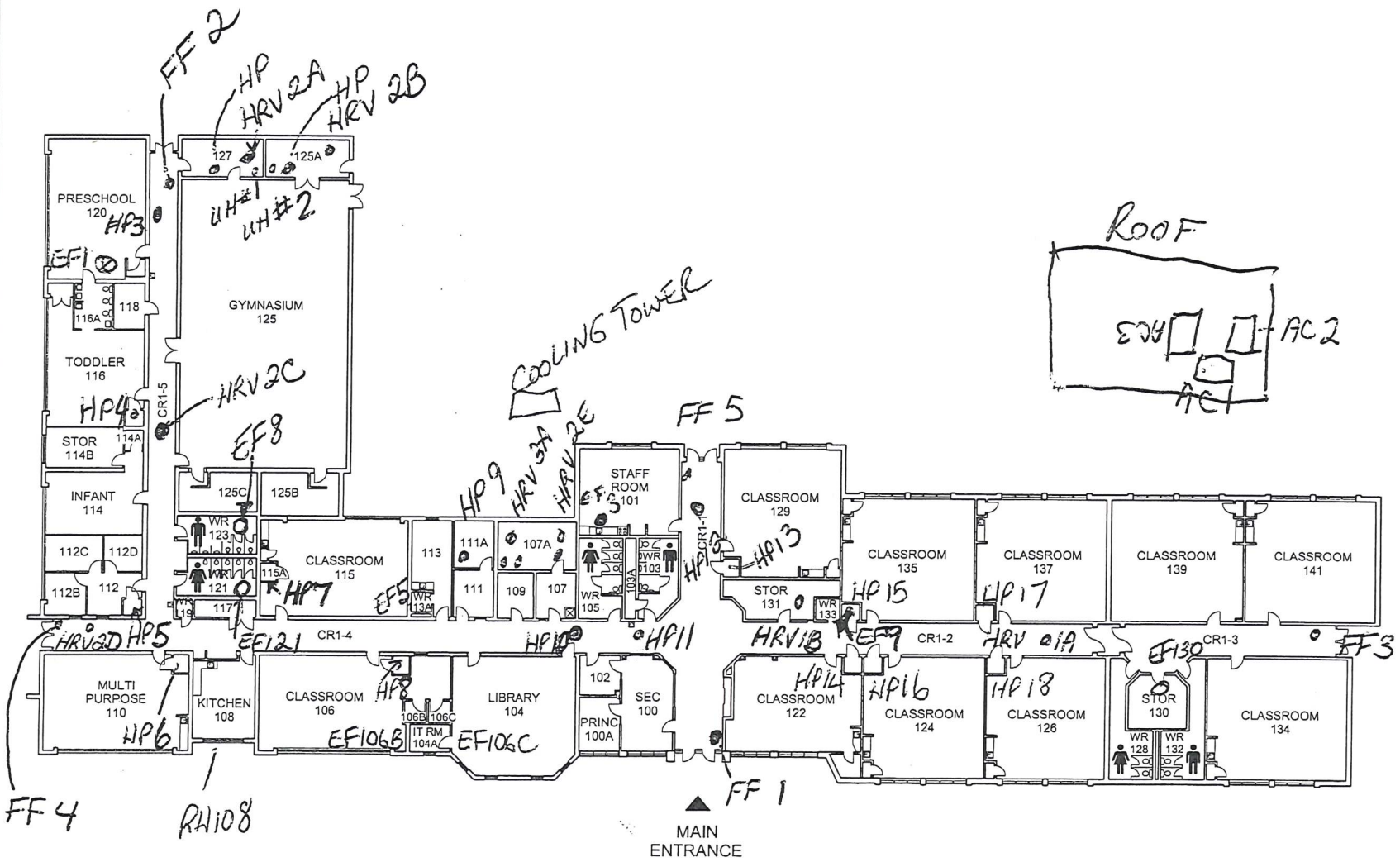
Pump B1 Armstrong
M/N 3x3x10 4380
S/N C409479 — 107A

Pump B2 Armstrong
M/N 3x3x10 4380
S/N 409478 — 107A

Pump C1 Armstrong
M/N ? Not readable
S/N ? — 107A

Pump D1 Armstrong
M/N 5-55-3 BF
S/N 0799 — 107A

COOLING TOWER B.A.C
M/N F1733-K
S/N CAN0000131
OUTSIDE DOORS 107A



ST. CLAIR CATHOLIC DISTRICT SCHOOL BOARD
Lighting the Way ~ Rejoicing in Our Journey

FLOOR PLAN

01/01/2015

St. Philip
Catholic School

420 Queen Street, Petrolia, ON, N0N 1R0

645

HEPTA CONTROL SYSTEMS INC.

St. Philip's Elementary School

HVAC Control System
As Built Documentation
&
Maintenance Data

Date: 01/07/00

KMC CONTROLS

Suite 199, 2 - 1200 London Rd., Sarnia, Ontario N7S 1P4 Tel. (519) 331- 0194 Toll Free. 888-726- 6688
Fax. (519) 541-1964 E-Mail:Houck@MNSi.net

St. Philip's Elementary School
4137 Victoria Street
Petrolia, Ontario

Table of Contents

HHCS
TOTAL BUILDING CONTROL
HEPTA CONTROL SYSTEMS INC.

Project -
St. Philip's Elementary School
4137 Victoria Street
Petrolia, Ontario

Architect -
ELCON
R.T. Pollard
Architect & Engineer
Elcon Engineering Wakkaceburg Limited

Engineer -
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London, Ontario
(519) 685-2570

User Defined -

Mechanical Contractor -
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Melbourne, Ont.
(519) 289-5818

KMC CONTROLS
Hepta Control Systems Inc.

Branch Information -
Hepta Systems Inc.
Suite 199, 2-1200 London Rd.
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Tel: (519) 464-7740
Fax: (519) 541-1964
E-Mail: Houck@MNSi.Net

Date- Jan. 7, 2000

File Name- St. Philips School.cdr

Riser Diagram -

Local Access

KMD-5136
Multinet Controller
#1

Panel 1 - Close Loop System

KMD-5502
Local Controller
2

Panel 2 - Close Loop System

KMD-5502
Local Controller
3

Panel 3 - Mechanical Room

KMD-5502
Local Controller
4

Panel D - Classroom #3

KMD-5502
Local Controller
5

Panel E - Gym

KMD-6401
Local Controller
1

Heat Pump #1

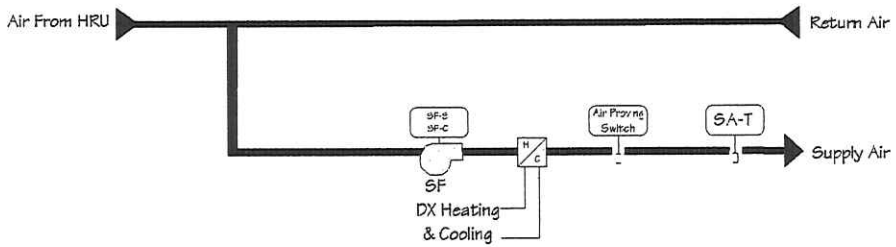
KMD-6401
Local Controller
2

Heat Pump #18

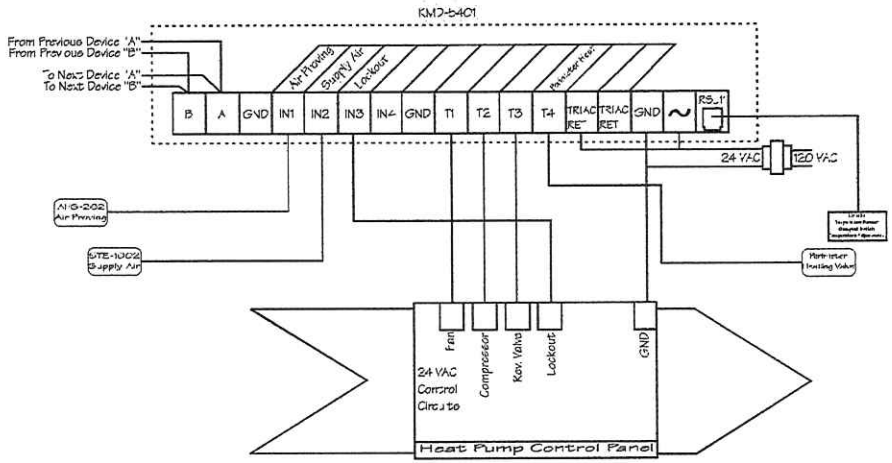
Drawing Title - Riser Diagram	KMC CONTROLS Hepta Control Systems Inc.	**Branch Information -** Hepta Systems Inc. Suite 199, 2-1200 London Rd. Sarnia, Ontario N7S 1P4 Tel: (519) 454-7740 Fax: (519) 541-1964 E-Mail: Houck@MNSi.Net
Project Title - St. Philip's Elementary School 4137 Victoria Street Petrolia, Ontario	**Date -** Jan. 7, 2000	**File Name -** St. Philips School.cdr **Page Number -** 1

Individual Heat Pumps & Perimeter Radiation -

Typical Heat Pump



Typical Heat Pump & Perimeter Radiation Connection
For Heat Pumps 1-18 & Perimeter Radiation 1-18



Bill of Materials

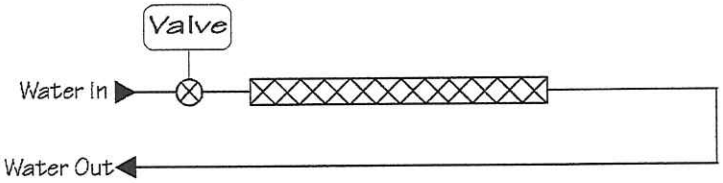
Designation	Quantity	Part #	Description
Field Devices-			
Space Temp.	18	KMD-1101	Space Temp.
Supply Air	18	STE-1002	Supply Air Temp.
Fan Blower	18	AFS 262	Diff. Pressure Switch
Panel Devices-			
Individual Heat Pump	18	KMD-6401	Local Controller

Sequence of Operation

Individual Heat Pumps (TYP Each Unit)-

1. Room temperature sensors will control the local hydronic baseboard heaters and room heat pumps to maintain 72°F air temperature.
2. Each room will have individual occ/unocc schedule to provide 5°F-night setback.
3. Fan to run continuously during occupied mode and cycle during unoccupied mode.
4. Space temperature alarm low 55°F, high 85°F.
5. Override button on room sensor will switch from unoccupied to occupied operation for up to 1½ hrs.

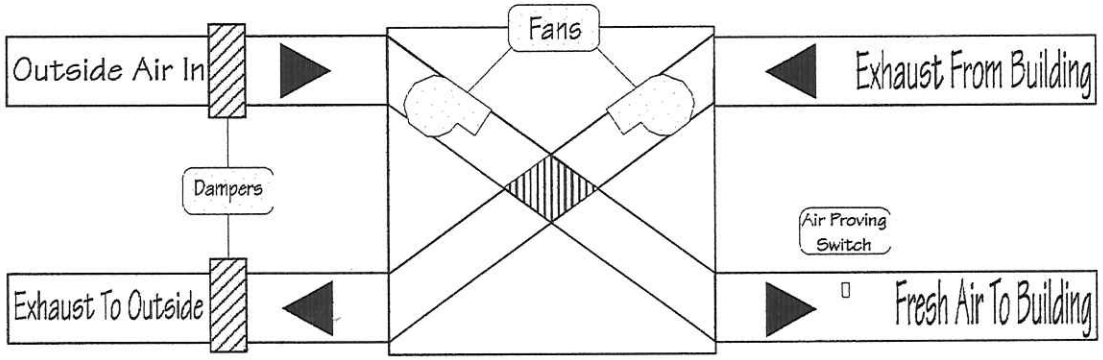
Typical Perimeter Radiation Heating



Drawing Title - Individual Heat Pumps & Perimeter Radiation	KMC CONTROLS Hepta Control Systems Inc.	Branch Information - Hepta Systems Inc. Suite 199, 2-1200 London Rd. Sarnia, Ontario N7S 1P4 Tel: (519) 454-7740 Fax: (519) 541-1964 E-Mail: Houck@MNSi.Net
Project Title - St. Philip's Elementary School 4137 Victoria Street Petrolia, Ontario	Date - Jan. 7, 2000	File Name - St. Philips School.cdr / Page Number - 2

Heat Recovery Units -

Typical Heat Recovery Unit



Bill of Materials

Designation	Quantity	Part #	Description
Field Devicee-Fan	8	AFS 262	Diff. Pressure Switch

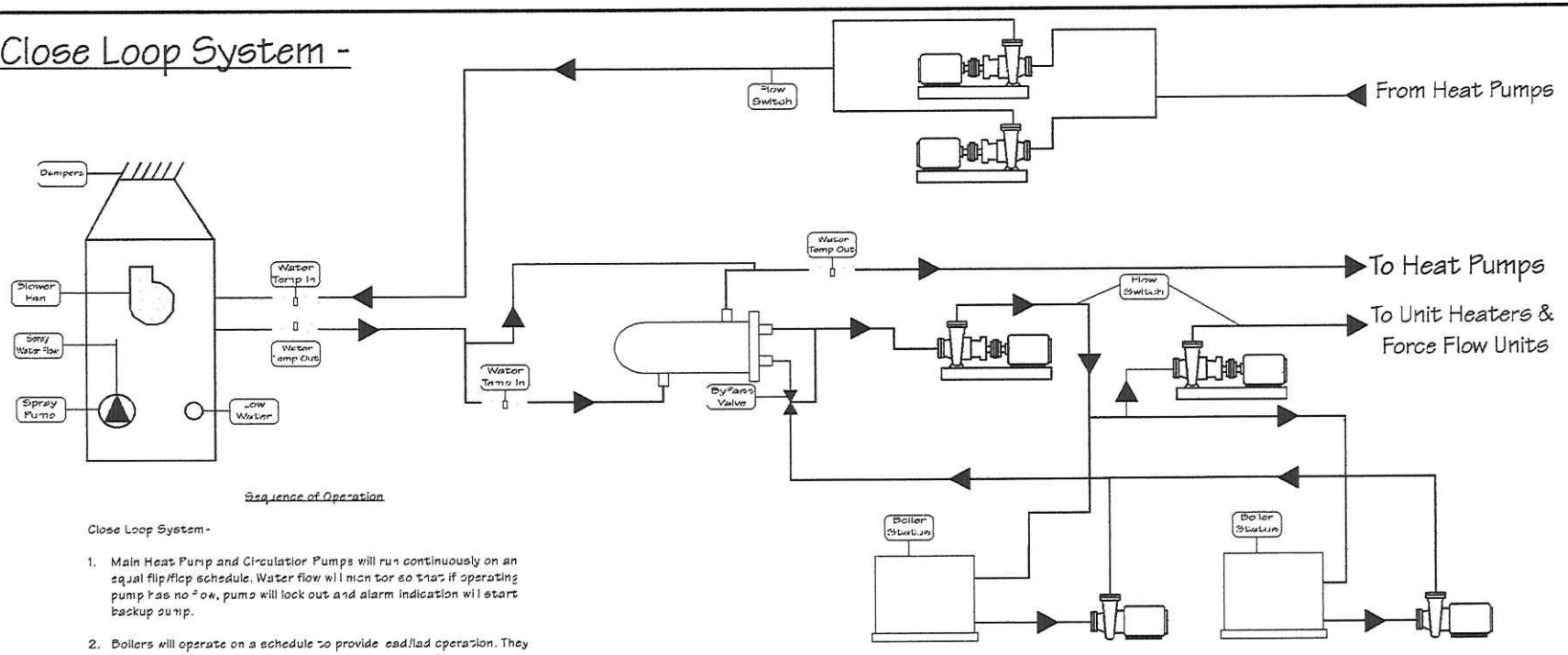
Sequence of Operation

Heat Recovery Units (TYP Each Unit)-

HRV Units are linked to Heat Pump & Perimeter Radiation room sensors and schedules.

Drawing Title - Heat Recovery Units	KMC CONTROLS Hepta Control Systems Inc.	Branch Information - Hepta Systems Inc. Suite 199, 2-1200 London Rd. Sarnia, Ontario N7S 1P4 Tel: (519) 454-7740 Fax: (519) 541-1964 E-Mail: Houck@MNSi.Net
Project Title - St. Phi is's Elementary Schoo 4137 Victoria Street Petrolia, Ontario	Date - Jan. 7, 2000	File Name - St. Philips School.cdr / Page Number - 3

Close Loop System -

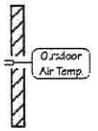


Sequence of Operation

Close Loop System -

1. Main Heat Pump and Circulation Pumps will run continuously on an equal flip/flop schedule. Water flow will monitor so that if operating pump has no flow, pump will lock out and alarm indication will start backup pump.
2. Boilers will operate on a schedule to provide lead/lag operation. They will provide loop temperature based on an indoor/outdoor reset schedule.
3. The Perimeter Radiation Pump and Heat Exchanger Pumps will run continuously during the heating season and shut-off at 68°F outdoor air temperature.
4. The Heat Exchanger 3 way modulating valve will maintain Heat Pump loop temperature at 75°F.
5. A Summer/Auto/Winter selector switch will allow operator to select Summer. (Heating will be disabled.) Winter, (Fluid cooler will be disabled.) Auto (System can operate heating and fluid cooler as per schedule.).
6. Fluid Cooler -
   1. Loop Temperature Rise To 82°F, Dampers Or.
   2. Loop Temperature Rise To 87°F, Spray Pump On.
   3. Loop Temperature Rise To 90°F, Blower On.
   4. Or Fall In Loop Temperature, Reverse Sequence At Not More Than 3°F Differential
7. Disable Spray Pump at 40°F outdoor air temperature.
8. A low water safety will lock out the Spray Pump operation.
9. A 5°F dead-band between heating and cooling will be maintained and an safety interlock will not allow operation of Fluid Cooler and Boiler at the same time.

Outdoor Air Temperature



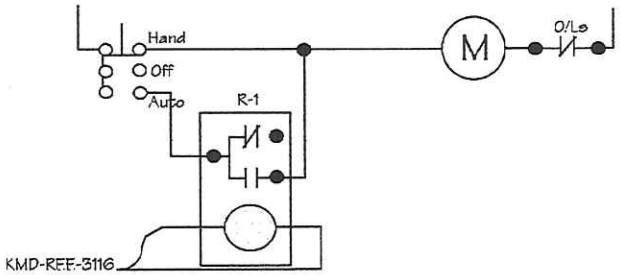
Bill of Materials

Designation	Quantity	Part #	Description
Field Devices -			
Immersion Sensor	1	TE2COCVB2E	Water In Temp.
Immersion Sensor	1	TE2COCVB2E	Water Out Temp.
Current Status	1	CS GNG	Spray Pump
Current Status	1	CS GNG	Blower Fan
Johnson	1	F61KB1"	Loop Water Flow
Johnson	1	F61KB1"	Spray Water Flow
Immersion Sensor	1	TE2COCVB2E	Water In Temp.
Immersion Sensor	1	TE2COCVB2E	Water Out Temp.
Current Status	1	CS GNG	Main Circ. Pump #B1
Current Status	1	CS GNG	Main Circ. Pump #B2
Current Status	1	CS GNG	Circ Pump #C1
Current Status	1	CS GNG	Circ. Pump #D1
Outdoor Air	1	TE200-Y	Outside Air Temp.
Boiler #1			Boiler #'
Boiler #2			Boiler #2
Relay	9	KMD-REE-3116	Relay
Panel Devices -			
Coes Loop System	1	KMD-5136	Multinet Controler

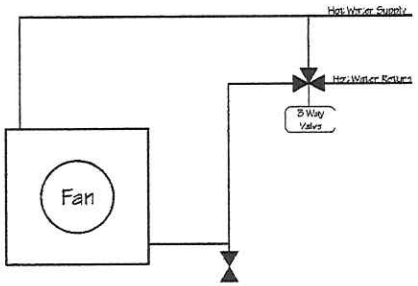
Drawing Title - Close Loop System	KMC CONTROLS	**Branch Information -** Hepta Systems Inc. Suite 199, 2-1200 London Rd. Sarnia, Ontario N7S 1P4 Tel: (519) 464-7740 Fax: (519) 541-1964 E-Mail: Houck@MNSi.Net
Project Title - St. Philip's Elementary School 4137 Victoria Street Petrolia, Ontario	Hepta Control Systems Inc.	
	Date - Jan. 7, 2000	**File Name - St. Philips School.cdr** | **Page Number - 4**

Misc. -

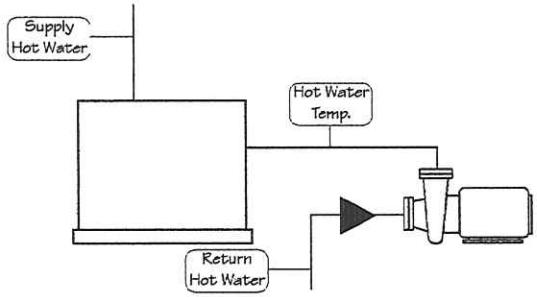
Exhaust Hood Typical Of 1-6



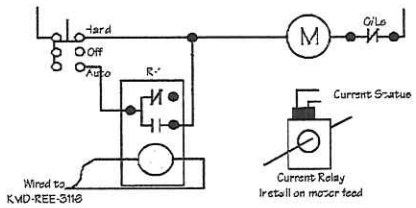
Typical of Unit Heaters & Force Flow Units



Domestic Hot Water



Typical of All Pumps & Fans



Bill of Materials

Designation	Quantity	Part #	Description
Field Devices-			
Relays	15	KMD-REE-3116	Relays
Greystone	8	TE200AD7	Room Sensor
Immersion Sensor	1	TE200C7B2E	Return Hot Water

Sequence of Operation

Exhaust Fans-

1. Exhaust fans will be run on a occ/unocc schedule.

Unit Heaters & Force Flow Units-

1. Control of blower, fan, and heating control valve will be thorough room sensor.

Domestic Hot Water-

1. Pump will run on timed schedule.

2. Pump will stop and start when return water rises above or below 110°F

Drawing Title - Misc.	KMC CONTROLS Hepta Control Systems Inc.	**Branch Information -** Hepta Systems Inc. Suite 199, 2-1200 London Rd. Sarnia, Ontario N7S 1P4 Tel: (519) 464-7740 Fax: (519) 541-1964 E-Mail: Houck@MNSi.Net
Project Title - St. Philip's Elementary School 4137 Victoria Street Petrolia, Ontario	**Date -** Jan. 7, 2000	**File Name -** St. Philips School.cdr **Page Number -** 5

Individual Heat Pumps & Perimeter Radiation Points List-

Full Spreadsheet		Software					Digital Controller Information		
Items	Point Type	System Name	Object Name	DC Type	Display Units		Cable Destination Bay/Terminal	Termination	Reference Drawing
Individual Heat Pumps (TYP Each Unit)									
Space Temperature	RSJ11	HP	HP#-ST	KMD-1101	°F		RSJ11		SP99-2
OCC Switch	RSJ11	HP	HP#-OCCS	KMD-1101	On/Off		RSJ11		SP99-2
Temperature Adjustment	RSJ11	HP	HP#-TA	KMD-1101	Variable		RSJ11		SP99-2
Supply Air	AI-1	HP	HP#-SA	KMD-6401	°F		DI		SP99-2
Fan Blower	DO-2	HP	HP#-FB	KMD-6401	On/Off		DO-1		SP99-2
Fan Blower Status	DI-3	HP	HP#-FBS	KMD-6401	On/Off		DI		SP99-2
Heat	DO-3	HP	HP#-HT	KMD-6401	On/Off		DO-2		SP99-2
Cool	DO-4	HP	HP#-CL	KMD-6401	On/Off		DO-3		SP99-2
Lockout	DI-4	HP	HP#-L	KMD-6401	On/Off		DI-4		SP99-2
Workroom (HP-8 & 13)	AI-2	HP	HP#-S	KMD-6401	°F		AI-2		
Sensor	DI-4	HP	HP#-OR	KMD-6401	On/Off		DI-4		
Override	AO-1	HP	HP#-HV	KMD-6401	On/Off		AO-1		

Drawing Title - Individual Heat Pumps & Perimeter Radiation Point List

Project Title - St. Philip's Elementary School, 4137 Victoria Street, Petrolia, Ontario

KMC CONTROLS

Hepta Control Systems Inc.

Branch Information -
Hepta Systems Inc.
Suite 199, 2-1200 London Rd.
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Date - Jan. 7, 2000 | File Name - St. Philips School.cdr |

Close Loop System Points List-

Main Circ. Pump # B2 Status	DI-14	Multi-Net	HPL-CP#B2S	KMD-5136	On/Off		DI-14	Mechanical Rm.	SP99-4
Circ Pump #C	DO-9	Multi-Net	HPL-CP#C1	KMD-5136	On/Off		DO-9	Mechanical Rm.	SP99-4
Circ Pump #C Status	DI-15	Multi-Net	HPL-CP#C1S	KMD-5136	On/Off		DI-15	Mechanical Rm.	SP99-4
Circ Pump #D1	DO-10	Multi-Net	HPL-CP#D1	KMD-5136	On/Off		DO-10	Mechanical Rm.	SP99-4
Circ Pump #D1 Status	DI-16	Multi-Net	HPL-CP#D1S	KMD-5136	On/Off		DI-16	Mechanical Rm.	SP99-4
Heat Exchanger									
Water In Temperature	AI-3	Multi-Net	HE-S-T	KMD-5136	°F		AI-3	Mechanical Rm.	SP99-4
Water Out Temperature	AI-4	Multi-Net	HE-R-T	KMD-5136	°F		AI-4	Mechanical Rm.	SP99-4
Bypass Valve	AO-1	Multi-Net	HE-BV	KMD-5136	%		AO-1	Mechanical Rm.	SP99-4
Outside Air Temperature	AI-5	Multi-Net	OA-T	KMD-5136	°F		AI-5	Mechanical Rm.	SP99-4
Domestic Hot Water Recirc Pump	DO-1	CLS-1	DHW-P	KMD-5502	On/Off		DO-1	Mechanical Rm.	SP99-5
Domestic Hot Water Recirc Pump Status	DI-4	CLS-1	DHW-PS	KMD-5502	On/Off		DI-4	Mechanical Rm.	SP99-5
Domestic Hot Water Temperature	AI-1	CLS-1	DHW-T	KMD-5502	°F		AI-1	Mechanical Rm.	SP99-5
Unit Heater - 3									
Room Sensor	AI-2	CLS-1	UH3-RS	KMD-5502	°F		AI-2	Mechanical Rm.	SP99-5
Fan/Valve	DO-2	CLS-1	UH3-F/V	KMD-5502	On/Off		DO-2	Mechanical Rm.	SP99-5
Force Flow - 3									
Room Sensor	AI-3	CLS-1	FF3-RS	KMD-5502	°F		AI-3	Mechanical Rm.	SP99-5
Control Valve	DO-3	CLS-1	FF3-CV/F	KMD-5502	On/Off		DO-3	Mechanical Rm.	SP99-5
Fan	DO-3	CLS-1	FF3-CV/F	KMD-5502	On/Off		DO-3	Mechanical Rm.	SP99-5
Staff Room Exh. Fan #5	DO-4	CLS-1	EF-SR	KMD-5502	On/Off		DO-4	Mechanical Rm.	SP99-5
Copy Room Fan #4	DO-5	CLS-1	EF-CR	KMD-5502	On/Off		DO-5	Mechanical Rm.	SP99-5
Washroom Exh. Fan #2	DO-6	CLS-1	EF-W	KMD-5502	On/Off		DO-6	Mechanical Rm.	SP99-5
HRV# 3A									
Fan	DO-7	CLS-1	HRV3A-FD	KMD-5502	On/Off		DO-7	Mechanical Rm.	SP99-3
Fan Status	DI-5	CLS-1	HRV3A-FS	KMD-5502	On/Off		DI-5	Mechanical Rm.	SP99-3
Dampers (2)	DO-7	CLS-1	HRV3A-FD	KMD-5502	On/Off		DO-7	Mechanical Rm.	SP99-3
HRV #2E									
Fan	DO-8	CLS-1	HRV2E-FD	KMD-5502	On/Off		DO-8	Mechanical Rm.	SP99-3
Fan Status	DI-6	CLS-1	HRV2E-FS	KMD-5502	On/Off		DI-6	Mechanical Rm.	SP99-3
Dampers (2)	DO-8	CLS-1	HRV2E-FD	KMD-5502	On/Off		DO-8	Mechanical Rm.	SP99-3
Fire Alram System	DI-7	CLS-1	FAS	KMD-5502	On/Off		DI-7	Mechanical Rm.	

Drawing Title -
Close Loop System
Points List

Project Title -
St. Philip's Elementary School
4137 Victoria Street
Petrolia, Ontario

KMC CONTROLS
Hepta Control Systems Inc.

Branch Information -
Hepta Systems Inc.
Suite 199, 2-1200 London Rd.
Sarnia, Ontario N7S 1P4
Tel: (519) 464-7740
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Date - Jan. 7, 2000 | **File Name - St. Philips School.cdr** | **Page Number - 7**

Heat Recovery Units Points List -

HRV# 1A									
Fan	DO-1	CLS-2	HRV1A-FD	KMD-5502	On/Off		DO-1	Mechanical Rm.	SP99-3
Fan Status	DI-3	CLS-2	HRV1A-FS	KMD-5502	On/Off		DI-3	Mechanical Rm.	SP99-3
Dampers (2)	DO-1	CLS-2	HRV1A-FD	KMD-5502	On/Off		DO-1	Mechanical Rm.	SP99-3
HRV# 1B									
Fan	DO-2	CLS-2	HRV1B-FD	KMD-5502	On/Off		DO-2	Mechanical Rm.	SP99-3
Fan Status	DI-4	CLS-2	HRV1B-FS	KMD-5502	On/Off		DI-4	Mechanical Rm.	SP99-3
Dampers (2)	DO-2	CLS-2	HRV1B-FD	KMD-5502	On/Off		DO-2	Mechanical Rm.	SP99-3
Force Flow - 4									
Room Sensor	AI-1	CLS-2	FF4-RS	KMD-5502	°F		AI-1	Mechanical Rm.	SP99-5
Control Valve	DO-3	CLS-2	FF4-CV/F	KMD-5502	On/Off		DO-3	Mechanical Rm.	SP99-5
Fan	DO-3	CLS-2	FF4-CV/F	KMD-5502	On/Off		DO-3	Mechanical Rm.	SP99-5
Force Flow - 5									
Room Sensor	AI-2	CLS-2	FF5-RS	KMD-5502	°F		AI-2	Mechanical Rm.	SP99-5
Control Valve	DO-4	CLS-2	FF5-CV/F	KMD-5502	On/Off		DO-4	Mechanical Rm.	SP99-5
Fan	DO-4	CLS-2	FF5-CV/F	KMD-5502	On/Off		DO-4	Mechanical Rm.	SP99-5

Drawing Title -
Heat Recovery Units
Points List - Mechanical Room

Project Title -
St. Philip's Elementary School
4137 Victoria Street
Petrolia, Ontario

KMC CONTROLS
Hepta Control Systems Inc.

Branch Information -
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Date - Jan. 7, 2000 | **File Name - St. Philips School.cdr** | **Page Number - 8**

Exhaust Fans Points List -

Items	Point Type	System Name	Object Name	DC Type	Display Units		Cable Destination Bay/Terminal	Termination	Reference Drawing
Exhaust Fans									
Change Room 3A	DO-1	CLS-3	EF-CR#3A	KMD-6403	On/Off		DO-1	Change Room	SP99-5
Change Room 3B	DO-1	CLS-3	EF-CR#3B	KMD-6403	On/Off		DO-1	Change Room	SP99-5
Existing Washroom	DO-2	CLS-3	EF-E.WSH	KMD-6403	On/Off		DO-2	Change Room	SP99-5
Boys Washroom									
Uranil Sensor	AI-3	CLS-3		KMD-6403	Occ. Sensor			Change Room	???
Uranil Value	DO-4	CLS-3		KMD-6403	On/Off			Change Room	???
Radiation Heaters									
Heating Valve	DO-3	CLS-3	RH-HV	KMD-6403	On/Off		DO-3, DO-4	Change Room	SP99-2
Sensor	AI-1, AI-2	CLS-3	RH-S	KMD-6403	°F		AI-1, AI-2	Change Room	SP99-2

Drawing Title - Exhaust Fans Points List - Gym Change Room	KMC CONTROLS Hepta Control Systems Inc.	**Branch Information -** Hepta Systems Inc. Suite 199, 2-1200 London Rd. Sarnia, Ontario N7S 1P4 Tel: (519) 454-7740 Fax: (519) 541-1964 E-Mail: Houck@MNSi.Net
Project Title - St. Philip's Elementary School 4137 Victoria Street Petrolia, Ontario	**Date - Jan. 7, 2000**	**File Name - St. Philips School.cdr** **Page Number - 9**

Heat Recovery Units Points List -

Items	Point Type	System Name	Object Name	DC Type	Display Units		Cable Destination Bay/Terminal	Termination	Reference Drawing
HRV# 2D									
Fan	DO-1	CLS-4	HRV2D-FD	KMD-5502	On/Off		DO-1	Classroom #3	SP99-3
Fan Status	DI-3	CLS-4	HRV2D-FS	KMD-5502	On/Off		DI-3	Classroom #3	SP99-3
Dampers (2)	DO-1	CLS-4	HRV2D-FD	KMD-5502	On/Off		DO-1	Classroom #3	SP99-3
HRV# 2C									
Fan	DO-2	CLS-4	HRV2C-FD	KMD-5502	On/Off		DO-2	Classroom #3	SP99-3
Fan Status	DI-4	CLS-4	HRV2C-FS	KMD-5502	On/Off		DI-4	Classroom #3	SP99-3
Dampers (2)	DO-2	CLS-4	HRV2C-D	KMD-5502	On/Off		DO-2	Classroom #3	SP99-3
Force Flow - 2									
Room Sensor	AI-1	CLS-4	FF2-RS	KMD-5502	°F		AI-1	Classroom #3	SP99-5
Cortro Valve	DO-3	CLS-4	FF2-CV/F	KMD-5502	On/Off		DC-3	Classroom #3	SP99-5
Fan	DO-3	CLS-4	FF2-CV/F	KMD-5502	On/Off		DC-3	Classroom #3	SP99-5
Workroom									
Sensor	AI-2	CLS-4	WR-S	KMD-5502	°F		AI-2	Classroom #3	
Override	DI-5	CLS-4	WR-OR	KMD-5502	On/Off		DI-5	Classroom #3	

Drawing Title - Heat Recovery Units Points List - Classroom #3

Project Title - St. Philip's Elementary School, 4137 Victoria Street, Petrolia, Ontario

KMC CONTROLS

Hepta Control Systems Inc.

Branch Information -
Hepta Systems Inc.
Suite 199, 2-1200 London Rd.
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Date - Jan. 7, 2000 | **File Name -** St. Philips School.cdr | **Page Number -** 10

Heat Recovery Units Points List -

HRV# 2A									
Fan	DO-1	CLS-5	HRV2A-FD	KMD-6403	On/Off		DO-1	Gym	SP99-3
Fan Status	DI-4	CLS-5	HRV2A-FS	KMD-6403	On/Off		DI-4	Gym	SP99-3
Dampers (2)	DO-1	CLS-5	HRV2A-FD	KMD-6403	On/Off		DO-1	Gym	SP99-3
HRV# 2B									
Fan	DO-2	CLS-5	HRV2B-FD	KMD-6403	On/Off		DO-2	Gym	SP99-3
Fan Status	DI-5	CLS-5	HRV2B-FS	KMD-6403	On/Off		DI-5	Gym	SP99-3
Dampers (2)	DO-2	CLS-5	HRV2B-FD	KMD-6403	On/Off		DO-2	Gym	SP99-3
Force Flow - 1									
Room Sensor	AI-1	CLS-5	FF1-RS	KMD-6403	°F		AI-1	Gym	SP99-5
Control Valve	DO-3	CLS-5	FF1-CV/F	KMD-6403	On/Off		DO-3	Gym	SP99-5
Fan	DO-3	CLS-5	FF1-CV/F	KMD-6403	On/Off		DO-3	Gym	SP99-5
Unit Heater - 1									
Room Sensor	AI-2	CLS-5	UH1-RS	KMD-6403	°F		AI-2	Gym	SP99-5
Fan/Valve	DO-4	CLS-5	UH1-F/V	KMD-6403	On/Off		DO-4	Gym	SP99-5
Unit Heater - 2									
Room Sensor	AI-3	CLS-5	UH2-RS	KMD-6403	°F		AI-3	Gym	SP99-5
Fan/Valve	DO-5	CLS-5	UH2-F/V	KMD-6403	On/Off		DO-5	Gym	SP99-5

Drawing Title - Heat Recovery Units Points List - Gym

Project Title - St. Philip's Elementary School, 4137 Victoria Street, Petrolia, Ontario

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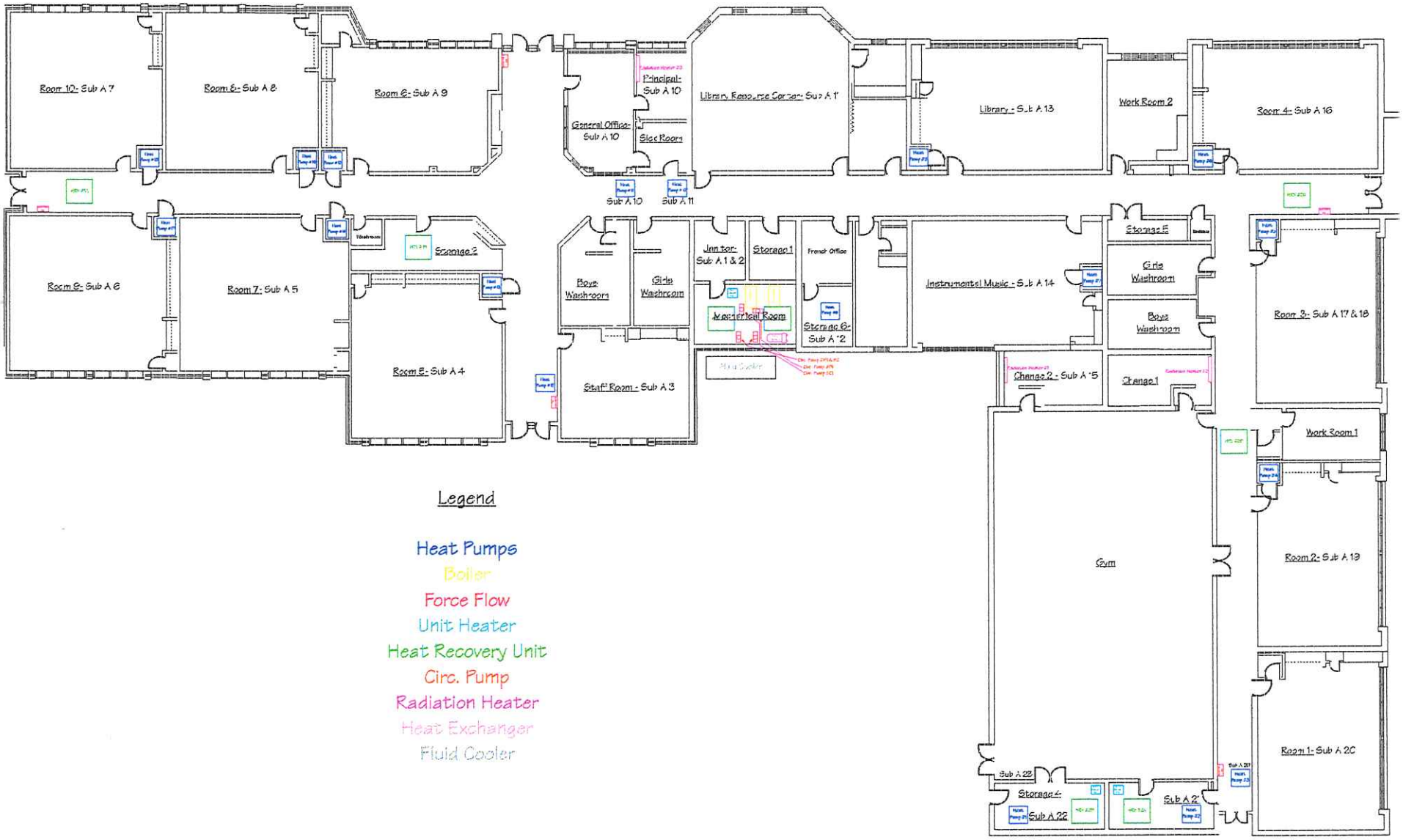


Legend

Heat Pumps
Boiler
Force Flow
Unit Heater
Heat Recovery Unit
Circ. Pump
Radiation Heater
Heat Exchanger
Fluid Cooler

KMC CONTROLS

KMD-5110, 5111
KMDigital Controllers

DESCRIPTION

The KMDigital Controller is a modular, programmable direct digital controller and a high level LAN communications manager for facilities management systems. The operating software utilizes a high level, nonproprietary programming language that ensures reliability, operator independence, compatibility with future system enhancements and reduced maintenance costs.

The KMDigital Controllers have multiple security levels with 128 user defined passwords. The three RS-232 ports may be used by a host computer, printers or auto-dial/auto-answer modems.

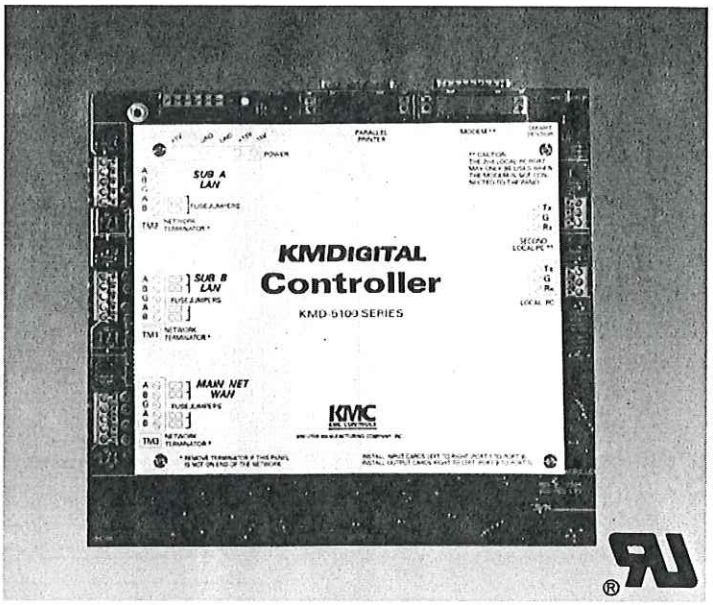
A RS-422/485 port is provided for connection to the Main Network LAN which will support up to 125 KMDigital Controllers on a full peer-to-peer basis. Two other RS-422/485 ports provide for communication to Sub Network LAN's, A and B, each of which will support up to 124 nodes of stand-alone Local Controllers and Terminal Controllers on a full peer-to-peer basis. Subnetwork B also provides a communications interface for approved equipment or an additional PC connection.

The KMDigital Controllers are intelligent, programmable direct digital controllers. They are designed as stand-alone controllers or networked into a KMDigital system to precisely monitor and control any device in the HVAC industry or related field. Up to 128 input/output points may be controlled directly by using KMD-5120 and 5121 input/output cards.

Model KMD-5110 uses a zero maintenance capacitor for backup purposes. KMD-5111 uses a lithium battery which only requires replacement every 10-15 years.

KMdigital Software Functionality includes the following:

- Direct Digital Control (DDC)
- Energy Management (EMCS)
- Facilities Management (FMS)
- Full mathematics with floating point and natural logs
- Custom sequences
- Polynomial curve fitting functions
- Extensive internal diagnostics, diagnostic LED's
- Up to 128 user programs
- Up to 128 input/output points - multiple analog and digital ranges (Input/Output cards must be installed)
- Standard P, PI, PID controllers for closed loop control
- Trend logs - each log storing up to 6 values at fixed intervals
- Run time totalizers and event logs
- Weekly schedules with 4 on/off times per weekday and 2 override days
- Annual schedules



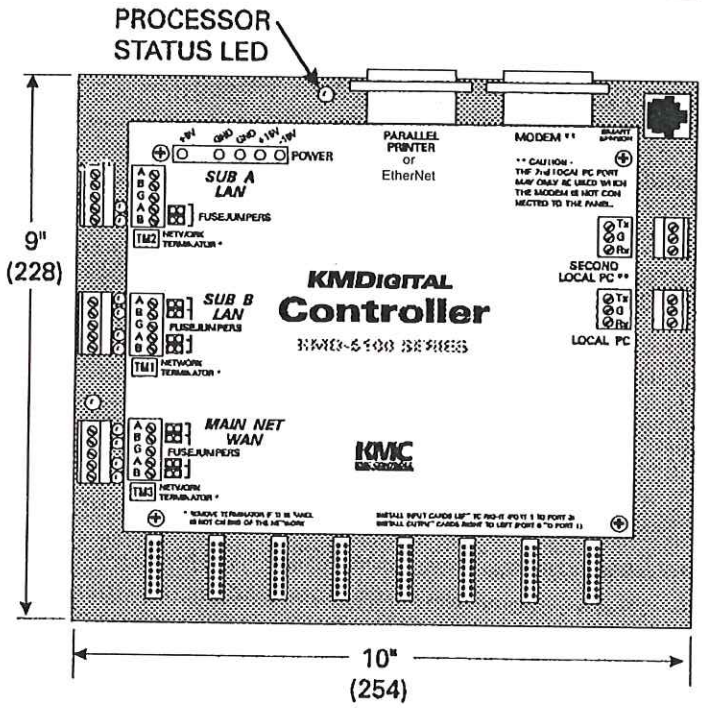
- User passwords
- Custom tables
- Custom analog and custom digital engineering units

SPECIFICATIONS

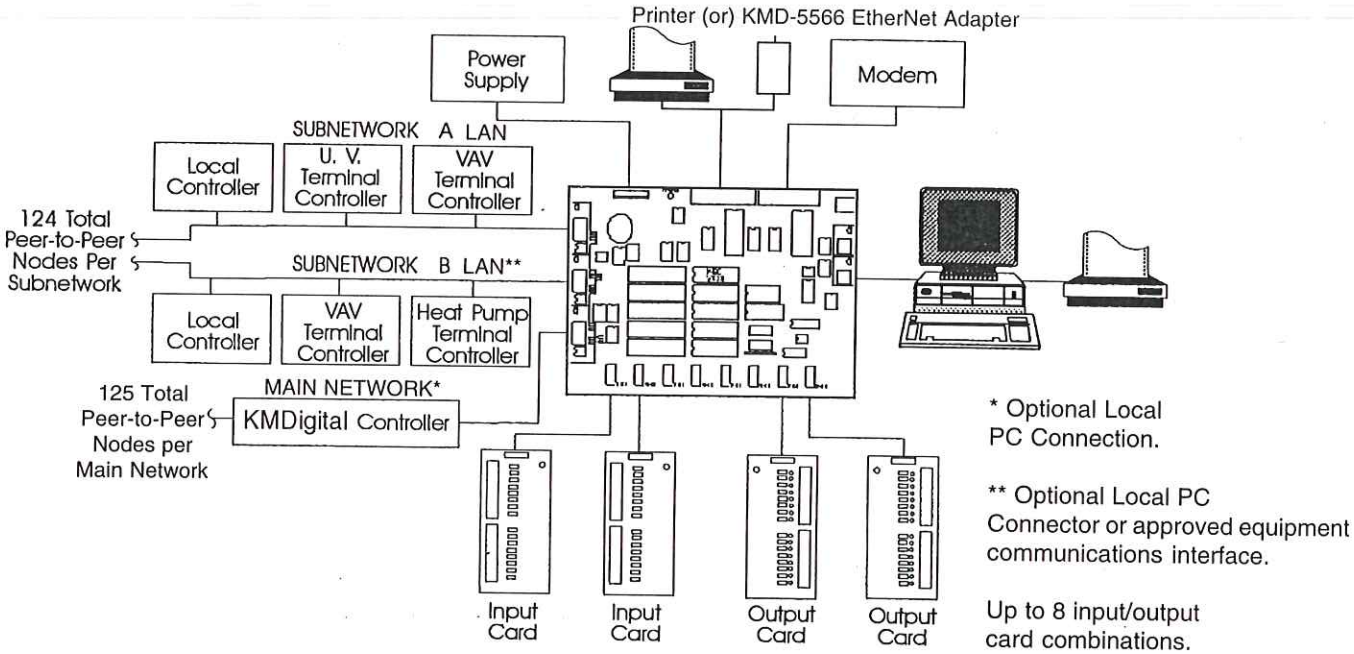
Supply Voltage	5 VDC @ 0.5 A maximum, 15 VDC @ 0.35 A maximum, -15 VDC @ 0.35 A maximum
Communications	Two RS-232, two RS-422/485, & one RS-485 @ 38,400 baud maximum. 1 parallel printer, or EtherNet
Conversion	A/D operating @ 10 bit analog to digital (+/- 5 mV) D/A operating @ 12 bit digital to analog
Processor V53	16 bit word size, 16 MHz clock speed
Memory	128 K Eprom operating system. Standard 512 K static RAM user programming and data. 1 Meg optional. 2 K Eprom board configuration
Hardware Real Time Clock	+/- 30 seconds per month
Memory/RTC Backup	
KMD-5110	48 to 72 hours by zero maintenance capacitor
KMD-5111	72 hour reserve capacity, 10 year life on the lithium battery
Watchdog Timer	Auto-restart in event of crash
Status LED's	Displays panel and individual port operation
Overall Size	10" (254 mm) x 9" (229 mm)
Ambient Limits	
Operating	0°F to 120°F (-18°C to 49°)
Shipping	-40°F to 140°F (-40°C to 60°C)

DIMENSIONS

DIMENSIONS IN INCHES (MM)



TYPICAL APPLICATION



INSTALLATION-CALIBRATION

Refer to the KMDigital Technical Operators Manual for complete installation and calibration instructions.

MAINTENANCE

Replace lithium battery every 10 to 15 years. No routine maintenance is required. Each component's design and material selection assures dependable long-term reliability and performance. Careful installation will also enhance long-term reliability and performance.

MODELS

KMD-5110: Zero maintenance backup capacitor
KMD-5111: Ten year lithium battery backup

Also available UL Listed KMD-5100 Series Assemblies: KMD-5110 or KMD-5111 assembled with KMD-5120 Input Card(s), KMD-5121 Output Card(s), and KMD-5564 Power Supply, in an HCO-1005 enclosure.

ORDERING

Specify: Model Number
Order From: Local KMC Controls dealer or,
KMC Controls, Kreuter Manufacturing Co., Inc.

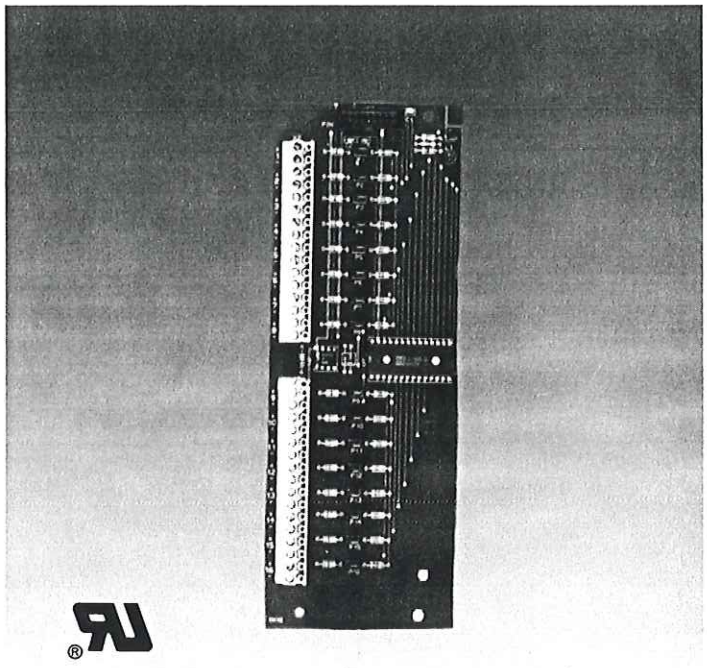
Specifications and design are subject to change without notice.

KMC CONTROLS

KMD-5120
Input Card

DESCRIPTION

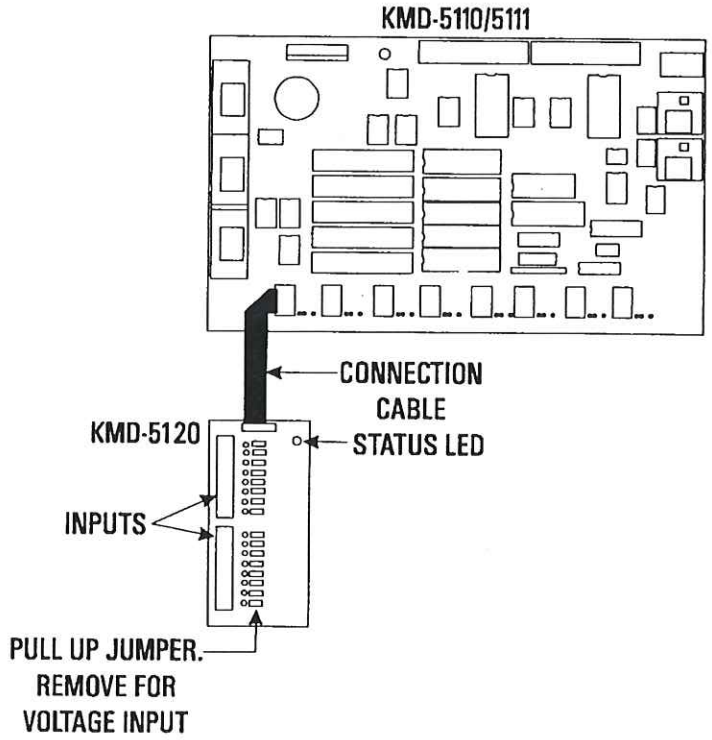
The KMD-5120 is a general purpose input card for use with the KMD-5110 or KMD-5111 MultiNet Controllers. Each of the 16 input channels may accept digital, analog or pulse signals. Boards are supplied in 3.25" (83 mm) snaptrack.



SPECIFICATIONS

Supply Voltages	+15 VDC, -15 VDC, +5 VDC via a MultiNet Controller
Input Voltage	0-5 VDC analog On-Off digital
Input Impedance	10 K ohms with jumper installed, 100 K ohms without jumper
Overvoltage Protection	24 VAC continuous
Connectors	Two 16 pole vertical plug-in for inputs. 16 pole ribbon cable header for MultiNet Controller (order cable assembly separately).
Wire Size	12-22 AWG
LED	Status LED flashes when card is accessed
Overall Size	8.5" (216 mm) x 3.25" (83 mm)
Ambient Limits	
Operating	0˚F to 120˚F (-18˚C to 49˚C)
Shipping	-40˚F to 140˚F (-40˚C to 60˚C)
Accessories	KMD-5660: 6" (15 cm) cable KMD-5661: 13" (33 cm) cable KMD-5662: 18" (46 cm) cable KMD-5663: 24" (61 cm) cable KMD-5664: 36" (91 cm) cable KMD-5665: 48" (122 cm) cable KMD-5666: 72" (183 cm) cable KMD-5667: 96" (244 cm) cable KMD-5668: 120" (305 cm) cable
UL Recognized	

APPLICATION DIAGRAM



ORDERING

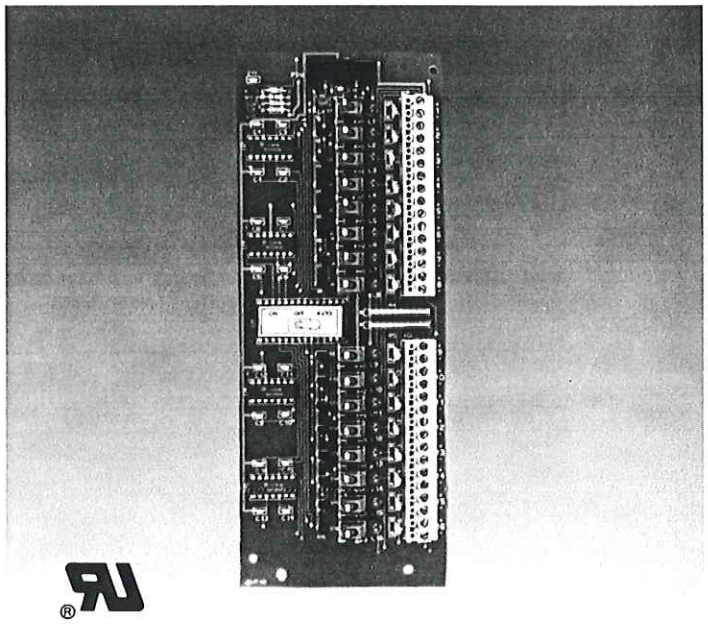
Specify: Model Number, accessory number if required
Order From: Local KMC Controls dealer or,
KMC Controls, Kreuter Manufacturing Co., Inc.

KMC CONTROLS

KMD-5121
Output Card

DESCRIPTION

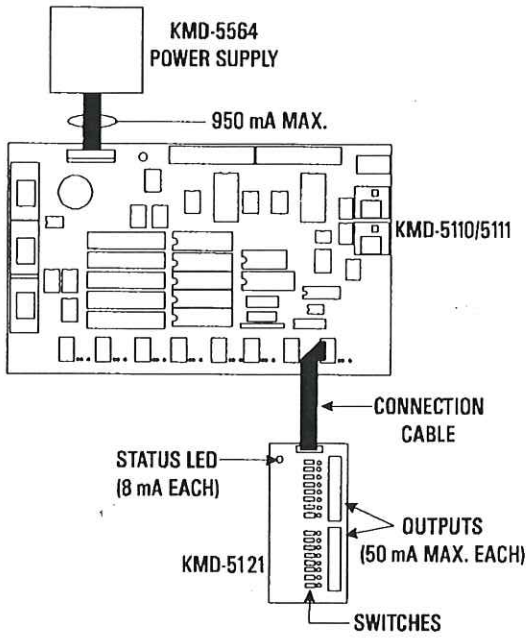
The KMD-5121 is a 16 output card for use with the KMD-5110 or KMD-5111 KMDigital MultiNet Controllers. All outputs are defined through software as either analog or digital. Boards are supplied in 3.25" (83 mm) snaptrack.



SPECIFICATIONS

Supply Power	+15 VDC, -15 VDC, +5 VDC via a MultiNet Controller; 950 mA maximum per MultiNet Controller. See *Note*.
Output	
Voltage	0-10 VDC for analog outputs; 0-12 VDC for digital outputs; manual ON provides 15 VDC
Current	50 mA maximum per output. *See Note.*
Short Protection	Yes
Applied Voltage Protection	Continuous application of 24 VAC
Switches	On/Off/Auto toggle switch per output
Connectors	Two 16 pole vertical plug-in for outputs. 16 pole ribbon cable header for MultiNet Controller
LED's	Status LED flashes when card is accessed, output LEDs indicate status
Overall Size	8.5" (216 mm) x 3.25" (83 mm)
Ambient Limits	
Operating	0˚F to 120˚F (-18˚C to 49˚C)
Shipping	-40˚F to 140˚F (-40˚C to 60˚C)
Accessories	KMD-5660: 6" (152 mm) cable KMD-5661: 13" (330 mm) cable KMD-5662: 18" (457 mm) cable KMD-5663: 24" (610 mm) cable KMD-5664: 36" (914 mm) cable KMD-5665: 48" (1219 mm) cable KMD-5666: 72" (1829 mm) cable KMD-5667: 96" (2438 mm) cable KMD-5668: 120" (3048 mm) cable
Approval	UL Recognized

APPLICATION DIAGRAM



NOTE: Current is supplied to KMD-5121 Output Cards by the KMD-5564 Power Supply (mounted w/MultiNet Controller). Since total cannot exceed 950 mA, and each LED uses 8 mA, the following equation applies:

$$\left(\begin{array}{c}\text{Total mA for all outputs}\\ \text{being supplied by}\\ \text{MultiNet power supply}\end{array}\right) + \left(\begin{array}{c}\text{8 mA x number}\\ \text{of outputs}\end{array}\right) \leq 950 \text{ mA}$$

ORDERING

Specify: Model Number, accessory number if required
Order From: Local KMC Controls dealer or,
KMC Controls, Kreuter Manufacturing Co., Inc.

KMC CONTROLS

KMD-6401, 6904
Direct Digital Controllers
MADE IN U.S.A.

DESCRIPTION

The KMD-6401 is an intelligent, programmable, 4 input/4 output direct digital controller. Each controller is capable of independent, stand-alone operation or may be networked together using the same peer-to-peer communications format as other KMDigital controllers. There is no auto-reset of time after power restoration.

The KMD-6401 was specifically designed for Heat Pump Unit applications and contain factory programmed (canned) control sequences with descriptors. The factory programming has options for controlling a fan, compressor, reversing, valve, and optional auxiliary heating. Program area 5 is for user programming. This feature allows the KMD-6401 to be user modified to add special sequences.

The KMD-6904 does not contain factory programmed control sequences or descriptors. These controllers have the same input/output hardware as the KMD-6401. Program area 5 is for user programming. This allows the KMD-6904 to be completely user customized.

These controllers contain many of the same features used in the other KMDigital products:

- Stand-alone or networked operation
- 4 inputs/4 outputs
- 32 software configurable Variables
- User programming
- 2 Trend Log Monitors
- 2 Runtime Totalizer Logs
- 1 Graphic compatible Control Group
- 1 Custom defined lookup Table
- Weekly schedule with Holiday/special event overrides
- 4 Full function PID Controllers
- Password protection

SPECIFICATIONS

Supply Voltage
24 VAC, -15%/ +20%, 10 VA maximum

Wiring
12-22 AWG

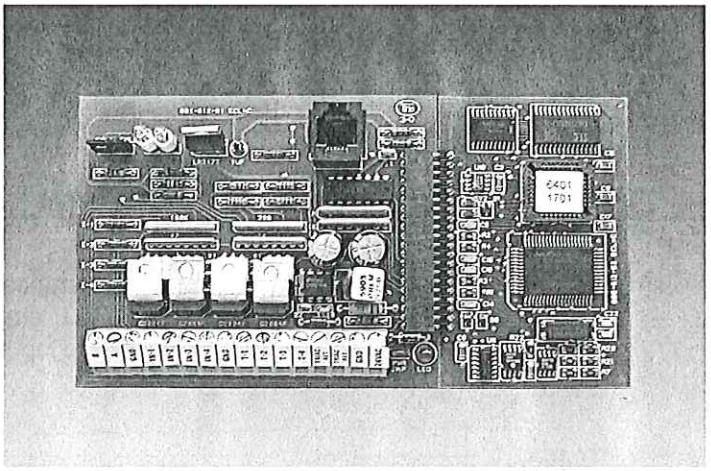
Communications
RS-485 @ 38,400 baud maximum

Communications Wiring
12-22 AWG twisted shielded pair, 4,000 feet maximum. Use KMD-5552/5554 repeaters for longer distances.

Communication Auxiliary
RJ11 for KMD-1001 NetView or for KMD-1101 NetSensor

Replacement Parts

HPF-6401	KMD-6401 Firmware chip
HPF-6904	KMD-6904 Firmware chip
HPO-0054	Fuse bulb
HPO-0063	Jumper
HPO-6501	KMD-6000/6900 CPU board
HPO-6602	KMD-6401, 6904 I/O board



Inputs
4 Universal analog or digital
Analog; 0-5 VDC
Digital; 0/5 VDC or dry contact closure
Impedance; 100 K
10 K pull-up to 5 VDC supply
Overvoltage protection

Outputs
4 Triacs, zero crossing, optically isolated
30 VAC, 1 A MAX

Size
6-1/8" x 3-1/4" (155.58 x 82.55 mm)

Weight
3.5 ounces (99.2 grams)

Ambient Limits

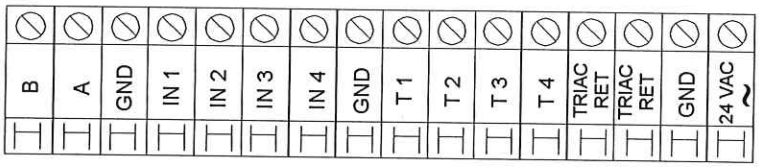
Operating	0°F to 120°F (-18°C to 49°C)
Shipping	-40°F to 140°F (-40°C to 60°C)

ORDERING

Specify: Model Number
Order From: Local KMC Controls dealer or,
KMC Controls, Kreuter Manufacturing Co., Inc.

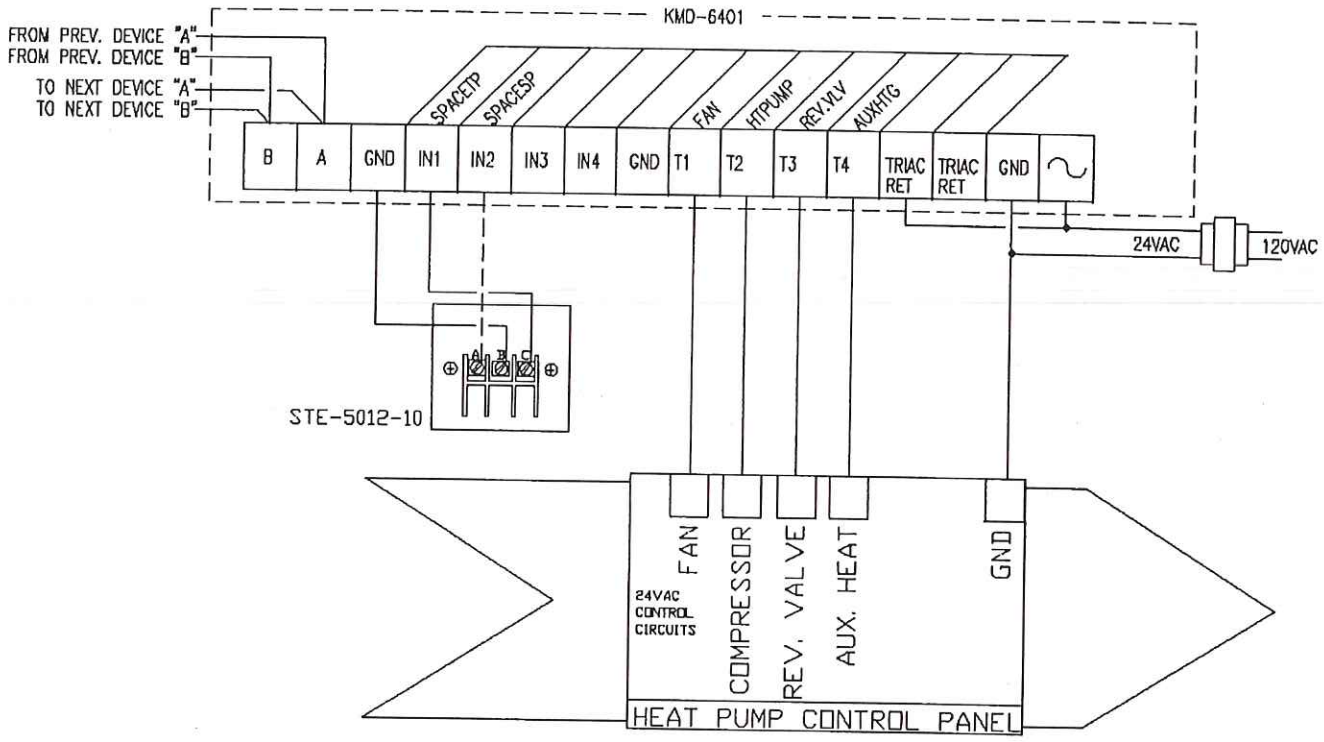
INSTALLATION

KMD-6401, 6904



4 Universal Inputs
4 Triac Outputs

Terminals; "B", "A", and "GND" are for communications
Terminals; "IN X" are inputs
Terminals; "GND" are input/output ground references
Terminals; "T X" are triac outputs, "TRIAC RET" are triac returns
Terminals; "24 VAC ~" is 24 VAC power phase input, "GND" is neutral



MAINTENANCE

No routine maintenance is required. Each component's design and material selection assures dependable long-term reliability and performance. Careful installation will also enhance long-term reliability and performance.

KMC CONTROLS

KMD-5500 SERIES
Local Control Unit
Direct Digital Controller

MADE IN U.S.A.

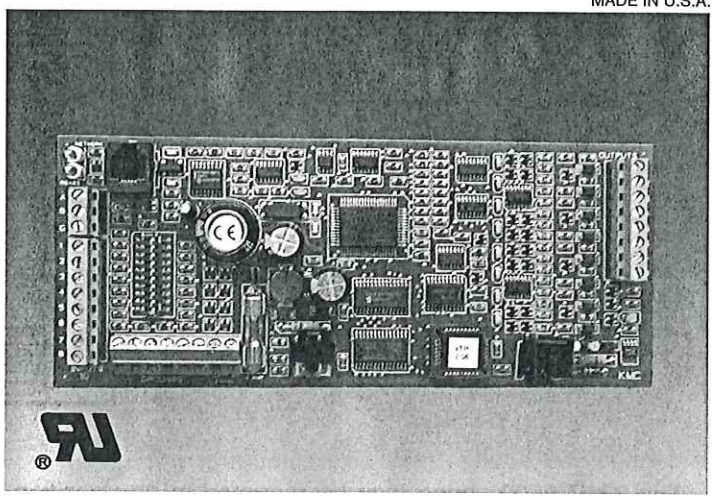
DESCRIPTION

The KMD-5500 series is a line of full peer-to-peer, programmable direct digital controllers. Used in a stand-alone environment, networked to other KMD-5500 or KMD-6000 controllers, or as part of a complete facilities management system (multiple LAN), the KMD-5500 controllers provide precise monitoring and control of connected points. Through a combination of block and basic programming it is easy to implement proportional (P), proportional + integral (PI), or proportional + integral + derivative (PID) programs desired for control purposes.

These controllers may also be used to optimize the energy consumption or your facility by implementing various Energy Management strategies such as; demand limiting, duty cycling, outside air optimization, temperature setup/setback optimum start/stop routines, etc.

Other on-board features include:

- Stand-alone or networked peer-to-peer capabilities
- 2-Way modem communications, dial in - dial out
- 8 Universal Inputs - software selectable as analog or digital with standard and custom ranges
- 8 Universal Outputs - software selectable for analog or digital with standard and custom ranges
- 32 Virtual or Variable points - software selectable as analog or digital with standard and custom ranges; may have manually set or program driven values
- 8 Standard P, PI, or PID controllers
- 5 User definable programs
- 8 Trend Logs for data logging purposes, each supporting up to 4 analog, digital or virtual elements or points; when linked to the KMDigital operating system these logs may be graphically displayed
- 8 Runtime Logs with time:date stamp and cumulative runtime
- 4 System Groups for organizing selected points or elements into a real-time display or color graphic
- 4 Weekly Time schedules with overrides and optimum stop/start
- 2 Annual Routines for Holiday Schedules
- 3 Sensor conversion tables for creating linear curves
- 6 Access Levels with password protection
- On-board 60 character full English alarm messages
- On-board 60 character full English maintenance messages
- Power-fail with auto restart capabilities
- Programs and program parameters are stored in non-volatile memory



SPECIFICATIONS

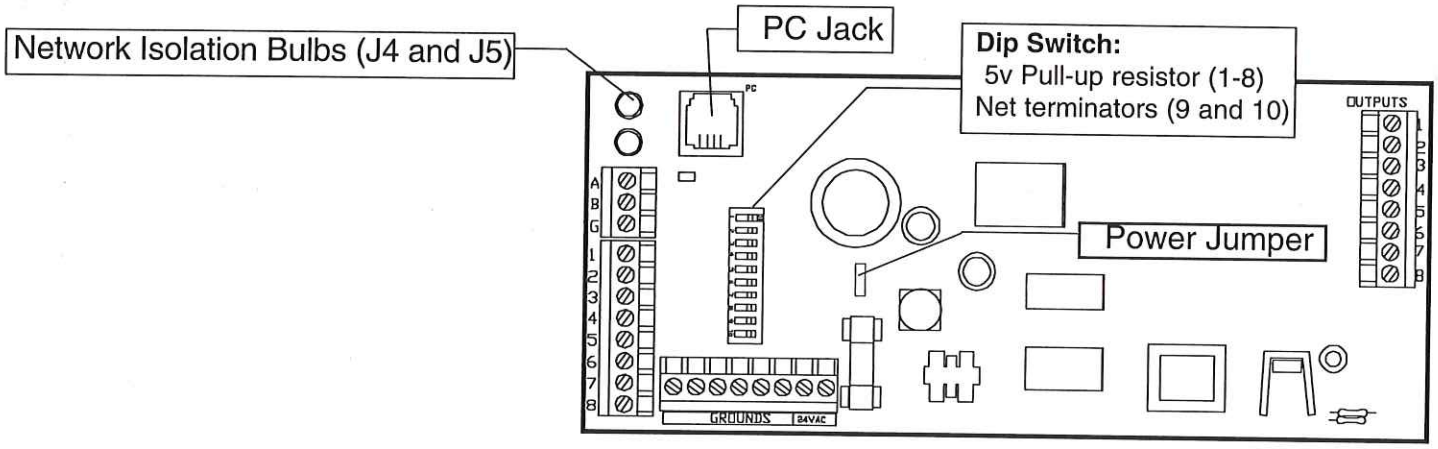
Supply Voltage	24 VAC -15%, +20%
Wiring	14-22 AWG
Input Power	20 VA
Communications	RS-485 @ 38,400 baud
Wiring	14-22 AWG twisted shielded, maximum 4,000 feet
Inputs	8 universal
Analog	0 to 5 VDC *(4-20 mA w/resistor)*
Digital	On/Off *(pulse counting dry contact up to 4 Hz)*
Impedance	10 K ohms
Overvoltage Protection	Yes
Wiring	12-22 AWG
Outputs*	8 universal
Analog	0 to 10 VDC
Digital	0/12 VDC
Short Protection	Yes
Wiring	12-22 AWG
Ambient Limits	
Operating	0°F to 120°F (-18°C to 49°C)
Shipping	-40°F to 140°F (-40°C to 60°C)
Size	7.78" x 3.25" x 1.438" (198 mm x 83 mm x 37 mm)
Weight	8 oz. (227 grams)
Approval	UL 916 Energy Management Equipment

*Output current (analog or digital) is limited to 100 mA per any output, but not to exceed 350 mA total per controller.

ORDERING

Specify: Model Number
Order From: Local KMC Controls dealer or, KMC Controls, Kreuter Manufacturing Co., Inc.

INSTALLATION-CALIBRATION



The KMD-5500 series may be mounted in any position. Carefully remove the board from the snaptrack. Mount the track in the desired location. Carefully replace the board into the track without sliding or flexing the board. Flex only the track when removing or replacing the board.

As shipped, the pull-up resistors are included in the circuit and 5 volts are present at the input terminal to provide a source to measure passive devices such as thermistors. To improve accuracy when reading voltages sourced from transducers, flip the switch for that input off (to the left). The switch number matches the input number. See Chapter 9 in the KMD manual for more info on reading voltage / current inputs.

The 9th and 10th positions of the DIP switch allow the network terminators to be removed. As shipped, the terminators are installed. If there are two wires under the "A" and two wires under the "B" terminal, flip the switch at position 9 and 10 off (to the left). This will indicate the board is not at the physical end of the network. See the KMDigital Operator's Manual for more information on end of line termination (chapter 9).

Refer to the KMDigital Operator's Manual for complete installation and calibration information.

MODELS

KMD-5501 .....On board clock with auto-reset of time after power restoration

KMD-5502 .....Same as KMD-5501 but without auto-reset

KMD-5504 .....On board clock with auto-reset of time after power restoration with detachable terminal blocks

KMD-5505 .....Same as KMD-5504 but without auto-reset

MAINTENANCE

No routine maintenance is required. Each component's design and material selection assures dependable long-term reliability and performance. Careful installation will also enhance long-term reliability and performance.

KMC CONTROLS

KMD-1101
NetSensor

DESCRIPTION

The KMD-1101 NetSensor is a wall mounted intelligent interface device with an on-board room temperature sensor for use in a KMDigital DDC System. The NetSensor communicates directly with the associated KMDigital Controller. In addition, the NetSensor has a local access communication port for a service tool/local PC connection into the KMDigital Network. This communication port is concealed under the flip-out cover door.

The NetSensor utilizes nine function keys and a bright four character display to provide practical information and operation. The display may be programmed to turn off after an elapsed time period after the last push-button is indexed. Three of the function keys are concealed under the flip-out cover door. These three function keys are programmable, as are the exposed four corner function keys, via the KMDigital Incontrol Operating System. The exposed two center function keys are fixed for "up" and "down" scrolling operation. The seven programmable function keys may be assigned to any point in the associated KMDigital controller. These points may be only status indication and/or values, or may be changeable setpoints and/or on-off control. In addition, the NetSensor has the capability to accept an auxiliary digital input via the pig-tail leads on the back of the NetSensor.

The simplicity of design allows variations of labeling for the function keys. The HDO-4000 series labels are for the exposed six function key area and the HDO-4100 series are for the concealed three function key area. Consult with factory for the library of HDO-4000/4100 series labels.

SPECIFICATIONS

Display
4-character, 7-lighted-segment, .375" high.

Connection
6-wire female RJ11 to KMDigital Controller. 2-6" pig-tail 18 AWG wire leads for auxiliary digital input.

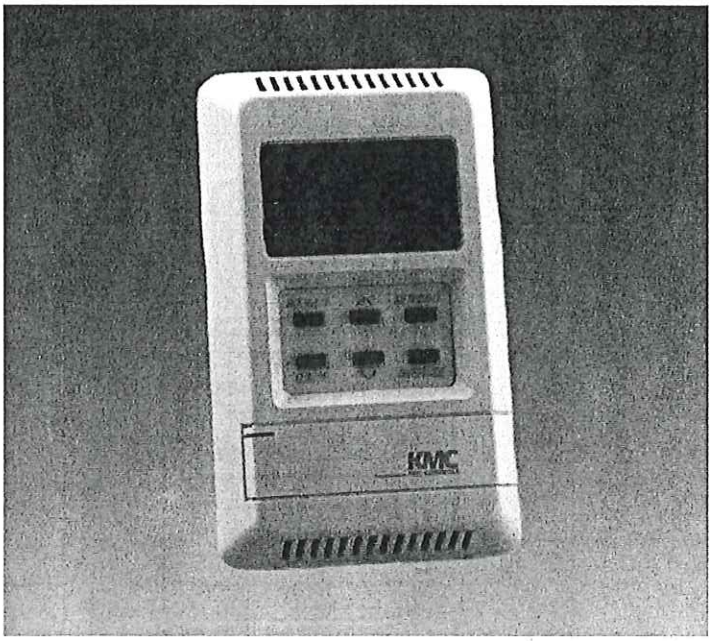
Power
5 VDC; supplied from associated controller.

Mounting
HMO-5040 back-plate (supplied) to 2" x 4" vertical standard handy-box. NetSensor secured by two concealed allen screws on back-plate.

Weight
2.8 ounces (80 grams)

Size
1.75" x 4.5" x .875" (44.5 x 114.3 x 22.2 mm)

Material
Light almond ABS



Accessories
HMO-5040: Replacement back-plate
HPO-0044: Replacement allen screw
HPO-0064: Replacement flip-out cover door
HDO-4001: Standard label: (exposed)
2-fixed;
Arrow up
Arrow down
4-programmable;
ROOM°F (key 1)
SETPOINT (key 2)
O.A.°F (key 3)
OVERRIDE (key 4)
HDO-4101: Standard label: (hidden)
3-programmable:
TIME (key 5)
I (key 6)
O (key 7)

Ambient Limits

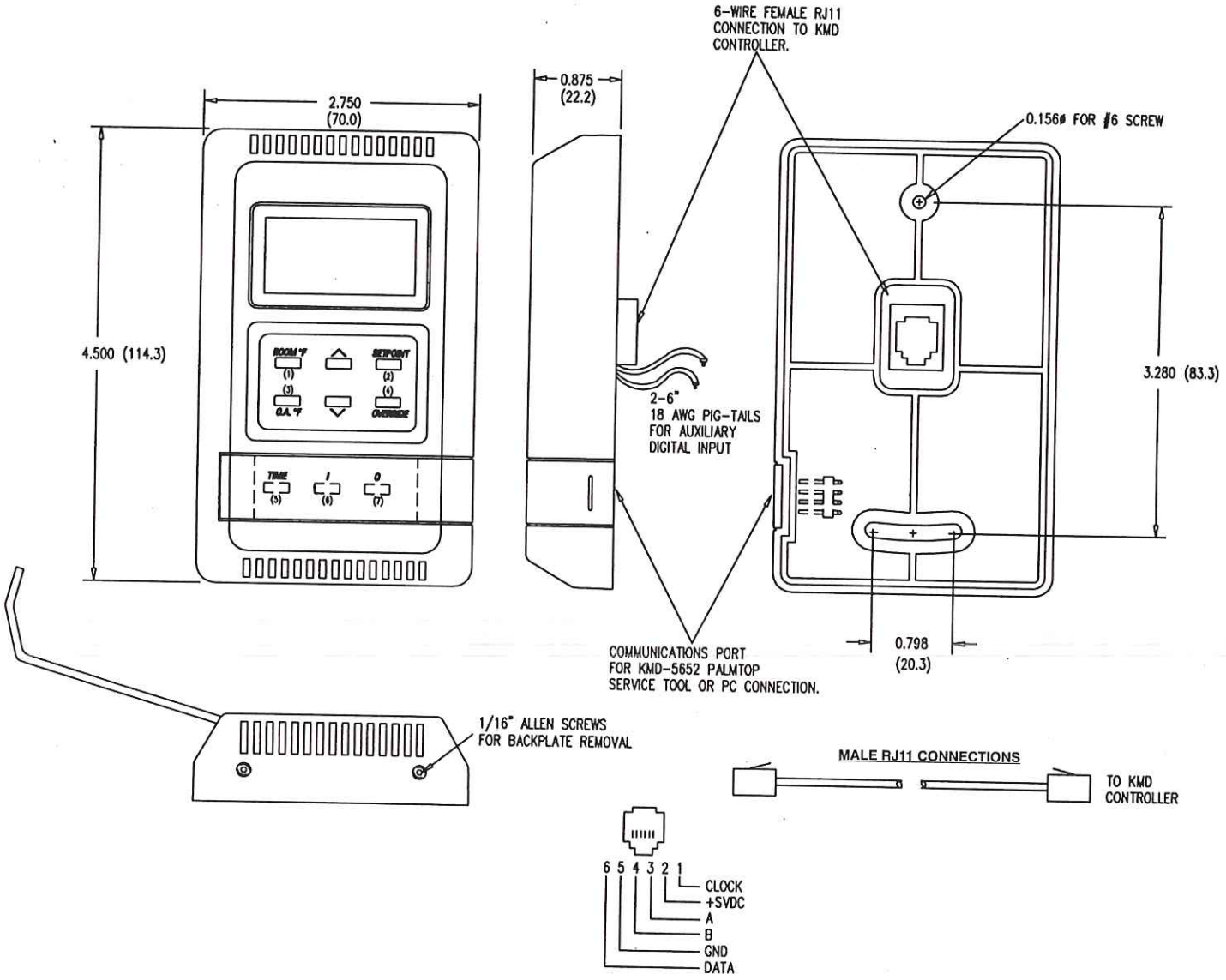
Operating	32°F to 104°F (0°C to 40°C)
Shipping	-40°F to 140°F (-40°C to 60°C)

ORDERING

Specify: Model Number
Order From: Local KMC Controls dealer or,
KMC Controls, Kreuter Manufacturing Co., Inc.

DIMENSIONS

DIMENSIONS IN INCHES (MM)



INSTALLATION

Remove the back-plate from the NetSensor by turning the two 1/16" allen screws clockwise. Once the allen screws are cleared of the NetSensor, the bottom of the back-plate will swing away from the NetSensor.

Pull the wire through the back-plate wiring/connector access hole. Mount the back-plate onto the vertically mounted 2" x 4" handy box with the allen screws to the front. Plug the 6-wire RJ11 male plug into the RJ11 female connector on the back of the NetSensor. If the 6-wire cable does not have the RJ11 male plug installed, one must be installed. See above "MALE RJ11 CONNECTIONS" for the correct pin-out for the Net Sensor and controller combination.

Attach the Net Sensor onto the back-plate and secure by backing out (turning counterclockwise) the two allen screws.

MAINTENANCE

No routine maintenance is required. Each component's design and material selection assures dependable long-term reliability and performance. Careful installation will also enhance long-term reliability and performance.

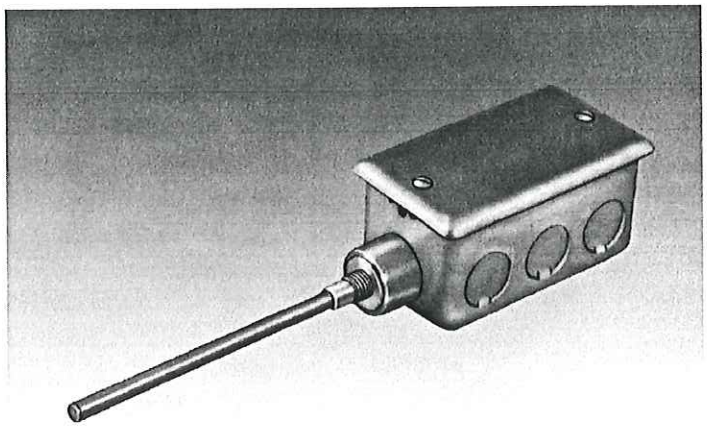
KMC CONTROLS

STE-1221, 1222, 1223
Immersion Sensor

MADE IN U.S.A.

DESCRIPTION

The STE-1221 is used to sense liquid temperatures within a range of -40°F to 250°F (-40°C to 121°C). The active sensing element is a highly stable 10 K precision thermistor enclosed in a rugged 0.17" (4 mm) diameter cylinder. The element is then sealed with a thermal conductive compound improving heat transfer characteristics, inside a 4" (102 mm) stainless steel probe. Select a brass or stainless steel well 1/2" NPT for installation. Equipped with a standard 2" x 4" electrical box and 22-gauge zipcord wire.



SPECIFICATIONS

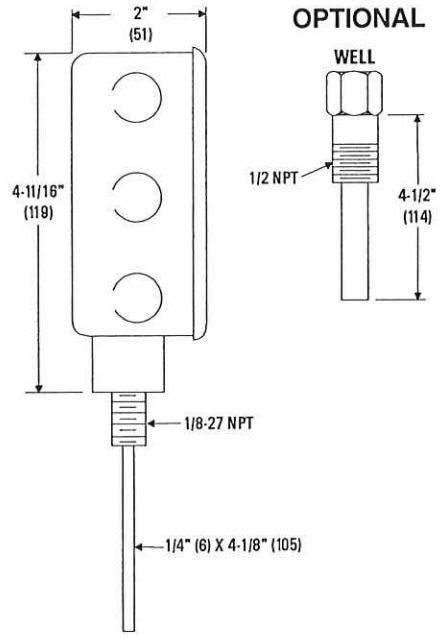
Accuracy	±0.36°F (±0.20°C)
Resistance	10,000 ohms @ 77°F (25°C)
KMDigital Ranges	#2 / #3
Operating Range	-40°F to 250°F (-40°C to 121°C)
Leadwires	22-gauge
Accessories	HMO-4513: 1/2" NPT brass well HMO-4514: 1/2" NPT stainless steel well

MODELS

STE-1221 ..... Sensor only
STE-1222 ..... Sensor with brass well
STE-1223 ..... Sensor with stainless steel well

DIMENSIONS

DIMENSIONS IN INCHES (MM)



INSTALLATION-WIRING

Locate sensor where it will be exposed to normal free circulation of the sensed medium. Thread the sensor well into the tapped pipe. Fill the well with a suitable heat conductive compound for best results. Insert probe and thread the sensor assembly into the well. Make field connections to leadwires. Solder or crimp-type butt splice connections are recommended. Apply silicone to connections.

MAINTENANCE

No routine maintenance is required. Each component's design and material selection assures dependable long-term reliability and performance. Careful installation will also enhance long-term reliability and performance.

ORDERING

Specify: Model Number, accessory number if required
Order From: Local KMC Controls dealer or,
KMC Controls, Kreuter Manufacturing Co., Inc.

DS-068-08/97 REV. 07-23-98

KMC CONTROLS

HCO-1004, 1005, 1006, 1016
Control Enclosures

MADE IN U.S.A.

DESCRIPTION

The HCO-1004, 1005, 1006 and 1016 provide a convenient method of surface mounting and protecting pneumatic and electrical devices. The cabinet is easily mounted on the wall, while the sub-panel with the control devices, may be added later. Cabinet doors can open right or left. If more than one enclosure is necessary, they are easily mounted next to each other and/or joined by removing the required knockouts which are on all four sides. Fastened with appropriate fittings and lock nuts, this provides a neat, flexible installation.

SPECIFICATIONS

Mounting	Keyhole surface
Approvals	
HCO-1004, 1005,1016	UL Listed and NEMA 1
HCO-1006	NEMA 1 Listed
Weight	
HCO-1004	23 pounds (10 kg)
HCO-1005	36 pounds (16 kg)
HCO-1006	59 pounds (27 kg)
HCO-1016	75 pounds (34 kg)
Material	
Cabinet	16 gauge steel (HCO-1016 14 gauge)
Subpanel	Steel perforated, 1/8" (3 mm) holes on 2" (51 mm) centers; 18 gauge
Finish	Textured blue (other colors on request)
Knockouts	Provided on all 4 sides, see dimensions for specific locations
Door	Welded piano hinge, key operated latch, tamper resistant
Accessories	
HCO-1020: Replacement lock & keys	
HSO-1002: Aerosol spray paint for touch-up, 9 oz. (255 grams)	

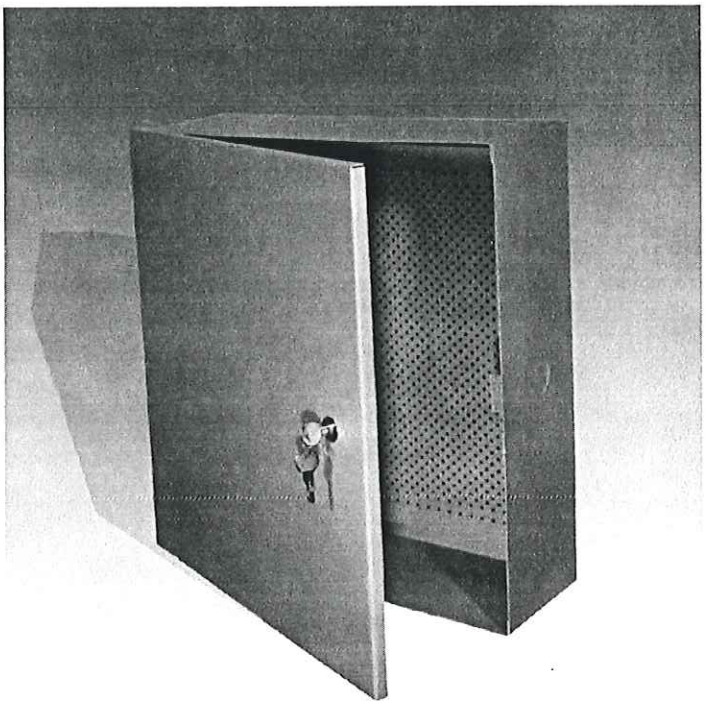
MODELS

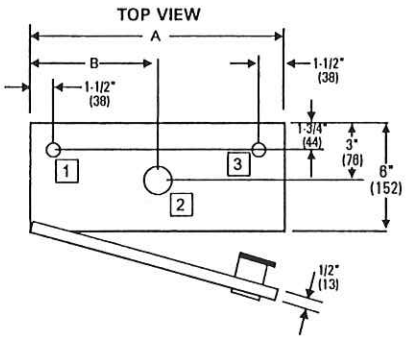
HCO-1004 ..... 16"W x 18"H x 6"D
(406 mm x 457 mm x 152 mm)
HCO-1005 ..... 20"W x 24"H x 6"D
(508 mm x 610 mm x 152 mm)
HCO-1006, 1016 ..... 24"W x 36"H x 6"D
(610 mm x 914 mm x 152 mm)

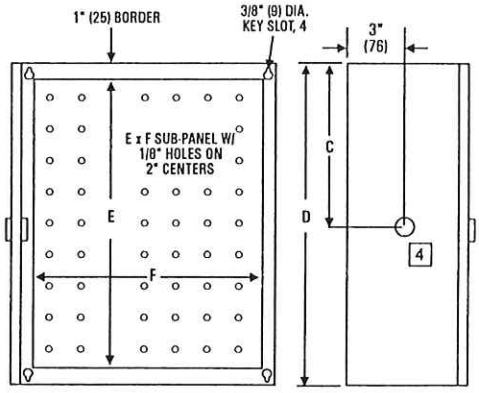
DIMENSIONS

DIMENSIONS IN INCHES (MM)

	A	B	C	D	E	F
HCO-1004	16 (406)	8 (203)	9 (228)	18 (457)	16 (406)	14 (356)
HCO-1005	20 (508)	10 (254)	12 (305)	24 (609)	22 (559)	18 (457)
HCO-1006 HCO-1016	24 (609)	12 (305)	18 (457)	36 (914)	34 (863)	22 (559)







FRONT VIEW (DOOR OPEN)

1 3/4" (19) KO, 1/2" (13) ON BOTTOM
2 1" (25) KO, TOP & BOTTOM
3 1/2" KO, 3/4" ON BOTTOM
4 3/4" KO BOTH SIDES

ORDERING

Specify: Model Number, accessory number if required
Order From: Local KMC Controls dealer or,
KMC Controls, Kreuter Manufacturing Co., Inc.

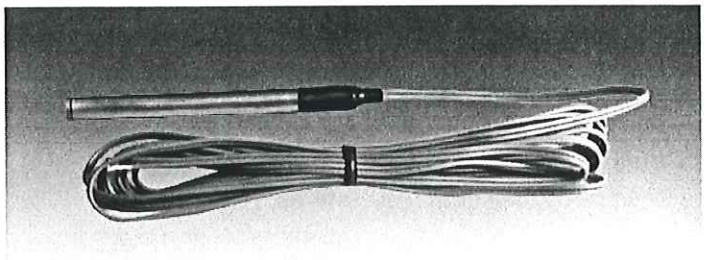
KMC CONTROLS

STE-1254
Strap-On Sensor

MADE IN U.S.A.

DESCRIPTION

The STE-1254 is a 10,000 ohm thermistor sensor providing reliable remote sensing for building automation systems. It is enclosed in a rugged .17" (4 mm) diameter cylinder and sealed with a thermally conductive compound inside a 3" (76 mm) moisture/waterproof stainless steel tube. With an operating range of -30°F to 230°F (-34°C to 110°C), this sensor may be mounted directly on hot or chilled water pipes or in refrigeration or freezer cases. For strap-on applications, use the HMO-4516 Strap Mounting Kit. This kit contains a foil-backed adhesive insulating pad and worm-gear type screw clamp capable of attaching the sensor to 2.5" to 10" diameter pipes.



SPECIFICATIONS

Accuracy	±0.36°F (±0.2°C)
Resistance	10,000 ohms @ 77°F (25°C)
KMDigital Ranges	#2 / #3
Operating Range	-30°F to 230°F (-34°C to 110°C)
Leadwires	8 feet (2.4 m), 22-gauge zipcord
Accessories	HMO-4516: Strap Mounting Kit
Weight	1 oz (28 grams)

INSTALLATION-WIRING

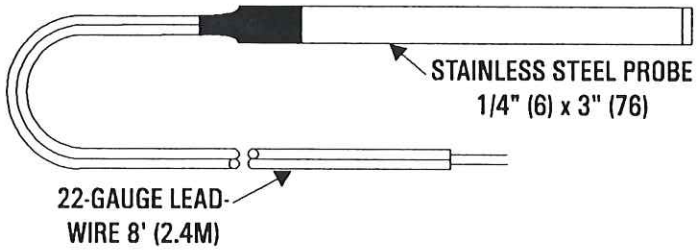
Locate sensor where it will be exposed to normal free circulation of the sensed medium. One installation method is to cut a slit in the insulation around the pipe, slip sensor through, and apply a conductive compound. Use tie-wraps (not supplied) around insulated pipe to secure.

A second method requires pipe-strap kit HMO-4516. Cut away a section of insulation equal to the size of the insulating pad. Apply a conductive compound to the pipe and place sensor on surface. Cover it with the adhesive side of the pad and use supplied screw clamp around the pipe to secure. Make field connections to entire eight foot leadwire using solder or crimp-type butt splice connections with silicone. Sensor may also be used with uninsulated pipes.

No maintenance is required.

DIMENSIONS

DIMENSIONS IN INCHES (MM)



ORDERING

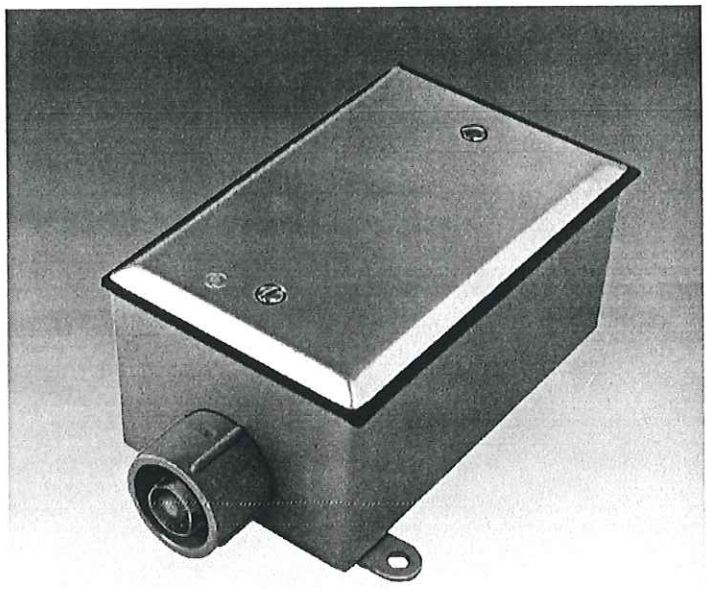
Specify: Model Number, accessory number if required
Order From: Local KMC Controls dealer or,
KMC Controls, Kreuter Manufacturing Co., Inc.

KMC CONTROLS

STE-1251
Outside Air Sensor
MADE IN U.S.A.

DESCRIPTION

The STE-1251 is designed for outdoor use in temperature ranges of -40°F to 140°F. The active sensing element is a highly stable 10,000 ohm precision thermistor assembly encased in epoxy and mounted in a treated PVC sun and rain shield. This shield is attached to a rugged weatherproof outlet box for mounting on a north wall in shade.

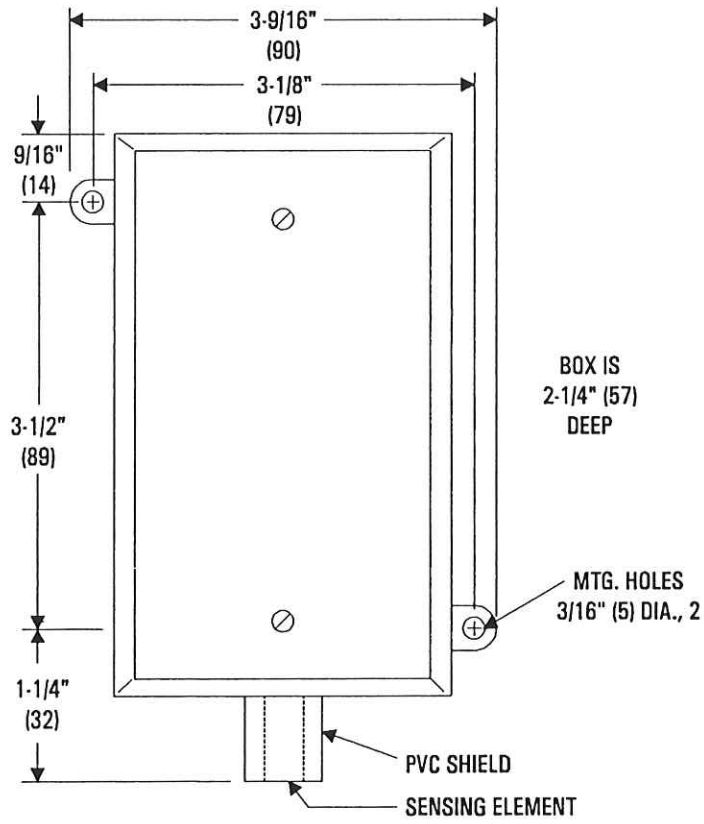


SPECIFICATIONS

Accuracy	+/-0.36°F (+/-0.20°C)
Resistance	10,000 ohms @ 77°F (25°C)
KMDigital Ranges	#2 / #3
Operating Range	-40°F to 140°F (-40°C to 60°C)
Leadwire	8 feet (2.4 m), 22-gauge zipcord
Weight	10 oz (286 grams)

DIMENSIONS

DIMENSIONS IN INCHES (MM)



INSTALLATION-WIRING

Mount sensor on a northerly exposed wall where it is not affected by direct sunlight, under the eaves is preferred. Eight feet of 22-gauge zipcord leadwire is supplied. Solder or crimp-type butt splice connections are recommended. Apply silicone to connections to prevent moisture and condensation interference. With proper installation, no routine maintenance is required.

ORDERING

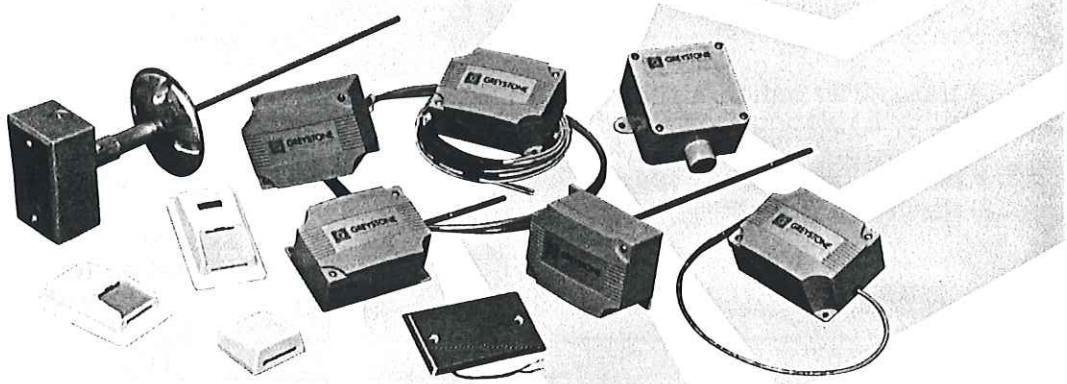
Specify: Model Number
Order From: Local KMC Controls dealer or,
KMC Controls, Kreuter Manufacturing Co., Inc.

Specifications and design are subject to change without notice.

GREYSTONE

ACCURACY BY DESIGN

TEMPERATURE SENSORS/TRANSDUCERS



Precision temperature control/sensing

FEATURES:

- Platinum RTD, integrated circuit or thermistor sensors
- Optional features include set point adjust, push button switch and external/internal jacks
- High accuracy temperature transmitters for any application
- Transmitters with optional output signal types, power supplies and temperature ranges
- Bimetal, Alcohol, LED or LCD temperature indication
- Custom logos available

Peace of mind through reliable temperature monitoring

GREYSTONE IS AN ISO 9000 REGISTERED COMPANY

SPACE/WALL MOUNT

FEATURES:

The TE Series Space Temperature sensors are available in four different enclosure styles. They are available with a choice of precision RTD's, IC's, or thermistors. A number of options, such as momentary override and set point adjustment are also available for various configurations.

A transmitter option is also available to be used with the 1000Ω platinum sensor which provides either 4 - 20mA, 0 - 5 VDC or 0 - 10 VDC output proportional to a selected temperature span. A 100Ω platinum sensor transmitter is optional.

TRANSMITTER:

The transmitters provide high accuracy, long-term stability, low hysteresis, fast response and a wide operating temperature range.

Every transmitter offers accuracy of 0.1% of span or better and are highly stable due to excellent RFI rejection and are also virtually immune to power supply noise and input voltage fluctuations.

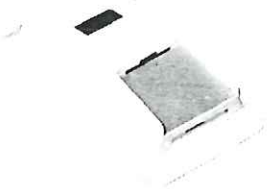
Transmitter General Specifications:

Supply Voltage: 24 VDC/VAC
Output: 4 - 20mA, 0 - 5 VDC or 0 - 10 VDC
Accuracy: ±0.1% of span
Operating Temp.: 0°C - 70°C (32°F - 158°F)

Display Type	LCD Display	LED Display
Power Supply	12 - 30 VAC/DC at 2mA max	12 - 30 VAC/DC at 30mA max
Display Units	°C or °F (factory set)	°C or °F (jumper selectable)
Display Range	0.0 - 35.0°C (32.0 - 95.0°F)	10.0 - 35.5°C (50.0 - 96.0°F)
Display Resolution	0.1°C (0.1°F)	0.5°C (1.0°F)
Display Size	23 mm W x 11 mm H (0.9" W x 0.45" H)	3 digit, 30 mm W x 7.6 mm H (1.18" W x 0.3" H)
Available Options	Various sensors, set points, push buttons, external jacks, and logos.	

A) Micro - Includes a compact snap-mounted cover for ease of installation, available with various temperature sensors.

C) Corporate - Well vented, large enclosure provides a decorative look and is available with different features. The base plate is suitable for mounting to any wall box.



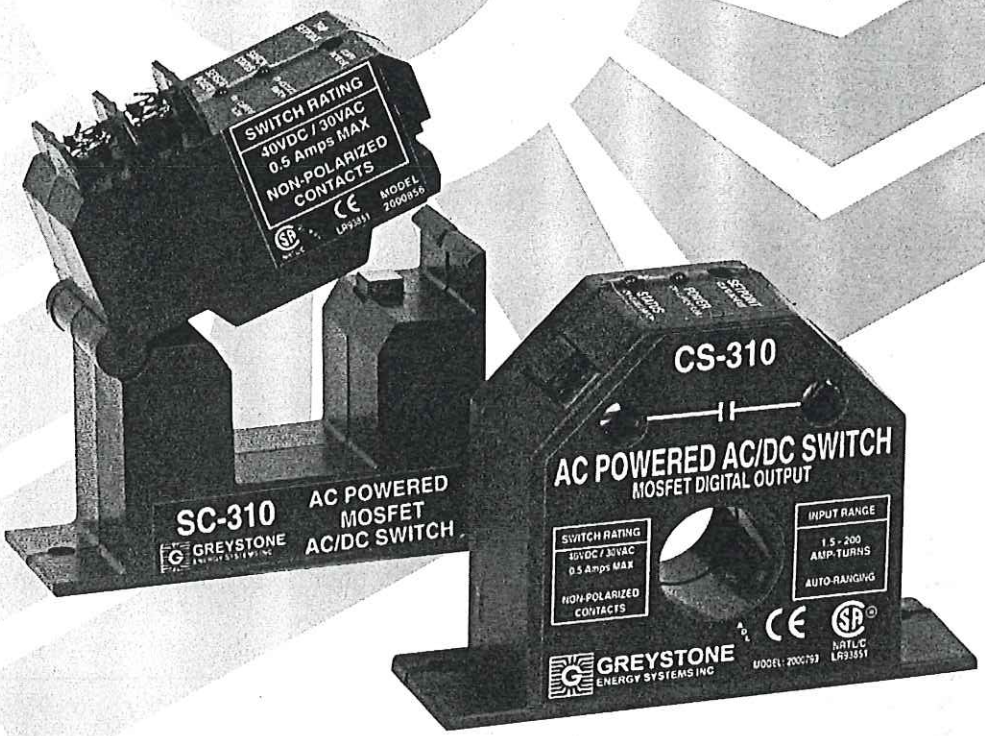
AD) Designer - Features include a three-piece enclosure that mounts directly to a wall box or on any wall. Available with various options, including LCD or LED temperature display, set point adjustments, momentary push buttons, custom logos, etc.

AS) Surface - A stainless steel plate which can be mounted to a wall box used where tamper-proof or protection is required. Available with various options, including momentary push buttons, etc.

GREYSTONE

ACCURACY BY DESIGN

CURRENT SWITCHES and SENSORS



Detect current fluctuation remotely and reliably

- Solid Core CS-300 Series
- Split Core SC-300 Series
- CT/PT Input CVT-100 Series

Peace of mind through reliable power monitors

GREYSTONE IS AN ISO 9000 REGISTERED COMPANY

AC CURRENT SWITCHES
300 SERIES

ADJUSTABLE CURRENT-OPERATED SOLID-STATE RELAYS FOR SWITCHING AC OR DC CIRCUITS.

APPLICATIONS:

- Direct connection to PCs for general status monitoring
- Directly controls AC or DC loads, such as relays and lamps, in response to the current of a monitored AC circuit
- Replaces Differential Pressure switches
- Safety and alarm circuits
- Monitors motors for broken belts or jammed tooling
- Heater monitoring
- CSA NRTL/C approval (Canada / USA)

DESCRIPTION:

The CS-300 Solid-Core and the SC-300 Split-Core series of current switches are solid-state N.O. switches that are available as either AC, DC or AC/DC switch types to suit any application. Models are available with integral zero-leakage LEDs to indicate sensor Power and also switch Status, which operates when the current level sensed by the integral current transformer exceeds the threshold value as set by the multi-turn adjustment. Some models feature a pre-set threshold value to operate as a go/no-go switch while another includes an integral control relay to switch 5A 240Vac loads. The sensors can monitor up to 200 Amps continuous and are either auto-ranging or jumper selectable in three ranges. This series is available with a full complement of output types, including a "dry contact" MOSFET output with no leakage, zero on-state voltage drop and high current switching capability for true digital switching. Internal circuits of all devices are totally powered by induction from the line being monitored and all units are certified to CSA, NRTL/C standards.

SPECIFICATIONS:

Op. Temperature:	0° - 70°C (32° - 158°F)	**Op. Humidity:**	0 - 95% RH non-condensing
Trip Set-Point:	Adjustable multi-turn pot over full detection range, GnG fixed at Input I Min	**Model 310R Relay Rating:**	20-30Vac/dc @ 10mA control signal 5 Amp @ 250Vac/30Vdc contacts, p.f.=1 2 Amp @ 250Vac/30Vdc contacts, p.f.= 0.4 N.O. (N.C. optional)
H x W x D:	76 x 89 x 30mm (3.0" x 3.5" x 1.2") max.	**Material :**	Self-extinguishing ABS (Cycolac 94V-0)
AC Conductor Hole:	Solid Core - 19mm (0.75") Diameter, Split Core - 19 x 24mm (0.75 x 0.95")	**Mounting Holes:**	2 x 5mm holes spaced 76mm on base (2 x 0.19" holes spaced 3" on base)
Hysteresis:	<1% FS max.		

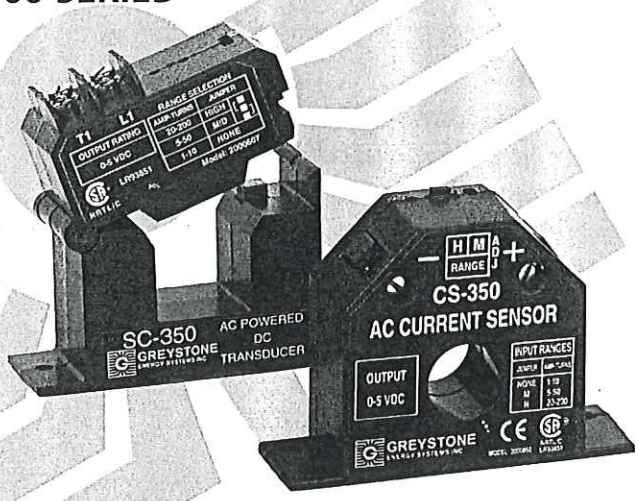
CURRENT SWITCH: PRODUCT ORDERING INFORMATION

Model	Output Type	Switch Type	Switch V Max	Switch I Max	Von@24Vdc @ 150 mA	Leakage Current	Power LED	Status LED	Auto Range	Input I Min	Input I Max
CS-GnG	Mosfet	AC/DC	30Vac/40Vdc	500 mA	<0.1 V	<25 µA	No	No	Yes	1.0A	150A
CS-300	Bipolar	DC	30 Vdc	150 mA	<0.8 V	<0.1 µA	No	No	Yes	1.5A	200A
CS-305	Mosfet	DC	40 Vdc	500 mA	<0.1 V	<25 µA	No	Yes	Yes	1.5A	200A
CS-310	Mosfet	AC/DC	30Vac/40Vdc	500 mA	<0.15 V	<25 µA	Yes	Yes	Yes	1.5A	200A
CS-310R	Mosfet	AC/DC	30Vac/40Vdc	500 mA	<0.1 V	<25 µA	Yes	Yes	Yes	1.25A	150A
CS-325	Triac	AC	250 Vac	1 Amp	n/a	<1 mA	No	No	No	1.25A	200A
SC-GnG	Mosfet	AC/DC	30Vac/40Vdc	500 mA	<0.1 V	<25 µA	No	No	Yes	2.5A	150A
SC-300	Bipolar	DC	30 Vdc	150 mA	<0.8 V	<0.1 µA	No	No	Yes	2.5A	200A
SC-305	Mosfet	DC	40 Vdc	500 mA	<0.1 V	<25 µA	No	Yes	Yes	2.5A	200A
SC-310	Mosfet	AC/DC	30Vac/40Vdc	500 mA	<0.15 V	<25 µA	Yes	Yes	Yes	2.6A	200A
SC-325	Triac	AC	250 Vac	1 Amp	n/a	<1 mA	No	No	No	1.6A	200A

NRTL/C

AC CURRENT SENSORS
300 SERIES

SOLID-STATE SENSORS FOR MONITORING AC CIRCUITS.



APPLICATIONS:

- Direct connection to PC's and other measurement or display devices
- Converts monitored AC current to a proportional DC voltage or industry standard 4-20 mA current loop
- Monitors motors, pumps, conveyors, machine tools and any electrical load where an analog output is required over a wide range of currents
- Energy management and monitoring
- CSA NRTL/C approval (Canada / USA)

DESCRIPTION:

The CS-300 Solid-Core and the SC-300 Split-Core series of current sensors are solid-state transducers that convert a primary circuit current to a proportional output signal. The sensors can monitor up to 200 Amps continuous and feature three jumper selectable ranges for the highest accuracy. All sensors are factory calibrated to <±2% FS and can also be easily field calibrated to custom ranges. Models are available with either a 0 - 5 Vdc or a 4 - 20 mA (loop powered) output signal and all units are certified to CSA NRTL/C standards.

SPECIFICATIONS:

AC Conductor Hole:	Solid Core - 19 mm (0.75") diameter, Split Core - 19 x 24 mm (0.75" x 0.95")	**H x W x D:**	76 x 89 x 30 mm (3.0" x 3.5" x 1.2") max
Mounting Holes:	2 x 5 mm holes spaced 76 mm on base (2 x 0.19" holes spaced 3" on base)	**Material:**	Self-extinguishing ABS (Cycolac 94V-0)
		Input Range:	0 - 200 Amp-turns
		Op. Humidity:	0 - 95%RH non-condensing

CS-350 / SC-350		CS-375 / SC-375	
Ranges:	Low: 1-10 Amps (40 Amps max.) Mid: 5-50 Amps (100 Amps max.) High: 20-200 Amps (250 Amps max.)	**Ranges:**	Low: 0-10 Amps (70 Amps max.) Mid: 0-50 Amps (180 Amps max.) High: 0-200 Amps (600 Amps max.)
Loading Error:	0.5% error with 1 MΩ load (0.05% with 10 MΩ load, etc)	**Power Supply:**	10 to 42 Vdc at sensor V supply = 10 Vdc + (R load x 20 mA)
Op. Temperature:	-30° to 70°C (-22° to 158°F)	**Op. Temperature:**	0° to 70°C (32° to 158°F)
Response Time:	100 mS (10 to 90%)	**Response Time:**	300 mS (to 99% of reading)
Ripple:	Less than 20 mV	**Ripple:**	Less than 20 mV

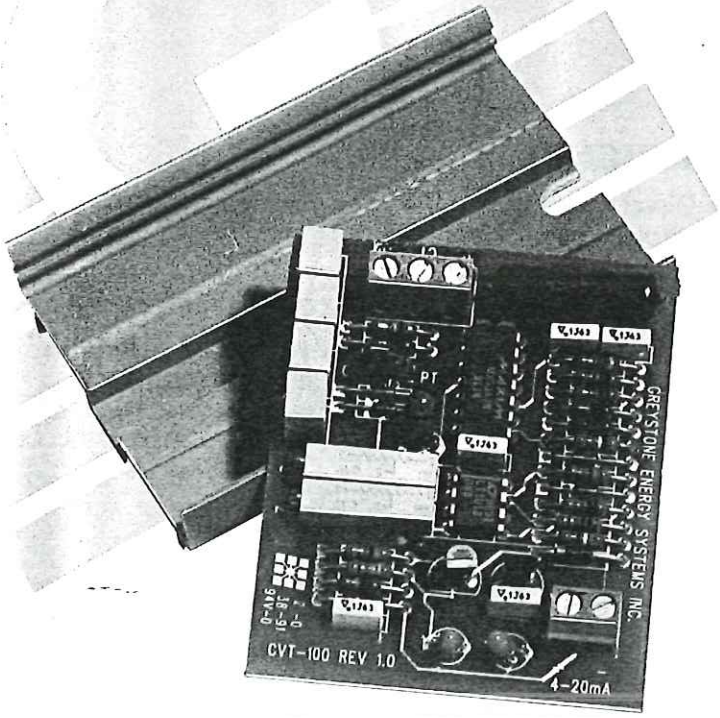
CURRENT SENSOR: PRODUCT ORDERING INFORMATION

Model	Output	Power	Accuracy	Frequency	Measurement
CS-350	0-5 Vdc	Induction	± 2% FSO	30 - 130 Hz	Average
CS-375	4-20 mA	Loop	± 1% FSO	30 - 130 Hz	True RMS
SC-350	0-5 Vdc	Induction	± 2% FSO	50 - 130 Hz	Average
SC-375	4-20 mA	Loop	± 2% FSO	50 - 130 Hz	True RMS

NRTL/C

GREYSTONE ENERGY SYSTEMS INC

CT/PT INPUT TRANSDUCER
CVT-100



FEATURES:

- True RMS-DC conversion
- CT or PT input (pin selectable)
- Loop Powered
- Reverse voltage protection
- CSA NRTL/C approval (Canada / USA)

APPLICATIONS:

- Power consumption monitoring
- Overload detection

The CVT-100 accepts a 0 to 5 Amp RMS current from a CT, or a 0 to 20 Volt RMS voltage from a PT, and converts it to a proportional DC current loop. The CVT-100 incorporates a true RMS conversion which is corrected for all types of waveforms, and therefore can be used with a wide variety of load types: SCR, TRIAC, Inductive motors, etc.

SPECIFICATIONS:

Power Supply:	10 - 32 Vdc	**Accuracy:**	± 1% Full Scale Output
Current Consumption:	26 mA (max.)	**Op. Temperature:**	0° - 70°C (32° - 158°F)
Input Signal:	0 - 5 Amp RMS (CT)	**Op. Humidity:**	0 - 95% RH non-condensing
	0 - 20 volt RMS (PT)	**H x W x D:**	19 x 57 x 70 mm (0.75" x 2.25" x 2.75")
Input Impedance:	0.1 Ω (CT) 15K Ω (PT)	**Mounting:**	Snap Track (factory supplied). Optional Enclosures

CVT-100: PRODUCT ORDERING INFORMATION

CODE	Enclosure Options
A	Snap Track
B	NEMA 1
C	NEMA 4

CODE	Input Options
1	CT (0 -5 Amp)
2	PT

ORDER EXAMPLE:
To order a:
CVT-100 with SNAP TRACK, CT INPUT 0 - 5 AMPs
the following order number would apply:
CVT-100-A-1

Greystone Energy Systems Inc. reserves the right to make design modifications without prior notice. Not intended to be used as life saving devices.

NRTL/C

GREYSTONE
ACCURACY BY DESIGN

Greystone Energy Systems Inc.
150 English Drive, Moncton, N.B.
Canada E1E 4G7
(506) 853-3057 Fax: (506) 853-6014
e-mail: greystone@nbnet.nb.ca

Greystone Energy Systems Inc., established in 1983, is Canada's largest manufacturer of HVAC sensors and transducers for Building Automation Management Systems. We have conscientiously established a worldwide reputation as an industry leader by maintaining leading-edge design technology, prompt technical support, and a commitment to on-time deliveries. We take pride in our Quality Management System which is ISO 9002 certified, assuring our customers of consistent product reliability.

GREYSTONE IS AN ISO 9000 REGISTERED COMPANY

PRINTED IN CANADA

KMC CONTROLS

VEP-43 SERIES
3-Way Electric Control Valves

ASSEMBLED IN USA

DESCRIPTION

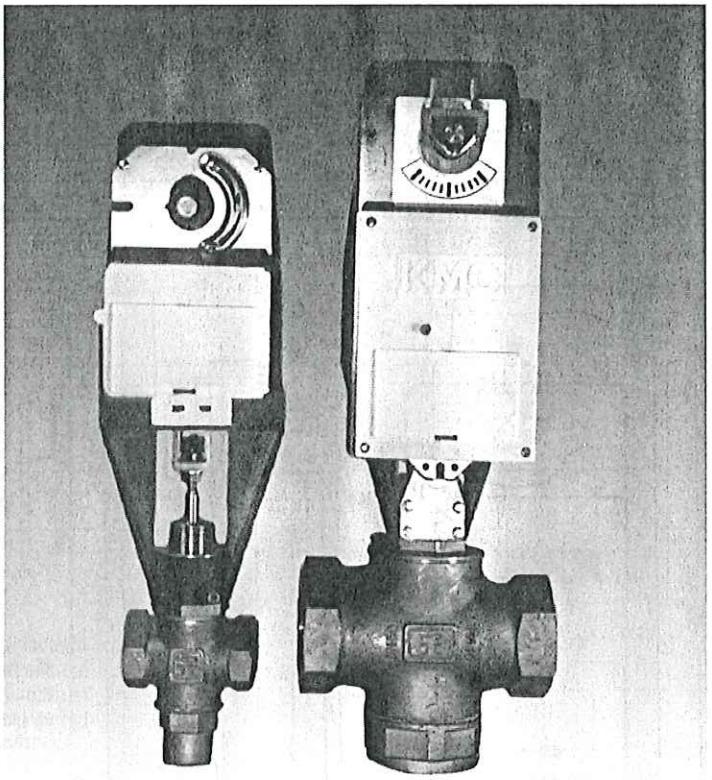
These control valves are 3-way mixing for control of hot or chilled water. Valves range in size from 1/2" to 2" with linear flow characteristics. Self adjusting packing and stainless steel stems make these valves ideal for many applications.

An optional "fail-safe" feature allows failure to either inlet upon loss of 24 VAC supply. A gear disengagement feature allows positioning of the valve stem/plug without energizing the actuator.

SPECIFICATIONS

Action	3-way mixing
Rangeability	30 to 1
Nominal Body Rating	250 psi (1724 kPa)
Valve Sizes	1/2" through 2" NPT
Body Type	
3-way mixing, female NPT inlets and outlet	
Flow Characteristics	Linear
Cv Rating	1/2" = 4.6; 3/4" = 6.9; 1" = 11.6; 1-1/4" = 18.5; 1-1/2" = 29.0; 2" = 46.4
Material	
Valve	Bronze body and seat Stainless steel stem (Type 303) Brass plug with EPM discs EPM, V-ring type self-adjusting packing
Actuator	Flame retardant polymer; UL94-5V plenum rating; blue housing, white cover(s)
Linkage	Glass-filled nylon; black
Actuators	MEP-5000 Series or MEP-1200 Series; See "MODELS" chart.
Temperature Limits	
Medium	35°F (2°C) to 250°F (121°C)
Ambient	35°F (2°C) to 120°F (49°C)
Accessories/Repair Parts	
CME-1002: Single auxiliary switch*	
CME-1004: Double auxiliary switch*	
CME-1006: Triple auxiliary switch*	
CME-2003: 10 K ohm; 1/3 watt; 3-wire pot.*	
HMO-4518: Snap-in connector for 1/2" flexible metal conduit	
HMO-4520: Compression connector for plenum cable	
HMO-4526: Female connector for 1/2" conduit	
HPO-5013: Replacement packing kit	

*MEP-5000 Series actuators only.



MODELS

VEP-43 XX XXX X

- X: 5 (0-10 VDC INPUT); 6 (24 VAC; 3-WIRE)
- XXX: 0445 (MEP-1202); 0456 (MEP-1203); 0475 (MEP-1222); 0486 (MEP-1223); 0495 (MEP-5322); 0506 (MEP-5324); 0515 (MEP-5002); 0526 (MEP-5005)
- XX: **Size / Cv Range**: 31 (1/2" - 4.6); 32 (3/4" - 6.9); 33 (1" - 11.6); 34 (1-1/4" - 18.5); 35 (1-1/2" - 29.0); 36 (2" - 46.4)

ORDERING

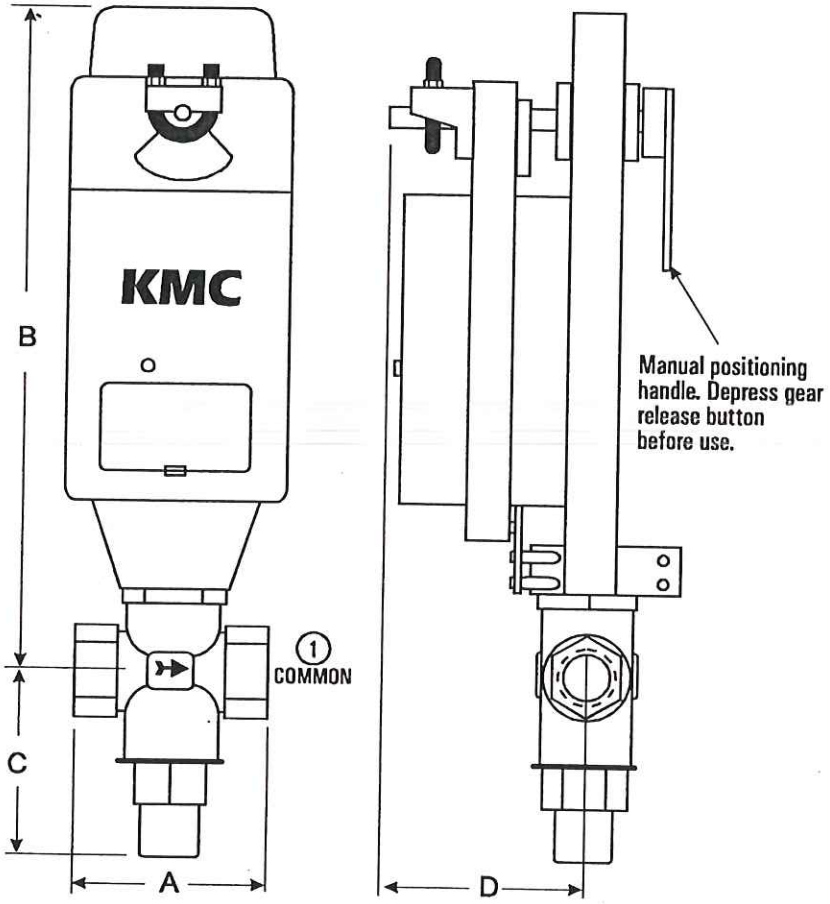
Specify: Model Number, accessory number if required
Order From: Local KMC Controls dealer or,
KMC Controls, Kreuter Manufacturing Co., Inc.

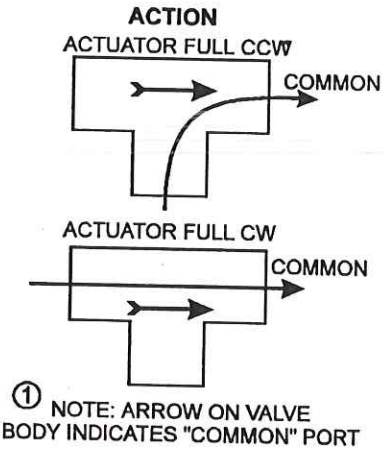
DIMENSIONS

DIMENSIONS IN INCHES (MM)

Size NPT	Dimensions in inches (mm)			
	A	B	C	D
1/2"	3.35 (85)	14.00 (356)	2.72 (69)	4.06 (103)
3/4"	3.35 (85)	14.00 (356)	2.72 (69)	4.06 (103)
1"	4.13 (105)	14.19 (360)	2.80 (71)	4.06 (103)
1-1/4"	4.72 (112)	14.31 (363)	2.95 (75)	4.06 (103)
1-1/2"	5.71 (145)	14.59 (371)	3.11 (79)	4.06 (103)
2"	6.50 (165)	14.94 (379)	3.54 (90)	4.06 (103)

Dimensions apply to MEP-1200/5000 Series actuators supplied valves.





- NOTE: All 0-10 VDC MEP Series actuators calibrated for 2-10 VDC control input and 3-9 VDC feedback output.

CLOSE-OFF RATINGS / PRODUCT WEIGHTS

SIZE NPT	Cv	* Close-Off Rating in PSI (kPa)		Weight in pounds (kg)			
		MEP-5000 Series	MEP-1200 Series	w/MEP-5000 Series	w/MEP-5300 Series	w/MEP-1200 Series	w/MEP-1220 Series
1/2"	4.6	105.0 (724)	250.0 (1724)	7.0 (3.2)	7.3 (3.3)	9.1 (4.1)	9.6 (4.4)
3/4"	6.9	105.0 (724)	250.0 (1724)	7.1 (3.2)	7.4 (3.4)	9.2 (4.2)	9.7 (4.4)
1"	11.6	63.0 (434)	216.0 (1489)	8.2 (3.7)	8.5 (3.9)	10.3 (4.7)	10.8 (4.9)
1-1/4"	18.5	42.0 (290)	144.0 (993)	9.1 (4.1)	9.4 (4.3)	11.2 (5.1)	11.7 (5.3)
1-1/2"	29.0	27.0 (186)	92.0 (634)	11.2 (5.1)	11.5 (5.2)	13.3 (6.0)	13.8 (6.3)
2"	46.4	18.0 (124)	61.0 (421)	13.6 (6.2)	13.9 (6.3)	15.7 (7.1)	16.2 (7.4)

*** Not to exceed body rating of 250 psi**

INSTALLATION-CALIBRATION

Mount valves with actuator positioned over valve. Allow sufficient clearance for servicing. Refer to the actuator installation sheet packed with each valve assembly for wiring calibration and setup.

MAINTENANCE

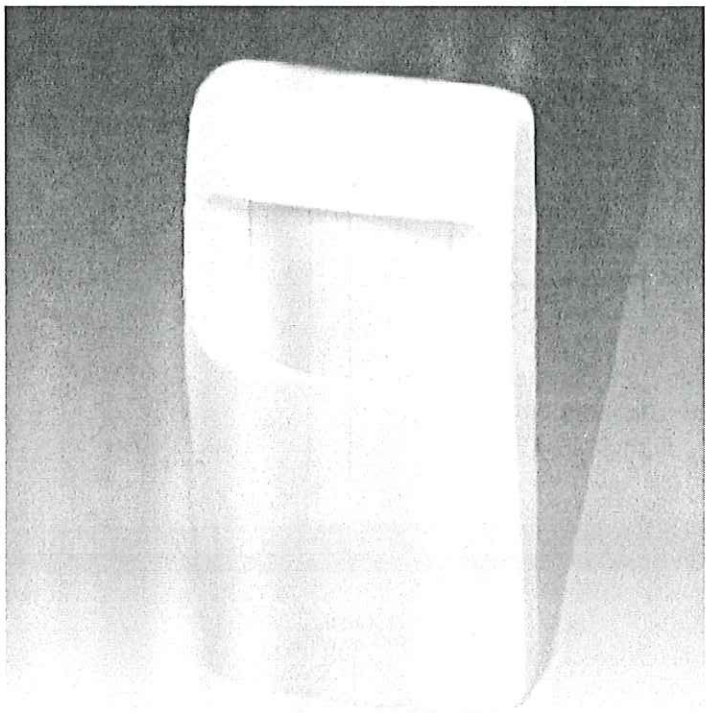
No routine maintenance is required. Each component's design and material selection assures dependable long-term reliability and performance. Careful installation will also enhance long-term reliability and performance.

KMC CONTROLS

SME-1001
Occupancy Sensor

DESCRIPTION

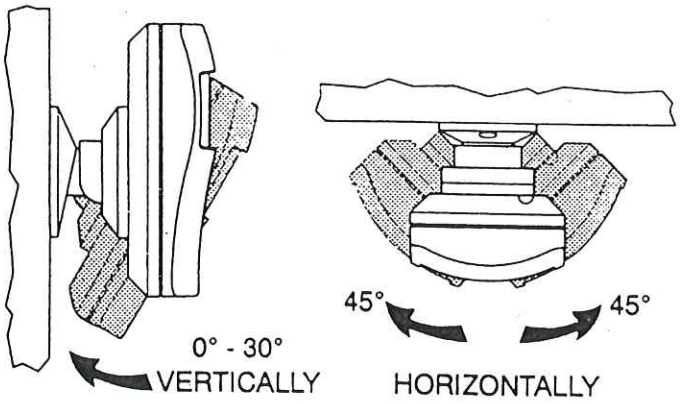
This quality passive infrared motion detector provides a reliable low cost sensor for general purpose installations. Aesthetic design and soft white housing blend with any decor. Features include surface or corner mounting, a superb noise filter eliminating RF interference, and a selectable pulse counter to virtually eliminate false alarms. Four interchangeable lenses offer effective coverage for every installation. Unit is sold with standard wide-angle lens. A silent relay, tamperproof contacts and a switch to disable visual LED indication ensures reliable unnoticed operation. Power can be supplied by an output from one of our DDC controllers or a separate 9-16 VDC supply.



SPECIFICATIONS

Supply Voltage	9 to 16 VDC
Supply Current	15 mA @ 12 VDC
Alarm Relay	SPST; Opens on alarm. 18 ohm resistor in series with contacts. Rating: 0.1 amp @ 24 VDC
Tamper Relay	SPST; Opens when cover is removed. Rating: 0.5 amp @ 24 VDC
Alarm Duration	3 seconds nominal
LED	Red; on/off selectable
Pulse Counter	Selectable for 1 pulse (instant detection) or 2 pulses for protection from false alarms
Sensor	Dual element-low noise pyroelectric detector
RFI Operation MHz	Greater than 20 V/M to 1,000
Dimensions	2.4" (61 mm) x 4.1" (104 mm) x 1.3" (33 mm)
Weight	3.3 ounces (94 grams)
Color	White
Ambient Limits	
Operating	14°F to 122°F (-10°C to 50°C)
Shipping	-40°F to 140°F (-40°C to 60°C)
Lenses/Accessories	
HPO-0056: Long range lens B	
HPO-0057: Ultra wide-angle lens C	
HPO-0058: Pet alley lens D	
HPO-0059: Swivel mounting bracket	

Optional Swivel Mount Bracket - HPO-0059

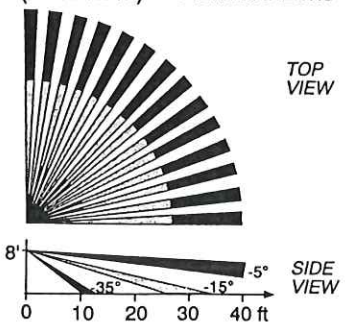


ORDERING

Specify: Model Number, accessory number if required
Order From: Local KMC Controls dealer or,
KMC Controls, Kreuter Manufacturing Co., Inc.

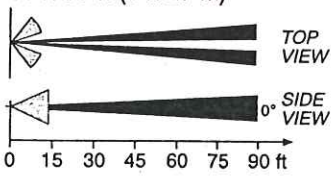
LENS PATTERNS

Lens-A Wide-Angle
Maximum coverage 40 x 40 ft
(12 x 12 m) – Standard Lens

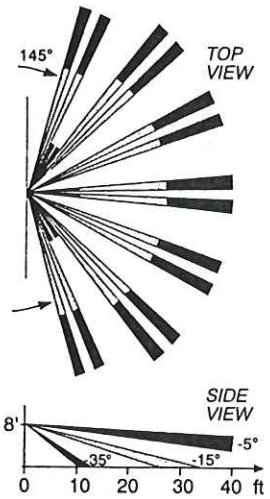


This lens comes standard with SME-1001.

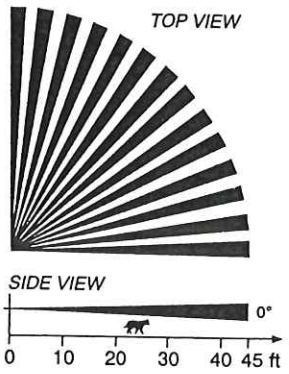
Lens-B Long-Range
Maximum coverage
10 x 90 ft (3 x 27 m)



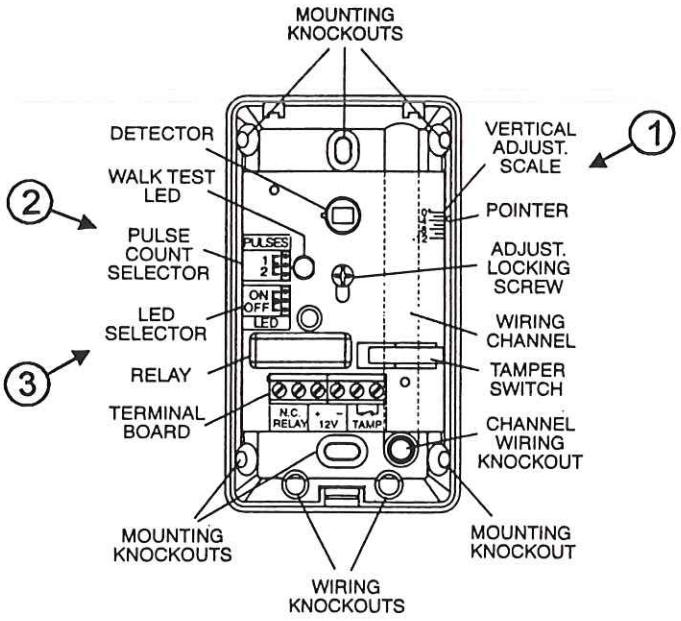
Lens-C Ultra-Wide Angle
Maximum coverage
40 x 60 ft (12 x 18 m)



Lens-D Pet Alley
Maximum coverage
45 x 45 ft (13.5 x 13.5 m)



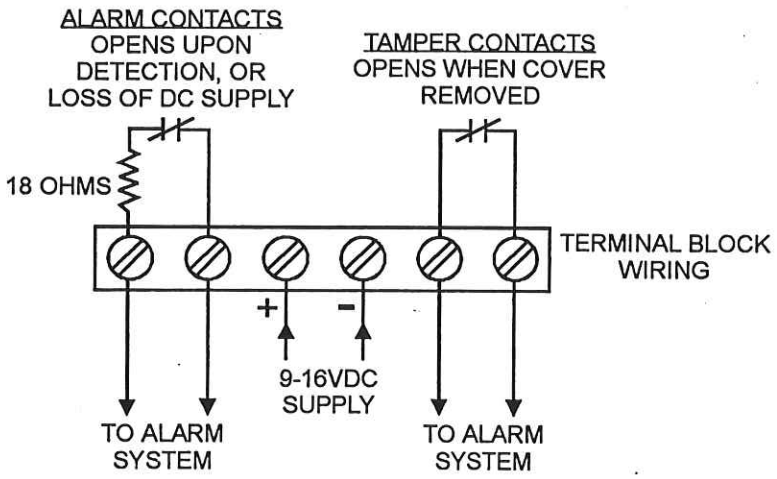
WIRING



• (1) Each SME is equipped with a vertical adjustment scale to allow for different mounting heights and coverages. A chart is included with each unit which shows suggested settings.

• (2) Pulse jumper is factory set for 1, which affords instant detection alarm when first disturbance is detected. If set for 2, unit provides improved protection against false alarms.

• (3) As shipped, LED will light during alarm period (3 seconds nominal). For additional security if desired, jumper can be moved to "off" position.



KMC CONTROLS

REE-3110 SERIES
12/24 VDC Multi-Voltage Relays
MADE IN U.S.A.

DESCRIPTION

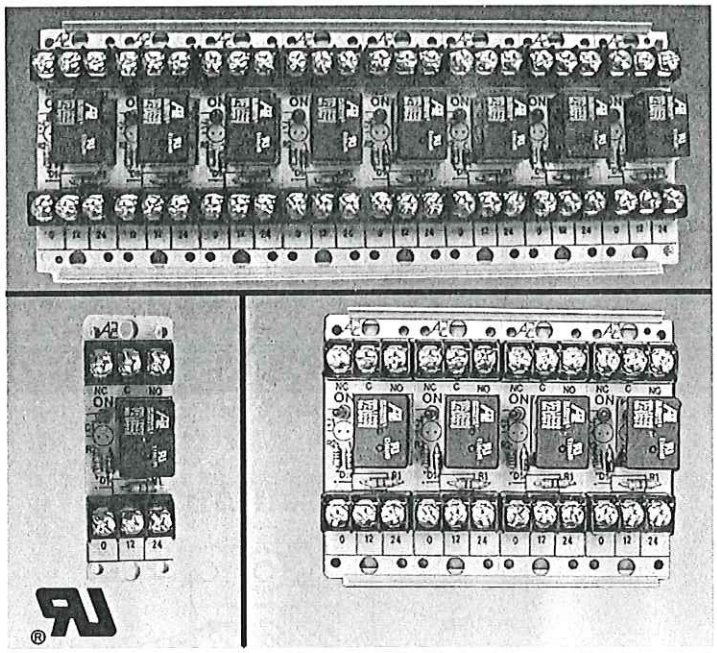
The REE-3100 series are ideal for applications where local or remote contacts are required for system status, control of electrical loads and general all-purpose switching. Suitable for use in systems such as HVAC, temperature control, fire, security, lighting control, etc.

These devices offer SPDT 10 amps contacts which may be operated by one of two input control voltages. A single relay may be energized from a voltage source of 12 VDC or 24 VDC by wiring to appropriate input terminals.

Each relay module has a red LED to indicate the relay coil is energized. Standard 4 or 8-module relay assemblies may be snapped apart for independent use.

SPECIFICATIONS

Contact Rating	10 amps @ 115 VAC
Power Requirements	
SPDT Relay	.017 amps @ 12/24 VDC
Approvals	UL Recognized
Mounting	Stand-offs or Track mounting hardware
Ambient Limits	
Operating	-58˚F to 185˚F (-50˚C to 85˚C)



MODELS

REE-3111 .....Single SPDT relay with LED and stand-offs
REE-3112 .....Single SPDT relay with LED and track mounting hardware

REE-3113 .....Four SPDT relays with LED and stand-offs
REE-3114 .....Four SPDT relays with LED and track mounting hardware

REE-3115 .....Eight SPDT relays with LED and stand-offs
REE-3116 .....Eight SPDT relays with LED and track mounting hardware

ORDERING

Specify: Model Number, accessory number if required
Order From: Local KMC Controls dealer or, KMC Controls, Kreuter Manufacturing Co., Inc.

Specifications and design are subject to change without notice.

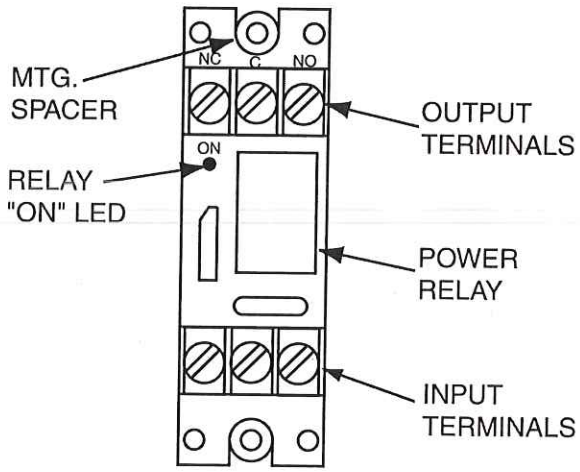
DIMENSIONS

DIMENSIONS IN INCHES (MM)

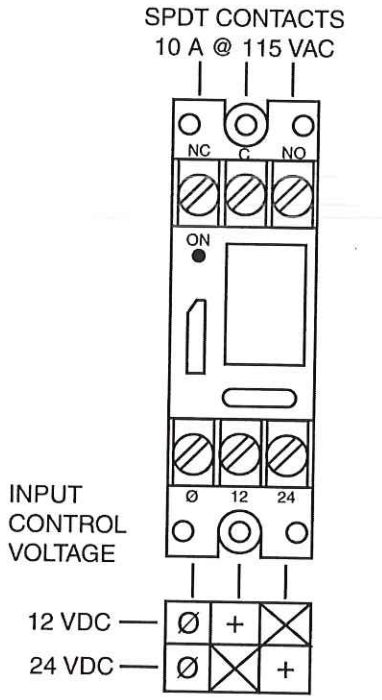
Model	Dimension	Weight
REE-3111,3112	3-1/4" H x 1-1/16" W x 1" D (82.6 x 27 x 25.4)	1.25 ozs.
REE-3113, 3114	3-1/4" H x 4-1/4" W x 1" D (82.6 x 108 x 25.4)	6 ozs.
REE-3115, 3116	3-1/4" H x 8-1/2" W x 1" D (82.6 x 216 x 25.4)	11.75 ozs.

INSTALLATION-CALIBRATION

REE-3111/3112



INSTALLATION WIRING



MAINTENANCE

No routine maintenance is required. Each component's design and material selection assures dependable long-term reliability and performance. Careful installation will also enhance long-term reliability and performance.

KMC CONTROLS

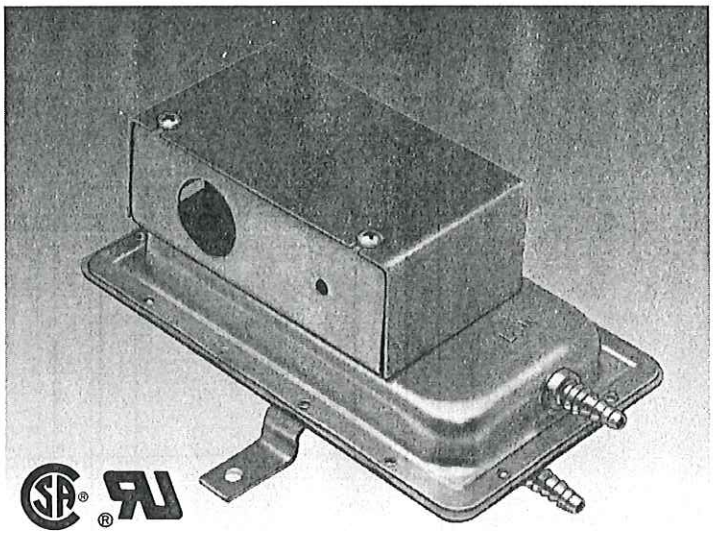
CSE-1102, 1103
Differential Pressure Switches
MADE IN U.S.A.

DESCRIPTION

The CSE-1102 and 1103 differential pressure switches are used to remotely sense low pressure or vacuum, differentials of pressure or vacuum.

Typical applications include sensing fan or blower operation in ducted ventilation systems, sensing pressure drop across filters, and sensing frost build-up on coils. The SPDT switch allows remote status or alarm indication or operation of electrical circuits to other control devices.

Model CSE-1102 (shown) has barbed tubing connections, while the CSE-1103 is furnished with compression connectors for use with copper tubing. Both models are UL Recognized and CSA Approved.



SPECIFICATIONS

Setpoint Range	
0.5" ±.02 W.C. to 12" ±.01" W.C., adjustable (.012 kPa ±.005 kPa to 3 kPa ±.02 kPa)	
Differential	
.02" W.C. (.005 kPa) rising to 0.8" W.C. (.02 kPa) @ highest setting	
Maximum Pressure	0.5 psi (3.4 kPa)
Electrical Connections	
Screw terminals, 1 knockout for 1/2" conduit connector	
Air Sampling Connections	
CSE-1102	Barbed for 1/4" - 3/8" OD (6 mm - 9 mm) polyethylene tube
CSE-1103	Compression for 1/4" OD copper tubing
Electrical Ratings	
Inductive	1/4 HP @ 125 VAC, 1/2 HP @ 250 VAC, 0.50 amp @ 125 VDC, 0.25 amp @ 250 VDC
Pilot Duty	300 VA @ 115 VAC to 277 VAC
Resistive	15 amps 125 VAC to 277 VAC
Weight	1.2 lbs. (.5 kg)
Ambient Limits	
Operating	-40°F to 180°F (-40°C to 82°C)
Shipping	-40°F to 180°F (-40°C to 82°C)
Approvals	UL Recognized, File MH6213 CSA Approved, File LR18754
Mounting Position	Diaphragm vertical
Accessories	
HFO-0015: 4-3/4" (121 mm) long sensing tube HFO-0016: 6-3/4" (171 mm) long sensing tube	

MODELS

CSE-1102 ..... Differential Pressure Switch w/barbed connections

CSE-1103 ..... Differential Pressure Switch w/compression connections

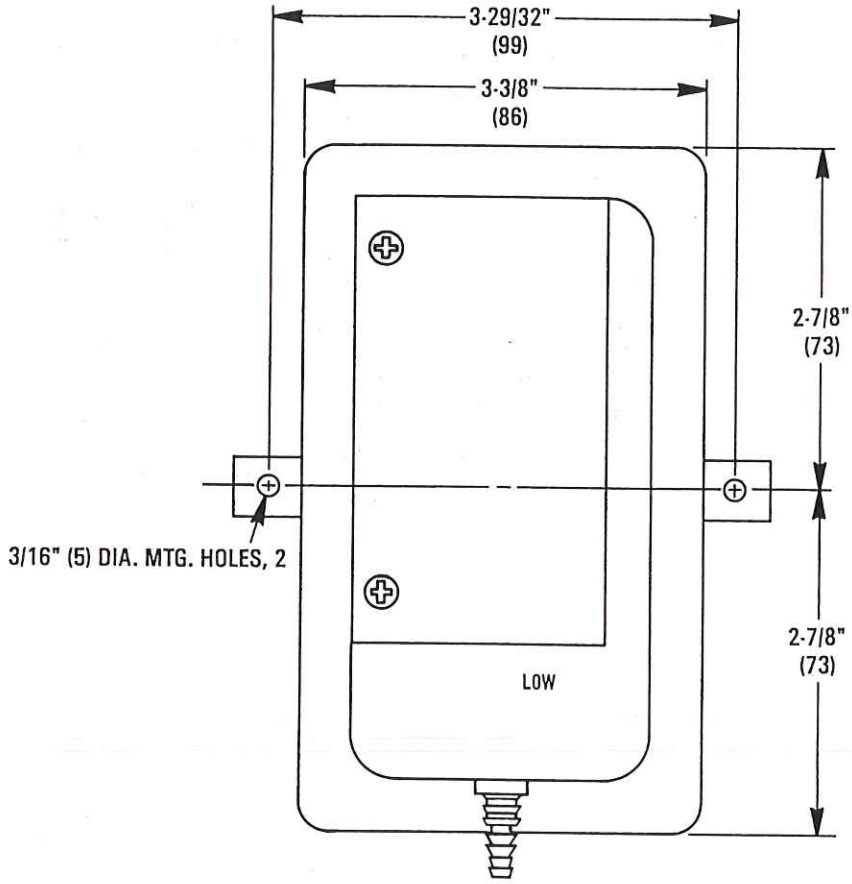
ORDERING

Specify: Model Number, accessory number if required

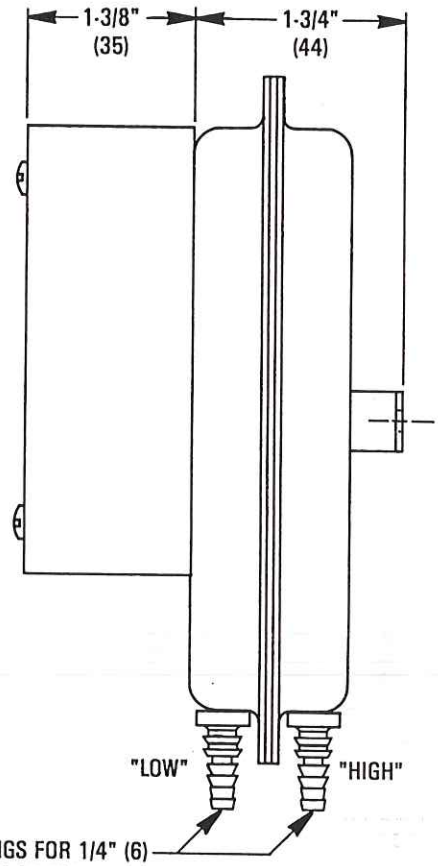
Order From: Local KMC Controls dealer or,
KMC Controls, Kreuter Manufacturing Co., Inc.

DIMENSIONS

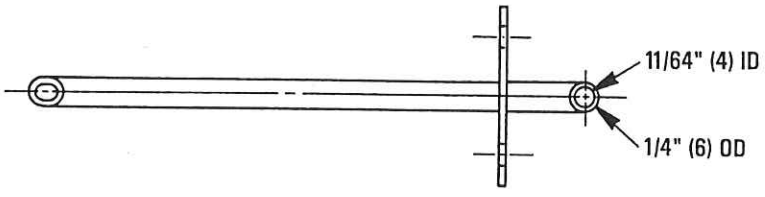
DIMENSIONS IN INCHES (MM)

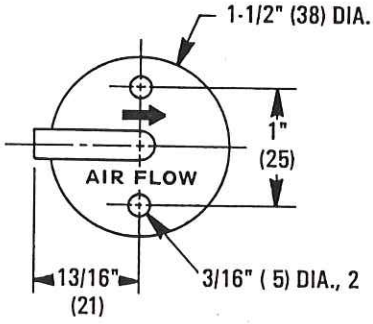


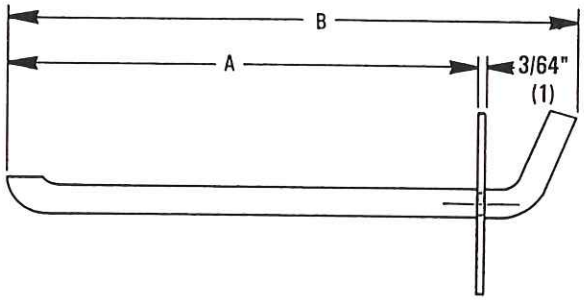
CSE-1102 SHOWN WITH BARBED FITTINGS



BARBED FITTINGS FOR 1/4" (6)
AND/OR 3/8" (9) OD TUBING, 2







DIMENSION	HFO-0015	HFO-0016
A	3-7/8" (98)	5-7/8" (149)
B	4-3/4" (121)	6-3/4" (172)

INSTALLATION-CALIBRATION

Recommended Air Sampling Method:

Install sensing tubes HFO-0015 or HFO-0016 (purchased separately) and connect to appropriate ports on pressure switch. Use 3/8" (9 mm) tubing for sample lines.

No routine maintenance is required.

KMC CONTROLS

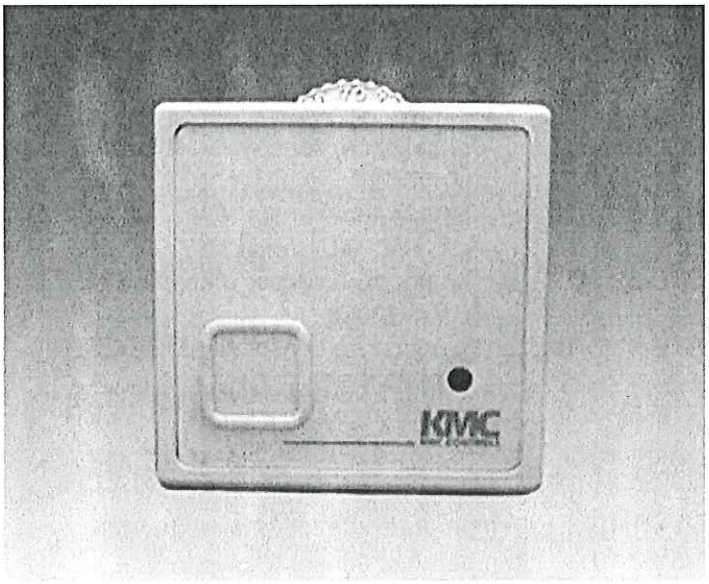
STE-5000 SERIES
Room Temperature Sensor

MADE IN U.S.A.

DESCRIPTION

This series of room temperature sensors is designed for use in **KMDigital** or other building automation systems. They incorporate a 10,000 ohm (@ 77°F) thermistor for the sensing element, providing precise, stable temperature sensing. Appealing with its low profile and durable thermostat style cover, these sensors may be surface wall mounted to a 2" x 4" electrical box.

Many models are available to provide sensing with or without setpoint control by dial or pushbuttons, pushbutton override or control and LED indication.



SPECIFICATIONS

Sensor		
Accuracy	±0.36°F (-0.2°C)	
Resistance	10,000 ohms @ 77°F (25°C)	
Operating Range	40°F to 120°F (4°C to 49°C) See "Response".	
NTC	4.37%/°C @ 25°C	
Dissipation Constant	7 mW/°C	
KMDigital Range	#4/#5	
Setpoint Potentiometer		
Resistance	0 to 10,000 ohms/54°F to 90°F (12°C to 32°C) linear	
Tolerance	±20%	
Pushbuttons		
Front	Momentary, shunts temp. sensor	
Top	Momentary, right (increase) shunts sensor; left (decrease) opens sensor	
LED(s)	Green, 10 VDC (12 VDC max.)	
Connections	Screw terminals	
Material	Ash white or light almond ABS, UL Flame Class 94HB	
Weight	1.25 oz. (35 grams)	
Ambient Limits		
Operating	40°F to 120°F (4°C to 49°C)	
Shipping	-40°F to 140°F (-40°C to 60°C)	
Response	40°F (4.4°C)	26.18K ohms
	50°F (10°C)	19.90K ohms
	60°F (15.6°C)	15.28K ohms
	70°F (21.1°C)	11.85K ohms
	80°F (26.7°C)	9.29K ohms
	90°F (32.2°C)	7.34K ohms
	100°F (37.8°C)	5.84K ohms
	110°F (43.3°C)	4.67K ohms
	120°F (48.9°C)	3.76K ohms

ACCESSORIES

HMO-5014: Standoff, light almond
HMO-5016: Standoff, ash white
HMO-5036: Vertical backplate, light almond
HMO-5037: Vertical backplate, ash white
HMO-5038: Horizontal backplate, ash white
HMO-5039: Horizontal backplate, light almond
HPO-0031: Setpoint cover, ash white
HPO-0032: Setpoint cover, light almond

ORDERING

Specify: Model Number, accessory number if required
Order From: Local KMC Controls dealer or,
KMC Controls, Kreuter Manufacturing Co., Inc.

DS-212-06/97 REV. 07-17-98

MODELS

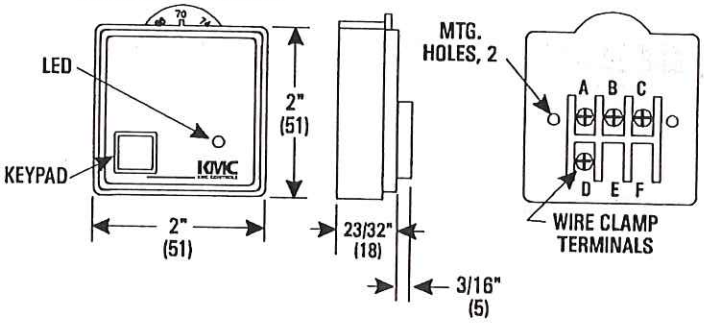
STE-5*11-10 ..... Temperature sensor
STE-5*12-10 ..... Temperature sensor w/°F setpoint
STE-5*12-11 ..... Temperature sensor w/°C setpoint
STE-5*13-10 ..... Temperature sensor w/keypad & L.E.D.
STE-5*14-10 ..... Temperature sensor w/keypad, L.E.D. & °F setpoint
STE-5*14-11 ..... Temperature sensor w/keypad, L.E.D. & °C setpoint
STE-5*15-10 ..... Temperature sensor w/keypad, 3 L.E.D.s & °F setpoint
STE-5*15-11 ..... Temperature sensor w/keypad, 3 L.E.D.s & °C setpoint
STE-5*16-10 ..... Temperature sensor w/INCR-DECR pushbuttons
STE-5*17-10 ..... Temperature sensor w/INCR-DECR pushbuttons, keypad & L.E.D.
STE-5*18-10 ..... Temperature sensor w/INCR-DECR pushbuttons & L.E.D.
STE-5*21-10 ..... Temperature sensor w/keypad switch
STE-5*22-10 ..... Temperature sensor w/keypad & °F setpoint
STE-5*22-11 ..... Temperature sensor w/keypad & °C setpoint

***: 0 = light almond; 1 = ash white**

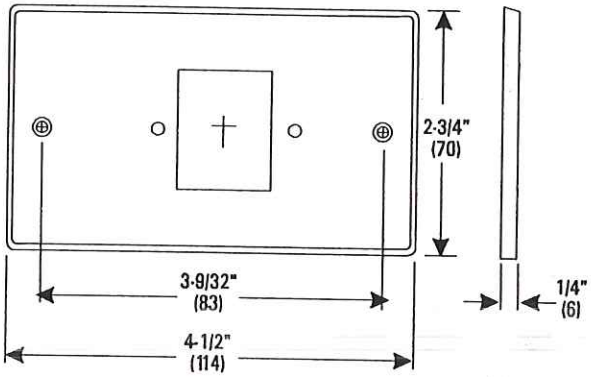
DIMENSIONS

DIMENSIONS IN INCHES (MM)

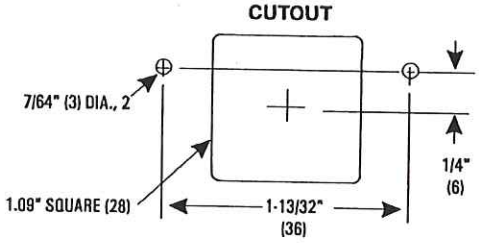
STE-5014-10 SHOWN



ADAPTOR BACKPLATE (HMO-5038 SHOWN)



CUTOUT



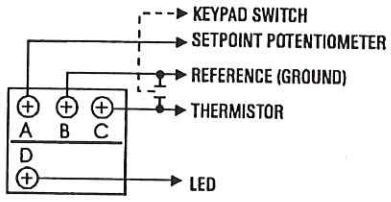
INSTALLATION-CALIBRATION

Cover must be removed for mounting. To remove, hold sensor upright (use terminal markings as a guide). Hold base securely and lift cover upward using slight pressure. Pull cover top outward from base. To replace cover, hook bottom of cover under the two base tabs, lifting upward and pushing cover top in towards base.

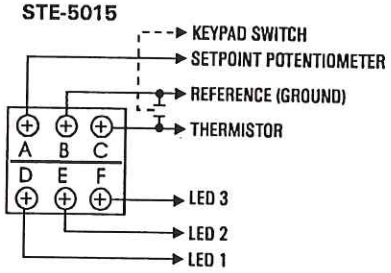
These sensors may be mounted into a hollow wall cutout shown above or to a 2" x 4" electrical handy box using an HMO-5038 (shown) or 5036/5037/5039 backplate. Mount in a location able to sense average room temperature. Avoid locations affected by the sun or drafts.

For electrical box mounting, mount the backplate to the 2" x 4" box using the two painted oval head screws supplied with the backplate. Mount sensor to backplate using the two 6-20 self-threading screws supplied. Connect wiring as shown.

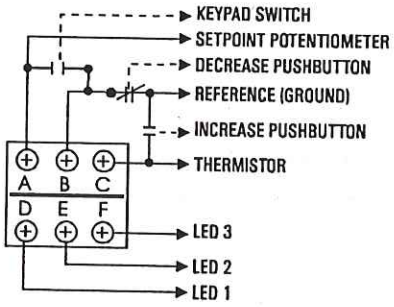
STE-5011, 5012, 5013, 5014



STE-5015



STE-5016, 5017, 5018



MAINTENANCE

No routine maintenance is required. Each component's design and material selection assures dependable long-term reliability and performance. Careful installation will also enhance long-term reliability and performance.

KMC CONTROLS

VEP-11, 12, 21, 22 SERIES
Electronic Control Valves
1/2", 3/4", & 1" 2-Way; Fail-Safe

ASSEMBLED IN U.S.A.

DESCRIPTION

These control valves are designed to regulate flow of hot or chilled water VAV terminal unit reheat coils, fan coil units, and induction units. The VEP-11 and 12 have a straight through body design, and the VEP-21 and 22 have a right angle body design.

Their compact size allows for easy installation within small enclosures. The fully enclosed electric actuator has heat resistant lead-wires and is readily installed or removed via a screw-on ring nut. Each control valve actuator utilizes a PTC thermal element for dependable long-life and noise-free operation.

The valve bodies are all normally open. The actuator determines the normally open or normally closed function. The VEP-11 and 21 normally open assemblies use the actuators with black print, and the VEP12 and 22 normally closed assemblies use the actuators with white print on brown label .

SPECIFICATIONS

Action

Normally Open	VEP-11 and 21 series (black print)
Normally Closed	VEP-12 and 22 series (brown label)

Sizes & Cv Ratings

1/2"	1.60, 2.00, and 2.60 Cv
3/4"	2.95 and 4.25 Cv
1"	5.00 Cv

Maximum Differential

	N.O.	N.C.	N.C. w/HPO-5055
1/2", 1.60 Cv	71 psi (490 kPa)	51 psi (352 kPa)	112 psi (773 kPa)
1/2", 2.00 Cv	47 psi (324 kPa)	34 psi (235 kPa)	74 psi (510 kPa)
1/2", 2.60 Cv	25 psi (172 kPa)	18 psi (124 kPa)	40 psi (276 kPa)
3/4", 2.95 Cv	34 psi (235 kPa)	24 psi (166 kPa)	53 psi (366 kPa)
3/4", 4.25 Cv	9 psi (62 kPa)	6 psi (41 kPa)	14 psi (97 kPa)
1", 5.00 Cv	11 psi (76 kPa)	8 psi (55 kPa)	17 psi (117 kPa)

Actuator Voltages 24 VAC (MEP-3001, 3006)
120 VAC (MEP-3002, 3007)
208-277 VAC (MEP-3003, 3008)

Power 3 watts operating; 14 watts average cold start-up surge.

Stroke Timing 3 minutes full stroke.

Body Ratings 188 psi (1296 kPa) hot water;
290 psi (1999 kPa) cold water.
35.6°F to 212°F (2°C to 100°C)

Connections

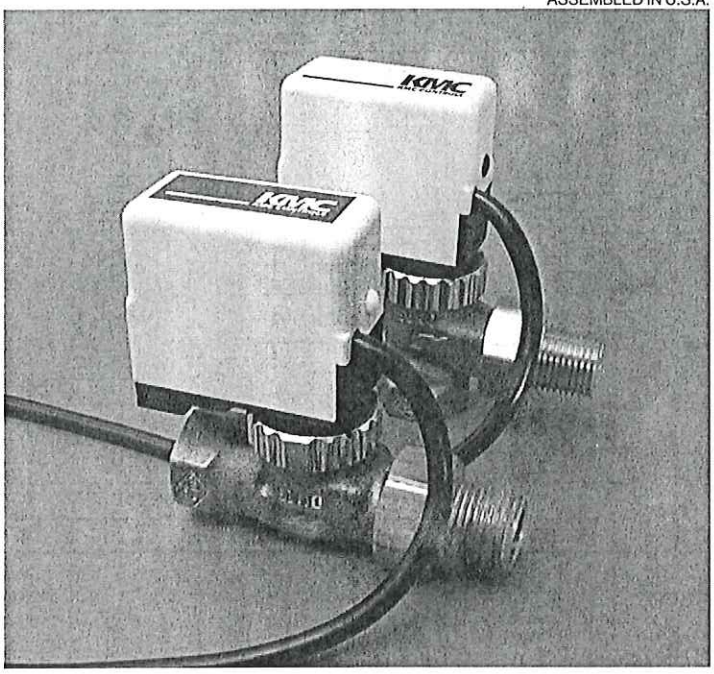
Inlet	FPT
Outlet	MPT

Material

Body and Seat	Bronze
Packing	Double O-ring
Disc	EPDM
Stem	Stainless steel

Ambient Limits

Operating	32°F to 120°F (0°C to 49°C)
Shipping	0°F to 140°F (-18°C to 60°C)



Accessories/Repair Parts

HMO-4510: Flexible conduit connector
HPO-5021: 3/4" union nut
HPO-5022: 1" union nut
HPO-5030: 1/2" bonnet assembly; 2.00 Cv
HPO-5031: 1/2" bonnet assembly; 2.60 Cv
HPO-5032: 3/4" bonnet assembly; 2.95 Cv
HPO-5033: 3/4" bonnet assembly; 4.25 Cv
HPO-5035: 1/2" bonnet assembly; 1.60 Cv
HPO-5037: 1" bonnet assembly; 5.00 Cv
HPO-5055: Amplifier for normally closed valves
HPO-5058: 1/2" union nut
HPO-5059: 1/2" MPT union
HPO-5062: 3/4" MPT union
HPO-5063: 1" MPT union
HPO-5064: 1/2" replacement disc; 1.60 Cv
HPO-5065: 1/2" replacement disc; 2.00 Cv
HPO-5066: 1/2" replacement disc; 2.60 Cv
HPO-5067: 3/4" replacement disc; 2.95 Cv
HPO-5068: 3/4" replacement disc; 4.25 Cv
MEP-3001: 24 VAC normally closed actuator
MEP-3002: 120 VAC normally closed actuator
MEP-3003: 208-277 VAC normally closed actuator
MEP-3006: 24 VAC normally open actuator
MEP-3007: 120 VAC normally open actuator
MEP-3008: 208-277 VAC normally open actuator

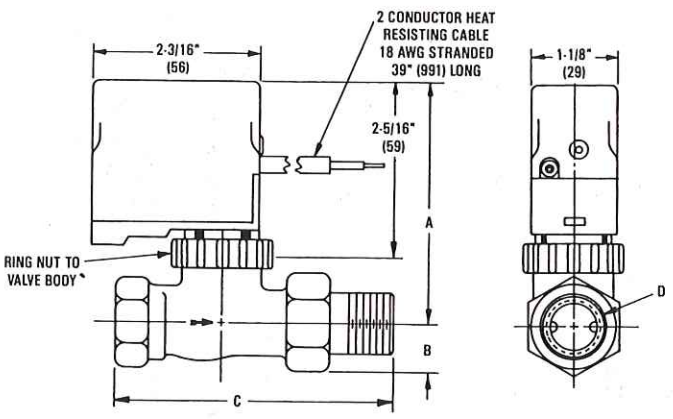
ORDERING

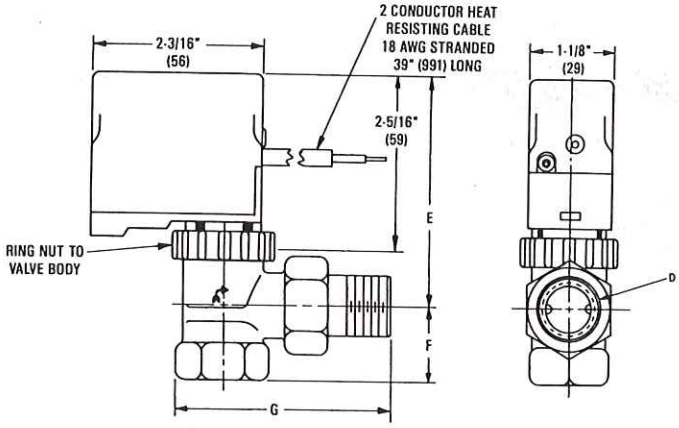
Specify: See "Models", accessory number if required
Order From: Local KMC Controls dealer or,
KMC Controls, Kreuter Manufacturing Co., Inc.

Specifications and design are subject to change without notice.

DIMENSIONS

DIMENSIONS IN INCHES (MM)





VEP-11, 12 SERIES							VEP-21, 22 SERIES			
DIMENSION		A	B	C	D	WEIGHT	E	F	G	WEIGHT
1/2"	Cv: 1.60	3-5/32" (80)	21/32" (17)	3-9/16" (91)	1/2" MPT	1 lb. (.45 kg)	3-5/32" (81)	1" (25)	2-3/4" (70)	1.00 lb. (.45 kg)
	Cv: 2.00					1.05 lb. (.48 kg)				1.05 lb. (.48 kg)
	Cv: 2.60									
3/4"	Cv: 2.95	3-7/32" (82)	13/16" (21)	4-7/16" (113)	3/4" MPT	1.2 lb. (.54 kg)	3-1/8" (79)	1-1/8" (29)	3-13/32" (87)	1.20 lb. (.54 kg)
	Cv: 4.25	3-7/16" (87)				1.4 lb. (.64 kg)	3-9/32" (83)		3-15/32" (88)	1.40 lb. (.64 kg)
1"	Cv: 5.00	3-3/8" (86)	1-1/16" (27)	5-9/16" (141)	1" MPT	1.84 lb. (.83 kg)	3-3/8" (86)	1-1/2" (38)	3-27/32" (98)	1.84 lb. (.83 kg)

MODELS

VEP- X X XX 018 X

- 6: 24 VAC
- 7: 120 VAC
- 8: 208-277 VAC

- 14: 1/2"; 1.60 Cv
- 15: 1/2"; 2.00 Cv
- 16: 1/2"; 2.60 Cv
- 17: 3/4"; 2.95 Cv
- 18: 3/4"; 4.25 Cv
- 22: 1"; 5.00 Cv

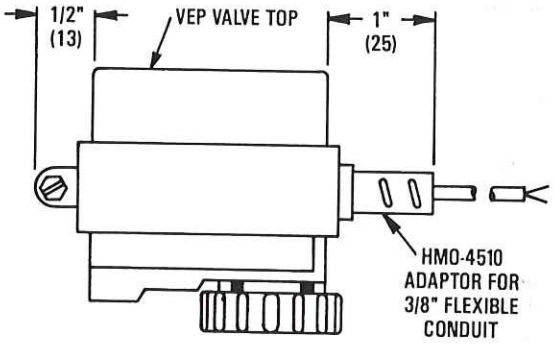
- 1: Normally open
- 2: Normally closed

- 1: Straight through body
- 2: Angled body

MAINTENANCE

No routine maintenance is required. Each component's design and material selection assures dependable long-term reliability and performance. Careful installation will also enhance long-term reliability and performance. Field repairs should be limited to the replacement of the complete bonnet assembly or valve disc.

INSTALLATION-APPLICATION



Valves may be connected with 3/8" flexible conduit by using the HMO-4510 adaptor easily added in the field. See above.

Valves are sized to the demand of the system to be controlled and are frequently smaller than supply lines. They should be installed as close as possible to the coil and should be in the *vertical* position so the actuator is over the valve. It may be installed in any position if necessary, but not inverted.

When installing, take these simple precautions:

1. Install the valve so it closes against the flow;
2. A minimum clearance of 1-1/2" (38 mm) must be allowed between the top of the actuator and the nearest obstruction. This permits removal of actuator yoke and parts required to replace bonnet assembly.
3. Allow sufficient clearance so the valve may be easily serviced if necessary.

KMC CONTROLS

VEP-3419, 3719 SERIES
1/2" Electronic Control Valves
3-Way Diverting: Fail-safe

DESCRIPTION

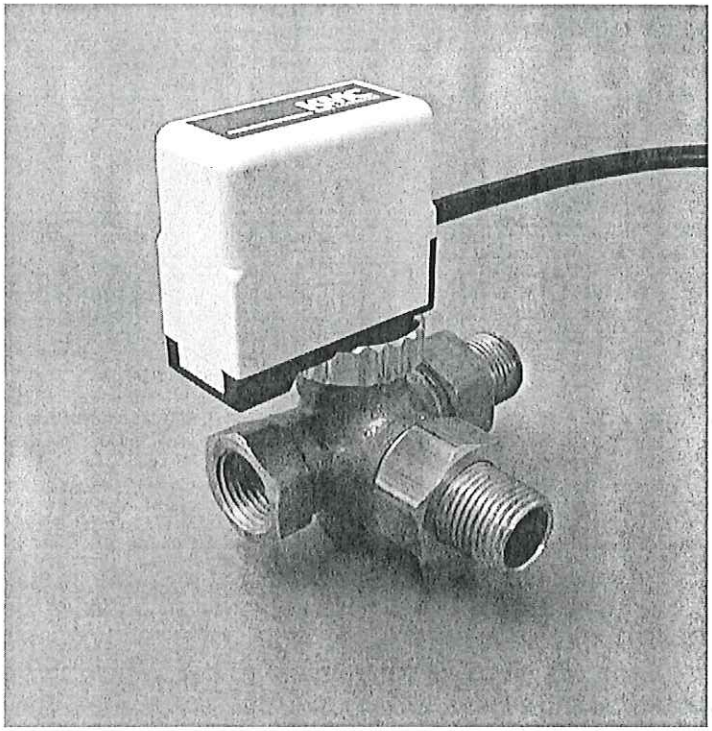
These control valves are designed to regulate flow of hot or chilled water in VAV terminal unit reheat coils, fan coil units, and induction units.

The VEP-3419 is designed for systems requiring full flow/fail-safe to the system return. The VEP-3719 is designed for systems requiring full flow/fail-safe to the coil.

Their compact size allows for easy installation within small enclosures. The fully enclosed electric actuator has heat resistant lead-wires and is readily installed or removed via a screw-on ring nut. Each control valve actuator utilizes a PTC thermal element for dependable long-life and noise-free operation.

SPECIFICATIONS

Cv Ratings	1.7 Cv
Maximum Differential	24 psi (165 kPa) for VEP-3419 34 psi (234 kPa) for VEP-3719 Common to straight through outlet. Side outlet has metal to metal seat and is not leak tight.
Power Requirement	3 watts operating; 14 watts average cold start-up surge.
Stroke Timing	3 minutes to/from full stroke
Body Ratings	188 psi (1296 kPa) hot water; 290 psi (1999 kPa) cold water 35.6°F to 212°F (2°C to 100°C)
Connections	
Inlet	1/2" FPT
Outlets	1/2" MPT
Material	
Body and Seat	Bronze
Packing	Double O-ring
Disc	EPDM
Stem	Stainless steel
Ambient Limits	
Operating	32°F to 120°F (0°C to 49°C)
Shipping	0°F to 140°F (-18°C to 60°C)
Weight	1.35 lbs. (0.612 kg)
Accessories/Repair Parts	
HMO-4510:	Flexible conduit connector
HMO-5034:	1/2" bonnet assembly
HMO-5058:	1/2" union nut
HMO-5059:	1/2" MPT union
HMO-5069:	1/2" replacement disc
HMO-5076:	1/2" sweat union
MEP-3001:	24 VAC actuator (brown label for VEP-3419)
MEP-3002:	120 VAC actuator (brown label for VEP-3419)



MEP-3003:	208-277 VAC actuator (brown label for VEP-3419)
MEP-3006:	24 VAC actuator (black print for VEP-3719)
MEP-3007:	120 VAC actuator (black print for VEP-3719)
MEP-3008:	208-277 VAC actuator (black print for VEP-3719)

MODELS

VEP-34190186 ..... 1/2"; 24 VAC (MEP-3001)
VEP-34190187 ..... 1/2"; 120 VAC (MEP-3002)
VEP-34190188 ..... 1/2"; 208-277 VAC (MEP-3003)

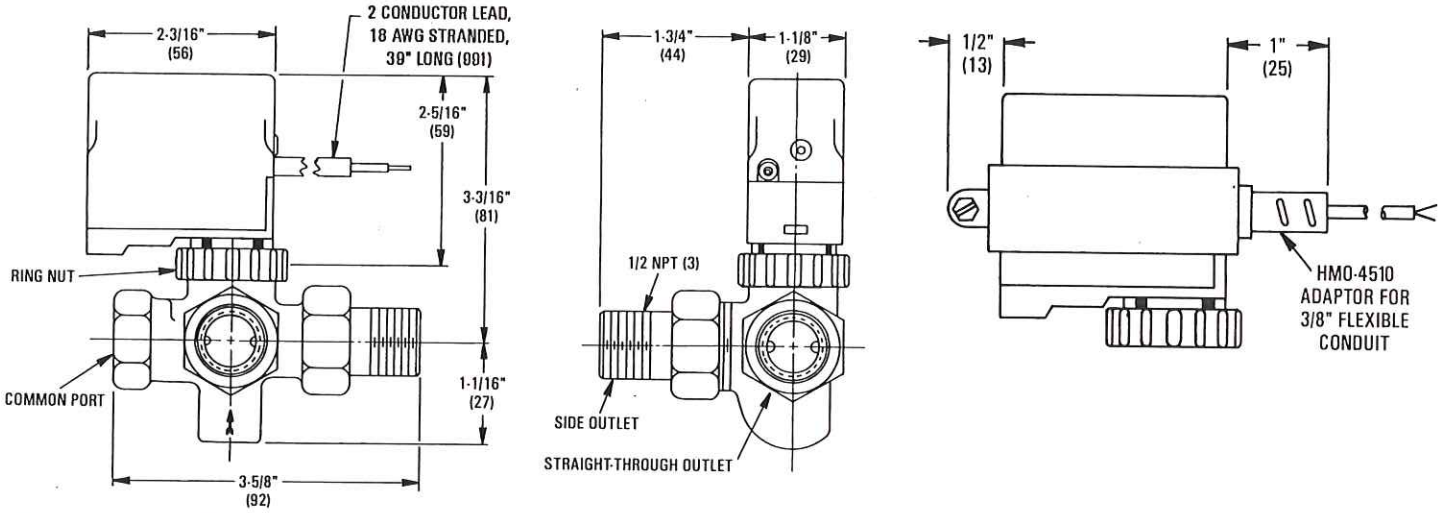
VEP-37190186 ..... 1/2"; 24 VAC (MEP-3006)
VEP-37190187 ..... 1/2"; 120 VAC (MEP-3007)
VEP-37190188 ..... 1/2"; 208-277 VAC (MEP-3008)

ORDERING

Specify: Model Number, accessory number if required
Order From: Local KMC Controls dealer or,
KMC Controls, Kreuter Manufacturing Co., Inc.

DIMENSIONS

DIMENSIONS IN INCHES (MM)



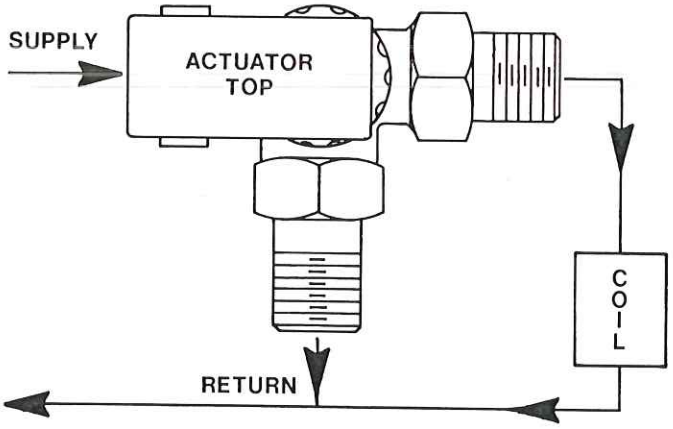
INSTALLATION-APPLICATION

This series of valves may be connected with 3/8" flexible conduit by using the HMO-4510 adaptor easily added in the field. (See above right).

Valves are sized to the demand of the system to be controlled and are frequently smaller than supply lines. They should be installed as close as possible to the coil and should be in the *vertical* position so the actuator is over the valve. It can be installed in any position if necessary, but not inverted.

When installing, these simple precautions should be taken:

1. Install the valve so it closes against the flow;
2. A minimum clearance of 1-1/2" (38 mm) must be allowed between the top of the actuator and the nearest obstruction. This permits removal of actuator yoke and parts required to replace packing. Allow sufficient clearance so the valve may be easily serviced if necessary;
3. The VEP-34/37 series should always be piped so that the side outlet feeds the return of the system. This outlet utilizes a metal-to-metal seat that *may not be leak tight.*



MODEL NUMBER	VOLTAGE	COLOR PRINTED ON ACTUATOR	SIDE OUTLET	STRIAGHT-THROUGH OUTLET	FAILS TO:
VEP-34190186	24 VAC	Brown Label	Normally Open	Normally Closed	Return
VEP-34190187	120 VAC				
VEP-34190188	208 - 277 VAC				
VEP-37190186	24 VAC	Black Print	Normally Closed	Normally Open	Coil
VEP-37190187	120 VAC				
VEP-37190188	208 - 277 VAC				

MAINTENANCE

No routine maintenance is required. Each component's design and material selection assures dependable long-term reliability and performance. Careful installation will also enhance long-term reliability and performance. Field repairs should be limited to the replacement of the complete bonnet assembly or valve disc.

HCS
HEPTA CONTROL SYSTEMS INC.

Project: St. Philip's Elcmcntary School
4137 Victoria Street
Petrolia, Ont.

Customer: Linde Plumbing & Heating Limited,
7003 Longwoods Road,
R.R. #1,
Melbourne, Ont.
N0L ITO

Warranty Start Date: January 10, 2000

Hepta Control Systems Ltd. (hitherto referred to as HCS) warrants all material & labour (where applicable) supplied & installed on the subject project to be free of defects, under normal use & service, for a period of one year from the "Warranty Start Date" printed above. If defective material and/or workmanship is determined to be the fault within the aforementioned time period then HCS will repair or replace at it's option the defective item.

HCS assumes no liability for consequential damages of any kind for equipment and/or labour provided on this project as a result of it's use or misuse by the customer or their employees or others.

This warranty is expressly in lieu of all other warrantics, guarantees, obligations or liabilities, expressed or implied by HCS or it's representatives.

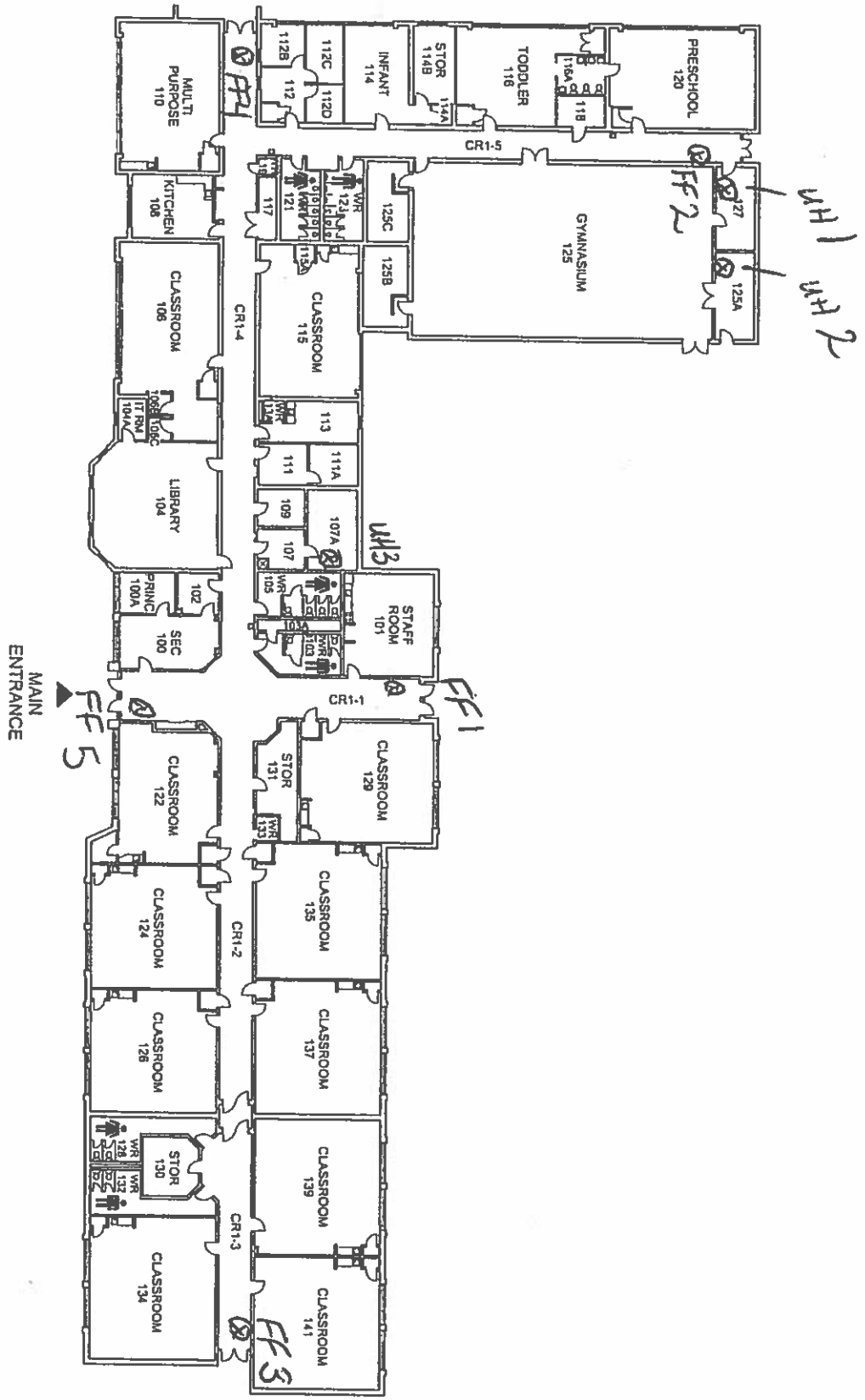
KMC
KMC CONTROLS

Suite 199, 2 - 1200 London Rd., Sarnia, Ontario N7S 1P4 Tel. (519) 331-0194 Toll Free. 888-726-6688
Fax. (519) 541-1964 E-Mail:Houck@MNSi.net

St Philip School, Petrolia, Ontario
2006

FIRE PANEL
GAS
POWER
WATER

ST. CLAIR CATHOLIC
DISTRICT SCHOOL BOARD



645

St. Philip
Catholic School

420 Queen Street, Petrolia, ON, N0N 1R0

FLOOR PLAN

01/01/2015

ST. CLAIR CATHOLIC
DISTRICT SCHOOL BOARD

BATTERY PACKS

ST. CLAIR CATHOLIC DISTRICT SCHOOL BOARD

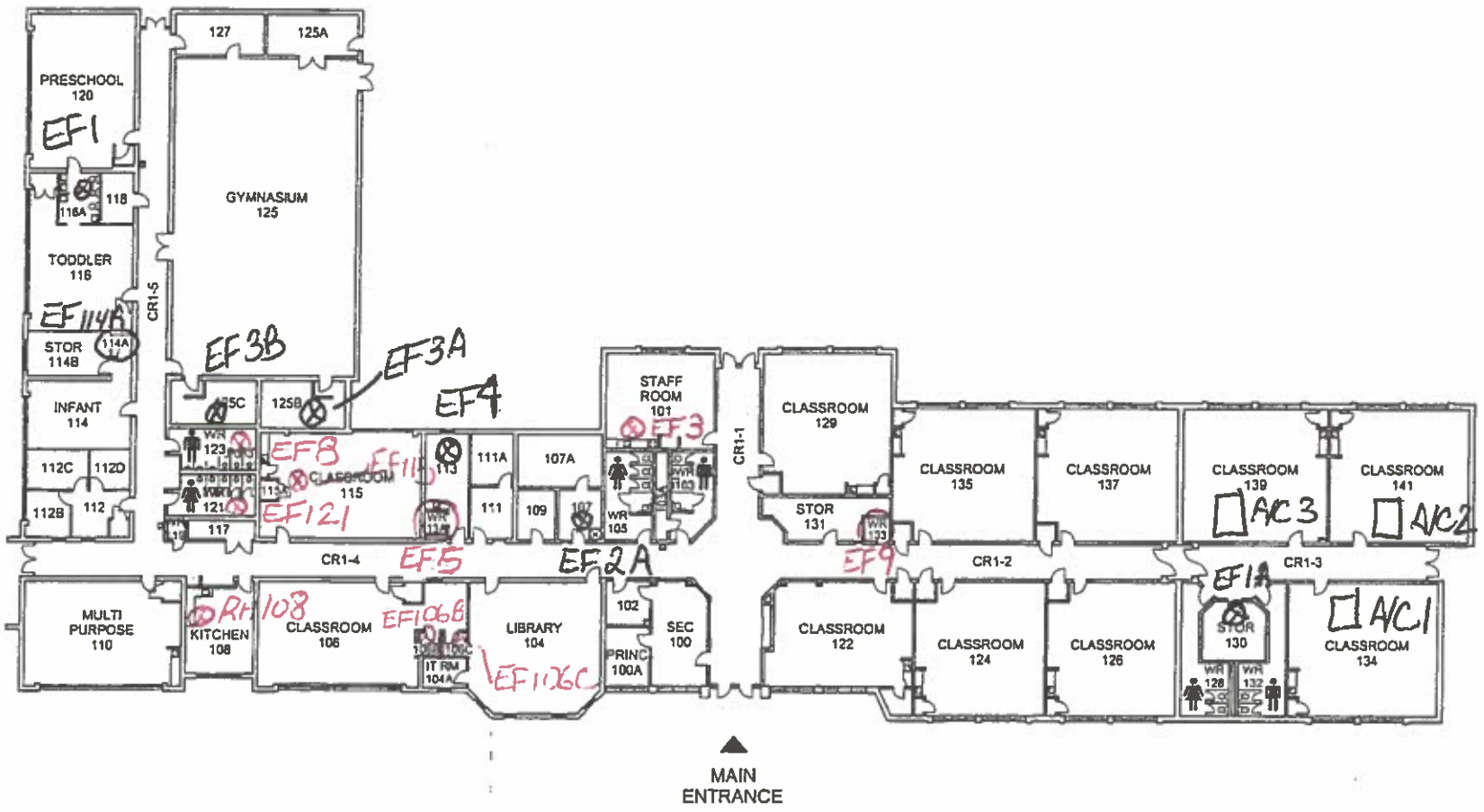
FLOOR PLAN

01/01/2015

St. Philip Catholic School

420 Queen Street, Petrolia, ON, N0N 1R0

645



EF Ceiling

E.F. Roof

ST. CLAIR CATHOLIC DISTRICT SCHOOL BOARD

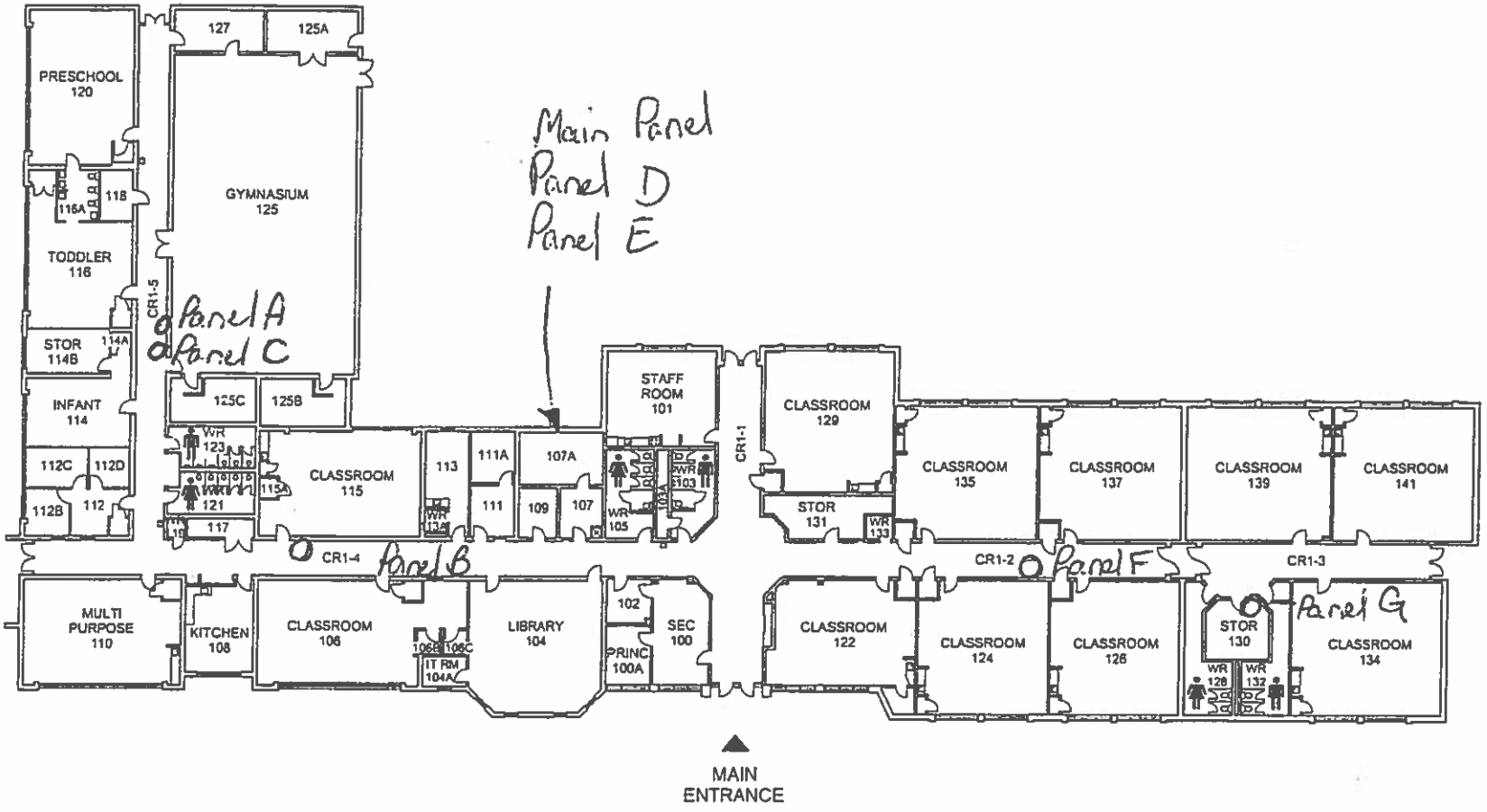
FLOOR PLAN

01/01/2015

St. Philip Catholic School

420 Queen Street, Petrolia, ON, N0N 1R0

645



Electrical Panels

ST. CLAIR CATHOLIC DISTRICT SCHOOL BOARD

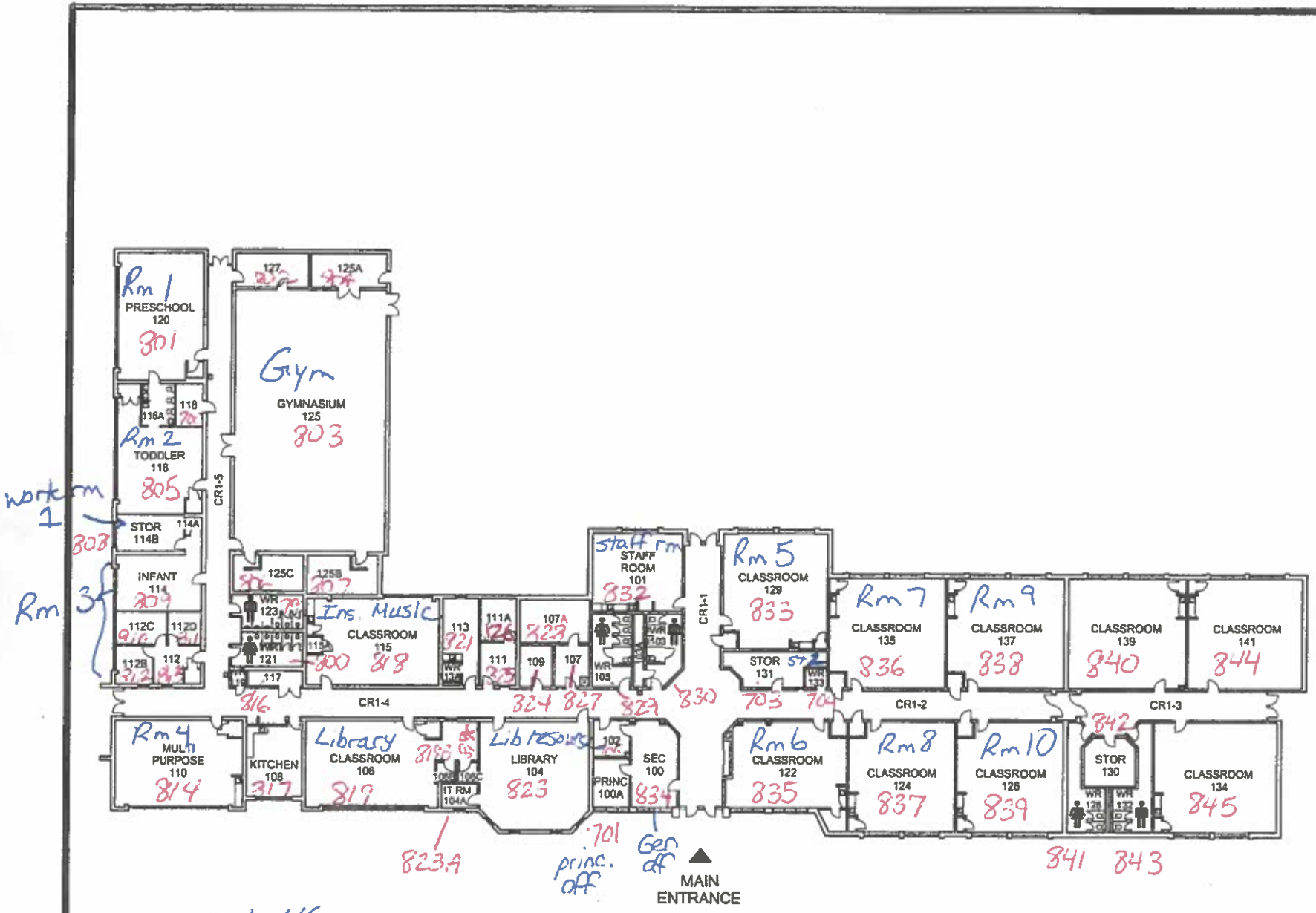
FLOOR PLAN

01/01/2015

St. Philip Catholic School

420 Queen Street, Petrolia, ON, N0N 1R0

645



ST. CLAIR CATHOLIC
DISTRICT SCHOOL BOARD

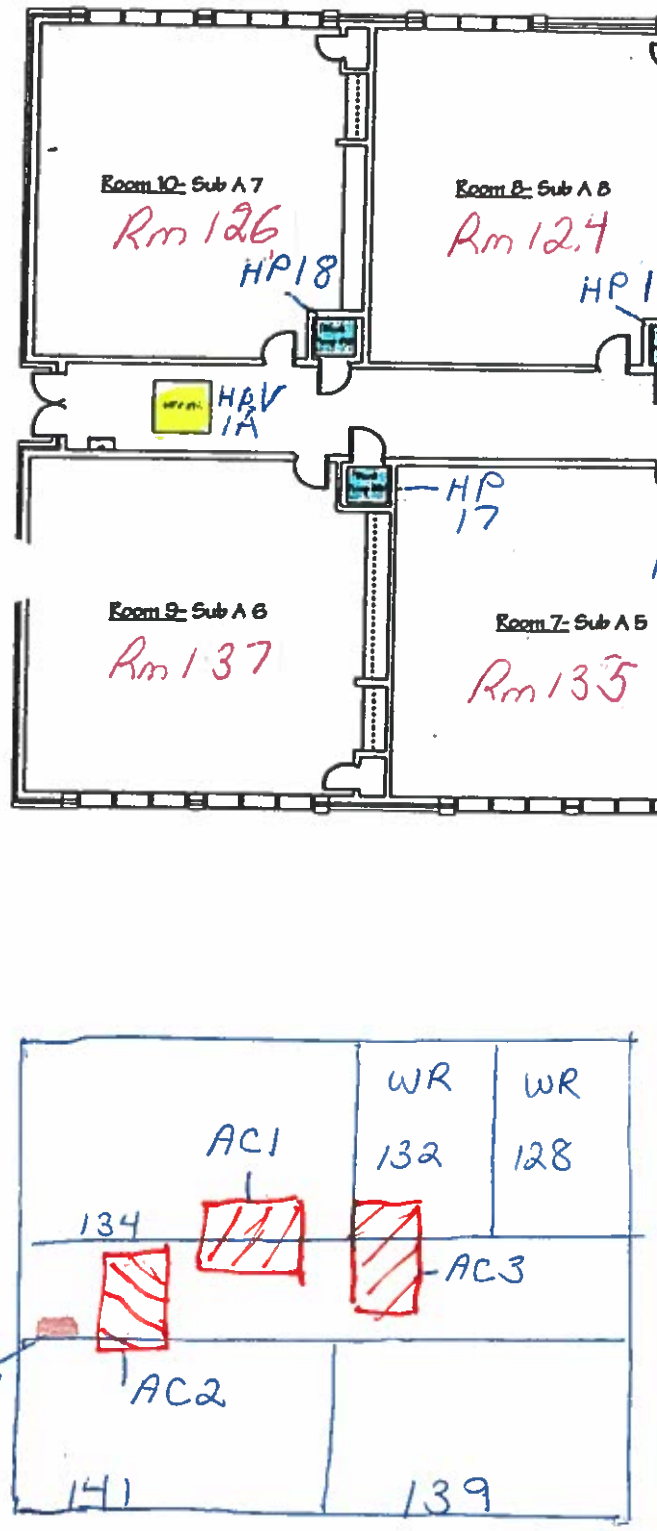
FLOOR PLAN

01/01/2015

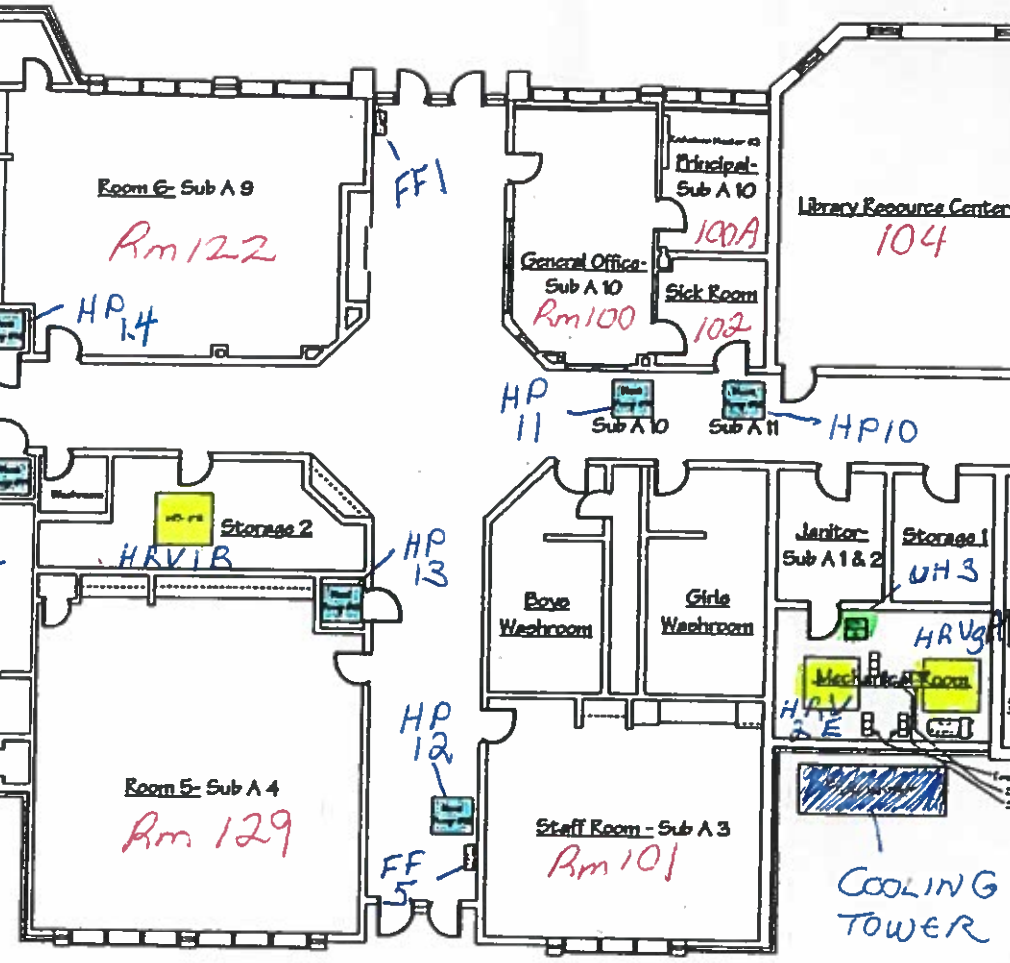
St. Philip
Catholic School

420 Queen Street, Petrolia, ON, N0N 1R0

645

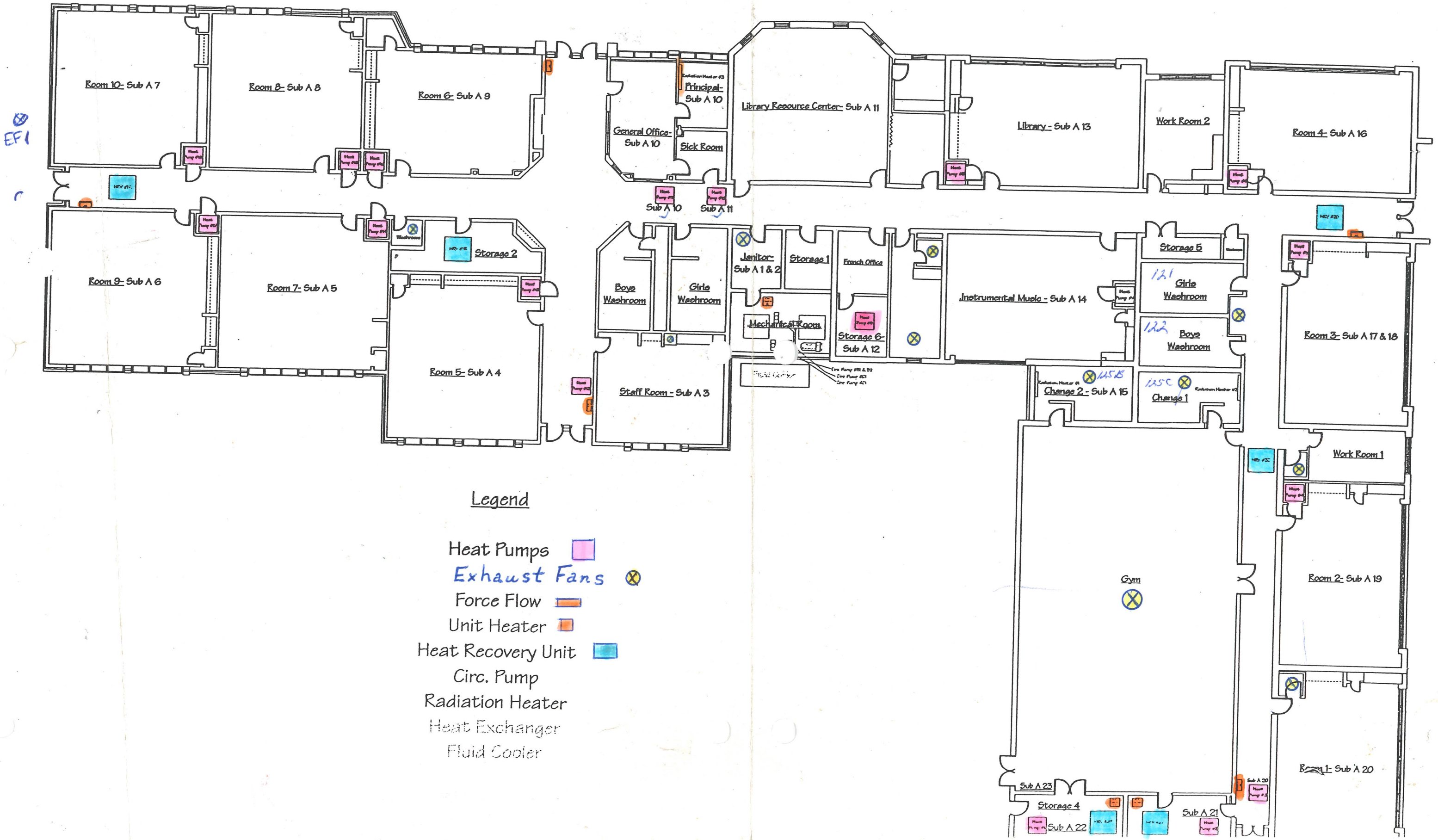


ADDITION
ROOF UNITS



Legend

- Heat Pumps
- Force Flow
- Unit Heater
- Heat Recovery Unit
- Circ. Pump
- Radiation Heater
- Heat Exchanger
- Fluid Cooler
- ROOF TOP UNITS



Legend

- Heat Pumps
- Exhaust Fans
- Force Flow
- Unit Heater
- Heat Recovery Unit
- Circ. Pump
- Radiation Heater
- Heat Exchanger
- Fluid Cooler

1 General

1.1 **DESCRIPTION**

1.1.1 Conform to the requirements of Section 15001, “Mechanical General Provisions”.

1.1.2 Perform commissioning of the complete Building Control System (BCS), including every device, input and output. A Commissioning Agent (CA) will be engaged by the General Contractor to verify commissioning has been performed in accordance with the requirements of this Section.

1.1.3 Attend all commissioning meetings and perform all commissioning responsibilities assigned by the CA at those meetings.

2 Products

2.1 **TEST EQUIPMENT**

2.1.1 Provide all test equipment necessary to fulfill testing and calibration requirements of this Division. Provide two-way radios for use by CA during commissioning, if required.

3 Execution

3.1 **SUBMITTALS**

3.1.1 Provide two copies of Record Drawings and Shop Drawings for the CA's review and use. Inform CA of any differences between actual systems and systems described in Shop Drawings. On one of the Record Drawing sets, mark the locations of network panels and interconnecting wiring. Indicate wiring types on Drawings.

3.2 **TEST PROCEDURES**

3.2.1 A test form or checklist will be provided by the CA for each Mechanical and Electrical equipment item controlled or monitored by the BCS. Prior to commissioning, test and calibrate all control devices, inputs and outputs, verify correct operation of devices and controls sequences, and complete test forms. Use a skilled technician who is familiar with the building to perform this work. Submit test forms to the CA for review.

3.2.2 Test forms will generally include the following:

- Calibration of all inputs and devices
- Check of points list stored in each panel
- Operational check of all valves and dampers
- Check that all specified sequences are set up, debugged and fully operable
- Check of battery backup and power-up after power failure restart functions
- Check of trending and graphing features
- Check of global commands features
- Check of schedules and alarms
- Synchronization of workstation and field panel clock settings
- Check of field panel functionality using portable workstation
- Check that all graphic screens and value readouts are completed
- Check of setpoint changing features and functions

- Check of night setback, morning warmup operation
- Check of communications to remote sites
- Check of fire alarm interlocks
- Check of optimum start/stop and sequential equipment staging/alternating

3.2.3 Prior to testing, ensure all wiring connections for all voltages are properly terminated, ensure all wiring is properly identified, and ensure all wiring requirements of Section 15900, “Controls”, are met.

3.3 **COMMISSIONING**

3.3.1 When the CA is satisfied the testing is complete, commissioning will be scheduled. Commissioning will consist of verification of operation of all points, sequences and features, witnessed and directed by the CA and the Owner's representative. Commissioning to be performed by the same technician who performed the testing described in Clause 3.2.

3.3.2 Allow a minimum of five days for assisting CA during commissioning. This does not include time spent in verification and testing described in Clause 3.2 above.

END OF SECTION

1 General

1.1 **GENERAL PROVISIONS**

1.1.1 This Section and Division 1 - General Requirements apply to and govern the work of all Sections of Division 16.

1.2 **VISITING SITE**

1.2.1 Visit the site and be familiar with working conditions and work involved before submitting Bids. **NO EXTRAS WILL BE GRANTED DUE TO LACK OF A THOROUGH PRELIMINARY INVESTIGATION.**

1.2.2 Remove and replace existing ceiling tiles to inspect ceiling for existing Mechanical, Electrical and Structural obstructions. Include cost of all necessary changes in Bid Price. No extras will be granted due to lack of a thorough preliminary investigation of accessible ceiling spaces.

1.2.3 Contractors visiting for site investigation must sign in at the main office. Upon arrival, review and sign the on-site Designated Substances Report prior to site investigation.

1.3 **CONTRACT DRAWINGS**

1.3.1 Electrical Drawings show Electrical work only and are not intended to show Structural details, Mechanical details or Architectural features. Take building dimensions and details from Architectural or Structural Drawings or from job measurements only.

1.3.2 Electrical Drawings indicate only the general locations of equipment and outlets. Wiring requirements are shown diagrammatically. Responsibility for the detailed layout of equipment, outlets, raceways and wiring is part of the work of this Division. Specific outlet locations are detailed on elevations.

1.3.3 If shown, only the general location and route of conduit, cable trays and communication hooks are shown. Install all services neatly to conserve headroom. All conduit, cable trays and communication hooks are to be accessible after work by other trades is complete. Install all services parallel to building lines unless shown otherwise.

1.3.4 The Consultant reserves the right to revise the locations of equipment and outlets within any given room without altering the Contract Price provided Notice of Change is given prior to roughing-in.

1.3.5 In case of conflict between work of other trades and work of this Division, clarify the location of these items with the Consultant before roughing-in.

1.3.6 In the event of any discrepancies or ambiguity of any symbol, note, abbreviation, etc., used in this Specification or on the Contract Drawings, obtain clarification, in writing, from the Consultant prior to submitting Bid. No allowance will be made for additional costs arising from failure to obtain proper clarification of conflicting information before Bid.

1.3.7 All dimensions and sizes are in SI units, Generally units are in millimetres. All exceptions to this are noted.

CONDUIT SIZES

Imperial (Inches)	½	¾	1	1-¼	1-½	2	2-½	3	3-½	4	4-½	5	6
S.I. (metric) (mm)	16	21	27	35	41	53	63	78	91	103	116	129	155

1.4 **SHOP DRAWINGS**

1.4.1 Submit Manufacturers' Shop Drawings, Electrical Wiring Diagrams and Control System Drawings to the Consultant. Provide title sheet for Shop Drawing submitted. Include project name, Shop Drawing item (including Specification paragraph reference) and approval stamps. The Consultant reserves the right to have samples submitted of any specified products.

1.4.2 Before submitting shop drawings, provide a complete list of shop drawings to be submitted in Microsoft Excel format. List all shop drawings and approximate date of submission.

1.4.3 Submit all shop drawings electronically in Adobe® Acrobat® PDF format. File attachments to an email must total no more than 5 MB and must be submitted unzipped. If multiple items are submitted in single PDF file, each individual piece of equipment must be “book marked” using equipment labels as per Design Drawings. All shop drawings submitted electronically must be checked and stamped by Contractor as specified below.

1.4.4 Catalogues, manuals or price lists will not be accepted as Shop Drawings. Before submission, check Shop Drawings, make necessary corrections, apply stamp “Checked and Certified Correct”, sign and date.

1.4.5 Submit one reviewed set of Shop Drawings with each set of Maintenance and Operating Instructions.

1.4.6 The review of Shop Drawings by Chorley + Bisset Ltd. is for the sole purpose of ascertaining conformance with the general design concept. This review does not mean that Chorley + Bisset Ltd. approves the detail design inherent in the Shop Drawings, responsibility for which remains with the Contractor. Such review does not relieve the Contractor of his responsibility for errors or omissions in the Shop Drawings or of his responsibility for meeting all requirements of the Construction and Contract Documents. The Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation, and for coordination of the work of all subtrades.

1.4.7 The Contractor is to review each shop drawing and document the differences between the shop drawing submission and the description listed in the specification. If there are no differences listed, the Contractor implicitly declares the shop drawing meets all requirements of the Specification.

1.4.8 Ensure at least one copy of the reviewed Shop Drawings is kept on site at all times for reference.

1.4.9 Prepare all Drawings in SI units.

1.4.10 Shop Drawings to include the following:

1.4.10.1 Indicate details of construction, dimensions, capacities, weight and electrical performance characteristics of equipment or material.

1.4.10.2 Where applicable, include wiring, single line and schematic diagram including interconnect with work of other sections.

1.4.10.3 Include manufacturer's special installation instructions where applicable.

1.5 FIELD DRAWINGS

1.5.1 Submit, to the General Contractor, Drawings accurately showing all openings for busducts, conduits, etc. Drawings must include the size of openings and their locations by dimensions, including the location of the structural members framing these openings. Each trade will be responsible for detail layout of their own work.

1.5.2 Assume full responsibility for the detailed coordination of all Division 16 work. Prepare Field Drawings to determine the exact location of each service. On these drawings, include all mechanical and electrical services, architectural features, and structural details. If a conflict becomes apparent after the installation of services, pay all costs associated with removing and reinstalling these services.

1.5.3 If the General Contractor separates the Communication, Security or similar work from the other work of Division 16, the General Contractor assumes full responsibility for this coordination work including the preparation of the Field Drawings.

1.6 AS-BUILT DRAWINGS

1.6.1 The Contractor will be provided with Mechanical and Electrical Files used to produce the contract documents. The following digital formats were used and are to be maintained: AutoCAD and PDF. The Contractor is to print Drawings from the PDF files provided.

1.6.2 Revise and maintain the prints as work progresses. Show all revisions, relocations and changes, to scale. Use colour markings.

1.6.3 Contractor shall take as-built measurements, prior to backfill, of all buried ductbanks and conduits under floor slab. Show routing, depths and dimensions from fixed points on as-built drawings.

1.6.4 Transfer information from the marked prints to AutoCAD files on a monthly basis to match the software that version the original files were created in.. Have the marked prints and updated CAD prints on site for review by the Consultant at all times. Monthly draws will not be approved unless all changes have been shown.

1.6.5 Prior to testing, balancing and final commissioning, complete the transfer of marked prints to the AutoCAD files. Fill in the Owner's equipment numbering system in the Schedules on the Drawings and on the plans where blank placeholder tags have been shown.

1.6.5.1 AutoCAD format files are to match exactly the layering system and symbology of the Consultant. Bind all external references.

1.6.6 Mark Drawings "As-Built Drawings" and insert name and logo of Contractor. Submit one set of printed "As-Built Drawings" for review by the Consultant. Remove Engineers Stamp. Include Contractors name and Logo.

1.6.7 Submit completed As Built Drawings on disks in same digital data software program, and version as original contract documents. Also provide one set of Drawings with the Operating and Maintenance Manuals.

1.6.8 For the purposes of Contract payments, As Built Drawings will be assumed to have a value of $500.00. This will not be released until As Built Drawings have been accepted as complete and acceptable by the Consultant. This amount is in addition to the normal 10% holdback required by the Construction Lien Act, 2018.

1.7 SIMULTANEOUS PROJECTS

1.7.1 Other projects may be under construction simultaneously on this site during the course of this construction project. The Owner will not be the "constructor" as defined by The Ontario Health & Safety Act & Regulations. This Contractor is to maintain a separation between this project and all other Contractors, by time or space, as defined by The Ontario Health & Safety Act & Regulations.

1.8 CONFLICTS AND PRECEDENCE

1.8.1 Immediately upon discovery of any conflict, ambiguity, error or omission in the Contract Documents, request clarification in writing from Consultant prior to starting the work in questions.

1.8.2 Failure to give such written notice will constitute an irrevocable waiver and release of any claim for additional compensation or delays incurred.

1.8.3 Where work fails to conform to Contract Documents, as clarified by Consultant, promptly remove and replace such work as directed, without adjustment to Contract price.

1.9 FIRESTOPPING

1.9.1 Before starting any work on site, submit detailed Shop Drawings to the Consultant for review and comments. Include:

1.9.1.1 Manufacturer's technical product data and installation instructions for each specific type and location of penetration.

1.9.1.2 Certification that proposed firestopping materials and assemblies comply with CAN4-115-M.

1.9.1.3 For each specific type and location of penetration, provide installation instructions from a recognized independent testing agency.

1.9.2 Mark penetration types and locations on set of white prints. At completion of project, transfer this information to As Built Drawings.

1.9.3 Comply with all requirements of Ontario Building Code Clause 3.1.9, “Building Services in Fire Separations and Fire Rating Assemblies”.

1.10 **MAINTENANCE AND OPERATING INSTRUCTIONS**

1.10.1 For the Electrical Division 16 work only, assemble three sets of equipment literature (cuts), operating instructions, maintenance instructions, voltage test results, certificate, other pertinent data and Letter of Warranty. Place in three ring binders, complete with index pages, indexing tabs and cover identification at front and side. Submit to Consultant for approval.

1.10.2 Make changes or submit additional information as required to obtain approval. Final Certificate of Completion will not be issued until the Consultant possesses approved sets. Include copies of reviewed Shop Drawings and name and address of Spare Parts' Suppliers with manuals.

1.10.3 Provide two electronic copies of the maintenance and operating manual in Adobe Acrobat PDF format on a USB Drive and submit with the final version of manuals. Electronic copy of manual to be provided as one file formatted with bookmarks in accordance with the sections of the hard copy manuals. Do not include separate files in sub folders. Divide the maintenance manuals into sections which correspond with Specification Sections.

1.10.4 The following information is to be contained within the Sections:

1.10.4.1 **Section 1:** A list of names, addresses and telephone numbers of the Consultants, General Contractor and Electrical Contractor. Written warranty of the Electrical systems.

1.10.4.2 **Section 2:** Electrical Safety Authority Inspection Permit, Fire Alarm Verification Report and Certificate, Emergency Lighting Verification Letter.

1.10.4.3 **Remaining Sections - By Specification Section**

1.10.4.3.1 A list of names, addresses and telephone numbers of all suppliers. A copy of all reviewed Shop Drawings.

1.10.4.3.2 A complete and comprehensive maintenance and operating instructions details D (daily), W (weekly), M (monthly), SA (semi-annually), A (annually) for maintenance.

1.10.4.3.3 Copies of warranties.

1.10.4.3.4 Complete control diagrams, wiring diagrams and description of applicable control systems and the functioning of the system.

1.11 REGULATIONS AND PERMITS

1.11.1 Carry out the work in accordance with the latest editions of relevant codes, local bylaws, and requirements of local Authority Having Jurisdiction. Apply for and obtain permits and pay all fees. Consultant will submit Drawings to Electrical Safety Authority if required.

1.11.2 Enforce all prevailing Provincial and local safety regulations at all times. Abide by all St Clair Catholic District School Board safety and security policies and procedures and conform to all regulations of the current Occupational Health & Safety Act.

1.11.3 After completion of the work, furnish to Consultant a Certificate of Unconditional Approval from Inspecting Authorities.

1.12 MATERIAL AND EQUIPMENT

1.12.1 Where an item of material or any equipment is specifically identified by a manufacturer's trade name and/or catalogue number, make no substitution except as provided for in paragraphs 3, 4 and 5 below.

1.12.2 In the case of some items of equipment, one or more additional names of acceptable equal manufacturers are listed in the Clause describing an item or a group of items. The design, layout, space allocation, connection details, etc., are based on the products named first in the description of each item. The products named first in the description of each item establish the quality of manufacture and design standards for all other manufacturers of that item. The general approval indicated by listing the names of other manufacturers is subject to final review of Shop Drawings, performance data, test reports, production samples (if required) by Consultant, and equipment shipped to site. Ensure that the products used meet the requirements specified and as shown on the Contract Drawings.

1.12.3 Suppliers wishing to submit other items of equipment for approval as an equal to those specified must apply to the Consultant at least 8 working days before Bid closing date. Requests must be accompanied by complete description and technical data on the items proposed. Approval for substitution of equipment will only be given on the understanding that all details, accessories, features and performance meet the Specifications unless otherwise stated. Deviations from the Specifications must be stated in writing at time of application for approval.

1.12.4 Include in the Bid, the equipment named in the Specifications or approved as an equal as in paragraph 3 above. This will form the Base Bid. Any number of alternative bids, as defined below, may be included in addition to the Base Bid.

1.12.5 Items of equipment by Manufacturers not named in the Specifications may be offered as alternatives to the manufacturers named in the Specifications. The alternative proposals must be accompanied by full descriptive and technical data, together with the statement of amount of addition or deduction from the Base Bid, if the alternative is accepted. Prior approval by the Consultant is not required on items submitted as alternative bids.

1.12.6 After execution of the Contract, substitution of equipment will be considered only if equipment accepted cannot be delivered in time to complete the work in proper sequence, or if the manufacturer has stopped production of the accepted item. In such cases, requests for substitution must be accompanied by proof of equality and

difference in price and delivery, in the form of Certified Quotations from Suppliers of both specified and proposed equipment. Credit any decrease in price involved in substitution to the Owner by reduction of the Contract Price. The Contractor will not be reimbursed for any such increase in price.

1.12.7 Where equipment other than the equipment used as a basis for design, layout and space allocation is used, produce and submit revised layouts of equipment, pipes, ducts, etc., in the areas affected. Submit these Drawings with the Shop Drawings. Failure to produce these Drawings is indication by the Contractor that they are not required and the original space allocations are adequate for the substituted equipment.

1.12.8 Name the Subcontractors and Manufacturers in the Bid as indicated in Clause “List of Electrical Subcontractors and Manufacturers”.

1.13 INTERPRETATION OF CONTRACT DOCUMENTS

1.13.1 The decision as to which trade provides required labour or materials rests solely with the Contractor. Extra payments will not be considered based on a difference in interpretation of the Contract Documents as to which trade involved provides materials or labour for specific items of work. The Consultant will not enter into such discussions.

1.14 SITE VISITS

1.14.1 The Electrical Contractor shall have an office representative (not site personnel) at each site meeting and deficiency review. Attendance at these meetings is mandatory.

1.15 PROGRESS DRAWS

1.15.1 Electrical Contractor shall review all supplier and subcontractor draws submitted to their office to ensure they are fair and reasonable for the amount of work completed on site to date prior to submitting to the General Contractor. Electrical Contractor will be responsible for the validity of supplier and subcontractor draw claims.

1.16 WARRANTY

1.16.1 Warranty all workmanship, material and equipment supplied by Division 16 for one year after Substantial Completion except where specifically specified otherwise. Make good damage caused due to defects and workmanship.

1.16.2 Where equipment specified in Sections of Division 16 to have an extended warranty period, e.g. five years, the first year of the warranty period will be governed by the terms and conditions of the warranty in the Contract Documents, and the remaining years of the warranty will be direct from the manufacturer and/or supplier to the Owner. Submit signed and dated copies of the extended warranties to the Consultant before applying for a Certificate of Substantial Performance of the Work.

1.17 DIMENSIONS AND QUANTITIES

1.17.1 Dimensions shown on Drawings are approximate. Verify dimensions by reference to Shop Drawings and field measurement.

1.17.2 Verify equipment access and coordinate with equipment supplier to ensure equipment can be physically transported to installation location. Under no circumstances will any claim be allowed for extra cost to disassemble and/or assemble equipment at the final location which will be considered as part of equipment installation.

1.17.3 Quantities or lengths indicated in any of the Contract Documents are approximate only and will not be held to gauge or limit the work. No adjustment to the Contract Price will be allowed to complete the work.

1.17.4 Provide labour, products and services specified, but not shown on Drawings and vice versa, and all other labour, products and services necessary for completion of the work.

1.17.5 Make any necessary changes or additions to routing of conduit, cables, cable trays, and the like to accommodate structural, mechanical and architectural conditions, without adjustment to Contract price.

1.17.6 Provide work in accordance with the approved Schedule to meet completion date and specified interim Schedules.

1.18 COOPERATION BETWEEN TRADES

1.18.1 Cooperate and coordinate with other trades as required for satisfactory and expeditious completion of work. Take field dimensions relative to work. Fabricate and erect work to suit field dimensions and field conditions. Pay cost of extra work caused by and make up time lost as result of failure to provide necessary cooperation information or items to be fixed to or built-in, in adequate time.

1.19 COOPERATE WITH OWNER'S STAFF

1.19.1 Maintain close cooperation with Owner's staff. The Owner will determine the times during which work may be carried out in certain areas. If the work cannot be completed in the allowed time, the Contractor may be required to clean up the area and finish the work at some future time.

1.19.2 Shutdowns will be scheduled during unoccupied times. Include any overtime wages due to conditions stipulated above in the Bid Price.

1.19.3 Provide seven day's minimum notice, in writing, prior to any interruptions of service or restriction of use of any service.

1.19.4 Provide all phase testing, as required, prior to disconnecting existing and connecting new to avoid damage to equipment.

1.19.5 The Owner's operations must take precedence over Contractors' operations at all times. Interruptions due to noise, drilling, etc., will not be allowed without Owner's prior approval.

1.19.6 Include any overtime wages due to conditions stipulated above in the Bid Price.

1.20 **EXAMINATION OF DAMAGED DEVICES**

1.20.1 Report all damaged, defective and non-functioning devices and equipment shown for reinstallation or relocation to the Consultant prior to removal and storage. All devices and equipment will be assumed to be fully functional unless reported otherwise prior to removal.

1.20.2 Devices and equipment damaged during removal, storage or reinstallation will be replaced at no cost to the Owner.

1.21 **CONSTRUCTION SCHEDULE**

1.21.1 Within one week of Award of Contract, submit to the Consultant a Construction Schedule. Show in the Work Schedule, a complete breakdown of the work of the Contract, together with planned progress dates.

1.21.2 Compare progress of work with the Work Schedule at every job meeting.

1.21.3 Provide a construction schedule with each monthly progress draw, even if there are no revisions. Prior to making any schedule revision dates from original construction schedule, obtain Consultant approval.

2 Products

2.1 **MATERIALS**

2.1.1 Use materials specified herein or approved equal as defined in Clause “Material and Equipment”.

2.2 **SLEEVES**

2.2.1 In general, sleeves are not required through walls or floors except in service room floors and foundation walls.

2.2.2 Use Schedule 40 steel pipe sleeves through concrete structural members, walls and floor slabs. Extend sleeves minimum 1″ AFF and seal pipe to sleeve.

2.2.3 For all conduits passing through foundation walls, use Link-Seal pre-engineered mechanical seals between sleeves and pipes.

2.2.4 For rated separation requiring a FT firestopping rating, use materials in conformance with manufacturer's recommendations.

2.3 **FIRESTOPPING**

2.3.1 Use only service penetration firestop components and assemblies tested in accordance with CAN.ULC S115 “Fire Tests of Firestop Systems” and listed in most recent ULC “List of Equipment and Materials” or by another recognized independent testing and certification agency acceptable to the Consultant.

2.3.2 Pipe sleeves through fire separations requiring a rating are to be installed as per firestopping manufacturer's recommendations, as some firestopping manufacturers do not allow pipe sleeves within their approved system. Confirm pipe sleeve compatibility prior to starting work on site.

2.3.3 The following manufacturers of the above equipment will be considered equal subject to requirements of Clause "Material and Equipment":

3M
Hilti
Tremco

2.4 ACCESS DOORS

2.4.1 Access doors to be flush to edge of frame, concealed continuous hinge with screwdriver operated cam latch. Non fire-rated door construction to be minimum 14 gauge, with 16 gauge frame. Fire-rated door construction to be a minimum 20 gauge insulated door with 16 gauge frame. Insulation thickness to provide required rating.

2.4.2 Size doors to allow adequate operating/maintenance clearance for devices. Doors to be a minimum 600 mm x 600 mm (24″ x 24″) for body entry, and 300 mm x 300 mm (12″ x 12″) for hand entry, unless noted otherwise. Use the following access doors:

Masonry Walls	Acudor UF-5000
Drywall Walls	Acudor DW-5040
Drywall Ceilings	Acudor BP58, match ceiling thickness
Fire-Rated	Acudor FW-5050/FB-5060 to match fire separation
Wet Areas, Operating Rooms	Acudor UF-5000 (stainless)

2.4.3 The following manufacturers of the above equipment will be considered equal subject to requirements of Clause “Material and Equipment”:

Adam
Ancon LeHage
E. H. Price

2.5 SPRINKLER PROOF EQUIPMENT

2.5.1 This building will be fully sprinklered. Use sprinkler proof electrical equipment to prevent the sprinkler system water from entering electrical equipment for all surface mounted equipment.

2.6 IDENTIFICATION NAME LABELS

2.6.1 Provide white lamacoid identification labels with black uppercase lettering, minimum 14 pt Arial or Helvetica typeface, for identification of all MCCs, switchboards, distribution panels, panelboards, transformers and transfer switches.

2.6.2 Submit a complete list of nameplate wording for review by Consultant prior to installation.

2.6.3 Warning plates are to be red with white letters, minimum 14 pt Arial or Helvetica typeface, as indicated on drawings.

2.7 **FLASHING**

2.7.1 For locations with roof penetrations serving a piece of equipment, such as for roof mounted split system condensing units, receptacles, etc, use Portals Plus, Inc. Alumi-Flash system consisting of 330 mm (13″) high, one piece spun aluminum base with deck flange and EPDM rubber cap. Use caps suitable for required number and diameter of service penetrations. Flashing is for Division 15 and 16 use only. Coordinate with Division 15 to minimize the number of flashings required.

2.7.2 The following manufacturers of the above equipment will be considered equal subject to requirements of Clause “Material and Equipment”:

Portals Plus

3 Execution

3.1 **GENERAL**

3.1.1 Instruct and supervise other Sections doing related work.

3.1.2 Supply the measurements of equipment to other Sections to allow for necessary openings to be left in the work of other Sections.

3.1.3 Install conduit, which is to be concealed, neatly and close to building structure so that the necessary furring can be kept as small as possible.

3.1.4 Carry out all work in accordance with the latest regulations of the Ontario Electrical Safety Code and all applicable Municipal, Provincial and Federal Codes and Regulations. In no instance, however, is the standard established by the Drawings and Specifications, to be reduced by any of the Codes referred to above.

3.1.5 Install all ceiling components in direct accordance with reflected ceiling plans.

3.1.6 Electrical Drawings show approximate locations for wall-mounted devices. Clarify exact location and mounting height with Consultant prior to roughing-in.

3.1.7 All serviceable equipment installed on the roof (including receptacles) to be installed minium 3 m (10'-0") from roof edge unless otherwise noted on Drawings.

3.2 **STORAGE OF MATERIALS**

3.2.1 Provide proper weatherproof storage for the protection of materials and equipment on site. Blank off openings in all equipment until required for use. Consultant may require materials which are not properly stored to be discarded and removed from the site.

3.3 **SUPPORTS AND BASES**

3.3.1 Provide structural work required for installation of equipment provided under this Division.

3.3.2 Set all floor-mounted equipment on concrete bases at least 100 mm (4″) high. Size concrete equipment bases to suit the equipment actually supplied and in accordance with the Shop Drawings of such equipment. Do not start concrete work until anchor

bolts and other embedded parts required for the complete installation, as well as Shop Drawings, are available at the site.

3.3.3 Extend existing concrete bases as required for replacement or new equipment. Match existing height.

3.3.4 For new concrete bases or pads on existing floors, first scrape and remove existing floor finish. Scarify existing floor so that new concrete adheres to it. Dowel new pads to new and existing floors.

3.3.5 Provide all brackets and supports required in steel stud walls. All conduits and equipment must be supported on brackets or supports attached to steel studs. Do not support materials or equipment from wall sheathing.

3.3.6 Provide independent support; brackets and unistrut structures where required to install electrical equipment; disconnect switches, splitters, panels, etc:

- in areas where the equipment is located on walls/columns that are not suitable for direct installation.
- When installation away from structural building elements is called for.
- When it is necessary to elevate the electrical equipment to ensure code compliance or ergonomical operator access.

3.3.7 For all supports of suspended or wall hung electrical equipment, provide structural drawings stamped and signed by a structural engineer holding a P.Eng. designation and registered in the Province of Ontario. This engineer is to submit proof of professional liability insurance. Equipment to be supported from the bottom.

3.3.8 Do not mount starters, VFD's, etc. on building equipment.

3.3.9 Do not suspend luminaires greater than 11.3kg (25 lbs), cable tray, conduit racks, etc from metal roof deck. Provide supports as required to suspend from roof joists.

3.3.10 Provide lintels for double-width and adjacent tubs and multiple conduits running in parallel, where located in block and poured walls.

3.4 CONCRETE INSERTS

3.4.1 General

3.4.1.1 Anchors for the support of conduits and equipment from the underside of suspended structural concrete systems may be by cast-in-place inserts placed prior to the pouring of concrete or by the use of inserts placed in holes drilled after the forms are stripped.

3.4.1.2 The safe load capacity of concrete anchors is affected by a number of variables such as specific anchor type, embedment, spacing between individual anchors, edge distances, direction of loading, concrete strength and "prying action". Refer to the manufacturer's recommendations for each specific insert proposed, including any dynamic or vibratory loads.

3.4.1.3 Be responsible for the proper selection and installation of inserts, including number, type, spacing and accurate placement to provide the necessary safe load capacity and satisfactory long term performance.

3.4.2 **Installation of Inserts in Hardened Concrete:**

3.4.2.1 Use inserts placed in pre-drilled holes. Do not use powder driven inserts or self-drilling inserts. Before drilling holes, accurately locate all reinforcing bars in the affected areas using an electro-magnetic locator.

3.4.2.2 Do not drill through or otherwise damage reinforcing bars. If reinforcing is encountered, the inserts must be relocated. Ensure that hole diameter, depth of penetration, spacing, etc., are in strict accordance with the insert manufacturer's recommendations for the specific insert type and load condition.

3.4.2.3 Due to the relatively close spacing of reinforcing bars in the bottom of many of the beams and girders, the preferred location of drilled-in-place anchors in beams and girders is into the sides of these members, rather than upwards into the bottom.

3.4.2.4 Inserts to be zinc plated female concrete anchors. Nylon or plastic anchors are not acceptable.

3.4.3 Concrete screws without anchors are not acceptable.

3.5 **SLEEVES**

3.5.1 **Sleeves Embedded in Concrete**: Except as approved otherwise by the Consultant, install sleeves embedded in concrete in accordance with the following general guidelines:

3.5.1.1 Centre to centre spacing to be not less than 3 diameters of the maximum size adjacent sleeve.

3.5.1.2 Provide additional reinforcing at points of congestion as directed by the Consultant.

3.5.1.3 Sleeves through beams will be permitted only as directed by the Consultant.

3.5.1.4 The reinforcing in beams, slabs and columns must not be displaced from its intended position under any circumstances unless prior written approval is obtained from the Consultant.

3.5.2 Provide sleeves for all conduits which pass through service room floors and foundation walls. Sleeves to extend minimum 1" above finished floor.

3.6 **FIRESTOPPING**

3.6.1 Provide a listed firestop system in accordance with the Ontario Building Code to seal around all conduits, electrical wires and cables, and other similar electrical services which penetrate part of a building assembly required to have a fire resistance rating or a fire separation. Refer to Architectural Drawings and Specifications Section “Firestopping and Smoke Seals” for building assembly and fire separation types and locations.

3.6.2 For all penetrations through fire separations required to have a fire resistance rating, use firestop systems with an F rating not less than the fire resistance rating for the fire separation. This includes the sealing of any sleeves provided for future uses. Provide an FT rating where required by the Ontario Building Code. For all penetrations through a Service Room floor, provide a minimum W rating - Class 1 in addition to the fire resistance rating.

3.6.3 All firestopping must be thoroughly reviewed by the Technical Representative of the systems manufacturer on site before any firestopping is concealed and submit a report of compliance with the rating requirements. Technical Representative to complete 3 destructive tests to confirm compliance with ULC listing, minimum one floor test and one wall test, third test to be Contractor's choice. Contractor to replace fire stopping system after destructive test has been completed. Submit a copy of the report to the Consultant. Report to include as a minimum, confirmation fire stopping shop drawings were used during review, locations where destructive testing was completed, confirmation all fire stopping locations were reviewed and installed systems meet the manufacturer requirements.

3.6.4 Provide instruction wall labels on both sides of wall for all thru-wall penetrations using FlameStopper. Locate adjacent to penetration as required to be visible from standing position.

3.7 CUTTING AND PATCHING

3.7.1 Flash holes through walls and roof to make weatherproof.

3.7.2 Do not cut or drill holes through floors, roof or structural members before obtaining permission from the Consultant.

3.7.3 For penetrations through walls not required to have a fire rating, seal all spaces between pipe or pipe and surrounding wall construction with a fire-rated foam sealant. Use 3M Fire Barrier, Metacaulk, or Dow Fire Stop UL Classified fire rated foam sealants. Do this as the work progresses, to avoid leaving inaccessible holes at completion of the job. For penetrations through parts of the building assembly required to have a fire resistance rating or acting as a fire separation, see Clause "Firestopping" in this Section.

3.7.4 Before drilling holes through floors or roof slabs, accurately locate and note sizes for each required hole. Get approval of Consultant before any cutting is started.

3.7.5 Where conduits are required to pass through existing walls, floors, and roof, cut and patch the necessary openings.

3.7.6 Where recessed electrical equipment is removed or replaced with equipment of a smaller size, patch openings to match existing wall material.

3.7.7 Where wiring devices (switches, receptacles, etc) are removed from drywall walls, remove device box and patch opening to match existing wall.

3.7.8 Where wiring devices (switches, receptacles, etc) are removed from poured concrete or block walls, remove device and provide blank coverplate.

3.7.9 Include the cost of all cutting and patching in the Lump Sum Contract Price for the work of Division 16.

3.7.10 Remove and replace ceiling where necessary to complete the work of this Division unless this work is specifically included in another Division.

3.7.11 All cutting and patching to be done by the trade specializing in the materials to be cut.

3.7.12 For devices to be removed on existing walls, allow for patching wall entirely to match adjacent surfaces. Paint wall as noted in paragraph "Painting" below.

3.7.13 Replace tiles where existing devices removed or allow for patching gypsum ceilings.

3.8 **PAINTING**

3.8.1 Touch up minor damage to finish on equipment supplied with factory applied baked enamel finish. Completely refinish items suffering damage which, in the opinion of the Consultant, is too extensive to be remedied by touchup.

3.8.2 Paint both sides and edges of plywood backboards for electrical and communications equipment before installing equipment. Use one coat fire retardant primer and two coats fire retardant paint.

3.8.3 Paint disconnect switch or breaker for fire alarm and exit light systems in red enamel. Use one coat of primer and one finish coat.

3.8.4 Where walls and/or ceilings are cut and patched for electrical work including the removal of existing devices, paint walls and ceilings to match existing. For walls and ceilings less than 9.3m2 (100 sq ft), paint entire wall. For walls and ceilings larger than 9.3m^2 (100 sq ft), paint area of patch. Painting to be completed by painting contractor.

3.8.5 **Uninsulated Piping, Conduits and Unprimed Metal Surfaces**: Paint with one coat of red Chromate Primer followed by two coats of eggshell enamel. Colour to be selected by the Owner.

3.8.6 Include the cost of all painting in the Lump Sum Contract Price for the work of Divisions 16.

3.9 **ACCESS DOORS**

3.9.1 Supply access doors wherever equipment, junction boxes, life safety devices, etc., are concealed behind walls or inaccessible ceilings. All devices installed requiring periodic maintenance to be made accessible. Doors will be installed by the trade specializing in the materials receiving access doors.

3.10 **IDENTIFICATION**

3.10.1 Colour code control wiring consistently throughout the installation and generally match colour coding of internal wiring of pre-wired components. Match existing colour coding in use on site. Verify with Owner prior to installation.

3.10.2 All branch circuits shall be:

Phase A - red
Phase B - black
Phase C - blue

3.10.3 Identify all disconnects, starters, and other control equipment with lamacoid nameplates indicating the equipment controlled and all panels, transformers, etc identifying equipment name.

3.10.4 Lamacoid labels to be mechanically attached with self-tapping screws or rivets. Lamacoid labels attached using adhesive methods are not acceptable.

3.10.5 Identify the panel and circuit number for each wiring device with self-adhesive label on the coverplate. Use clear tape with black 14 pt Arial or Helvetica typeface. Locate labels for receptacles on front of coverplate and labels for switches on rear of coverplate.

3.10.6 Identify all pull boxes, junction boxes or octagon boxes located in the ceiling cavity with the exact use of the box, including circuits contained within. Felt pen is acceptable.

3.10.7 Provide nameplate identifying equipment type, identification number, service and area served on each panelboard, MCC and transformer. Contractor is to complete a TVDSB Asset Tag Information Form for new and/or replaced piece of equipment. A sample copy of the form is attached in the Appendix. A list of all equipment that require asset tags are listed in the Appendix. The information gathered on these forms is required to be transferred electronically onto TVDSB's Ebase system.

3.10.8 Where equipment is concealed above accessible ceilings, indicate location using coloured-coded marking devices, approved by Consultant, fastened to the ceiling components.

3.11 LOCKS AND KEYS

3.11.1 Where locked panelboards, control panels, terminal cabinets, etc., are specified, use a separate key pattern for each system with all locks in each system common to one key. Provide seven keys of each pattern to the Owner on a 25 mm (1″) key ring. Submit one set of keys with manuals.

3.12 TESTING

3.12.1 All systems must be thoroughly tested before arrangements are made for the final demonstration in the presence of the Owner's staff. Systems to be tested are:

1. N/A

3.12.2 For the following systems, the manufacturer's Testing Representative must be present for the test period and submit a Certificate of Operation to the Consultant:

1. N/A

3.12.3 At the completion of the work, demonstrate operation of all systems to the Owner's representative and the Consultant. Promptly rectify any malfunction found.

3.13 TEMPORARY ELECTRICAL FACILITIES FOR CONSTRUCTION

3.13.1 Temporary electrical power is available at the site. Cooperate with owner for use of this power.

3.13.2 Tie in at one location only, as directed. Distribute temporary power from this location.

3.13.3 Arrange and pay for the cost of inspection of the temporary service.

3.13.4 Notify the monitoring company and Owner each and every time a part of the fire alarm system is shut down and reactivated.

3.13.5 Completely remove all temporary facilities when they are no longer required.

3.13.6 Provide fixed temporary lighting for open areas, stairwells and each enclosed room. In open areas and enclosed rooms use 150W A21 lamps, or equivalent, at spacings not exceeding 7.5m. In staiwells use one 100W A21 lamp, or equivalent, at each landing. Lighting to be on dedicated circuits.

3.13.7 Temporary lighting stipulated in this Section, do not include provisions for higher intensity lighting required for a specific operation (concrete finishing, plastering, etc.). This will be the responsibility of the specific trade requiring the higher intensity.

3.13.8 Provide minimum two 120V 20A GFCI receptacles, on dedicated circuits, per 150 m² construction area.

3.13.9 Temporary power requirements stipulated in this Section, do not include provisions for electric space heating, electric welders, or any other item of equipment which requires either a 3 phase supply or connection to a single phase circuit rated in excess of 20 amperes. Any trade using equipment which falls into above categories is to be responsible for providing additional facilities required for such equipment, including any increased sizing. This Division is responsible to see the connection to the temporary system is safe.

3.13.10 Use non-metallic sheathed cable, Type NMW-10, #12 AWG, manufactured in accordance with CSA Spec. C22.2 No. 38, for all temporary lighting branch circuit wiring.

3.13.11 **Temporary Fire Alarm Devices**

3.13.11.1 Notify the local Fire Department and Owner each and every time a part of the fire alarm system is shut down and reactivated.

3.13.11.2 Provide new temporary hard wired fire alarm detectors, pull stations and notification appliances within the construction area.

3.13.11.2.1 Provide one 135°F rate-of-rise heat detector for every 465 m² (5000 ft²) of floor area.

3.13.11.2.2 Provide smoke detectors in all temporary corridors spaced maximum 10m (30 ft).

3.13.11.2.3 Provide a manual pull station at every exit/entrance to the construction area.

3.13.11.2.4 Provide one surface mounted bell for every 560 m² (6000 ft²) of floor area.

3.13.11.3 Use #14 AWG, AC-90 cable for temporary wiring to devices.

3.13.11.4 Connect devices to dedicated fire alarm zones, grouped on a floor-by-floor basis. Provide zone cards as required to suit existing fire alarm panel.

3.13.11.5 Completely verify temporary fire alarm devices any time temporary devices are added, removed or relocated.

3.13.11.6 Once the permanent fire alarm system is operational completely remove all temporary devices and wiring. Turn devices over to the Owner.

3.14 EQUIPMENT SCHEDULE

3.14.1 Equipment Schedules are as shown on Drawings.

3.14.2 In general, the motor or item numbers shown in the Equipment Schedules coincide with those numbers shown for Mechanical Trades.

3.15 GROUNDING

3.15.1 Ground all components of the Electrical system in accordance with the requirements of Section 10 of the Ontario Electrical Safety Code latest edition and the Inspection Authority.

3.15.2 Provide a separate green ground conductor in all raceways.

3.15.3 Ground secondary neutrals of transformers to building ground conductor.

3.15.4 Where attached to equipment, conduits, cabinets, etc., use suitable approved solderless lugs, compression connectors. No soldered or split bolt type connections are to be used on grounding circuits at any point.

3.15.5 All compression connectors, lugs, etc., used in grounding circuits in any location are to have bolts, nuts, etc., of silicone bronze alloy equal to “Everdur” metal.

3.15.6 Clean all surfaces to which bus or cable are to be bolted, of all paint, rust, etc., and work to a bright, flat surface.

3.15.7 Conduit expansion joints and telescoping sections or metal raceways not thoroughly bonded otherwise, are to be provided with approved bonding jumpers or not less than #8 AWG stranded bare copper.

3.15.8 Provide a separate #14 green ground wire for all isolated ground receptacles.

3.16 START-UP SERVICES

3.16.1 Provide the services of a qualified person to be on call and available to the site within one hour, for 2 weeks after work of this Contract is taken over by the Owner. Assist Owner's staff to become familiar with the system operation.

3.17 MAINTENANCE OF EXISTING SERVICES

3.17.1 Take every precaution to locate and protect existing services so that no interruption occurs. If any existing service is damaged due to the work of this Division, arrange and pay for repair. Bear any costs due to interruption of existing services.

3.17.2 Be responsible for maintaining continuity of existing services, and for programming work so that the Owners can carry out their normal business uninterrupted, with the exception of scheduled shutdowns for connection to or rerouting of existing services, at a time agreed to by the Owners, on weekdays, over weekends or after normal working hours.

3.17.3 Permission from the Owner is required before making any connections to or rerouting of existing services. Give seven days prior notice to the Consultant and Owner.

3.18 PROTECTING AND MAKING GOOD

3.18.1 Be responsible for protection of Owner's property, as well as finished and unfinished work, from damage due to execution of work under this Contract. Repair damage resulting from failure to provide such protection to the satisfaction of the Consultant, at no expense to the Owner.

3.18.2 Attach and fasten fixture and fittings in place in safe, sturdy, secure manner so that they cannot work loose or fall or shift out of position during occupancy of building, as the result of vibrating or other causes in normal use of building.

3.18.3 Coordinate and cooperate with other trades, taking into account existing installations, to assure best arrangement of equipment in available space. For critical locations, prepare interference and installation drawing showing work of various sections as well as existing installations, for approval before commencing work.

3.18.4 All new equipment shall be delivered to site wrapped in plastic and removed only after room is thoroughly cleaned and painted, if applicable. Where existing or new equipment must be operational throughout construction in adjacent spaces, ensure door sweeps are installed and mechanical ventilation systems are fully operational. Provide filters with minimum filtration rate of 10 micron (MERV 5) on all make-up air and supply ducts. Ensure filters are regularly changed to maintain adequate airflow.

3.19 REMOVAL OF EXISTING MATERIAL AND EQUIPMENT

3.19.1 Remove existing material and equipment where shown or specified. Equipment such as Fire Alarm devices, and any other special devices are to be turned over to the Owner. Relocate these items to a designated storage site as directed by Owner. Other material and equipment which is removed becomes the property of the Contractor, and must be immediately removed from the site.

3.20 LOAD BALANCE

3.20.1 Measure phase current to distribution panels and MCCs with normal loads operating at time of acceptance.

3.20.2 Submit, at completion of work, a report listing phase and neutral currents on panelboards, dry-core transformers and motor control centre, operating under normal load. State hour and date on which each load was measured, and voltage at time of test.

3.21 REBATES AND INCENTIVES

3.21.1 Provide all invoices and proof of purchase documentation to Owner as requested for application by Owner for rebates and incentives. All incentives will be paid to the Owner.

3.22 CASH ALLOWANCES

3.22.1 Refer to Section 01020 for cash allowances carried by the General Contractor.

3.22.2 Any amounts in excess of the cash allowances will be paid by the Owner. Return any unused portions of the cash allowances in full to the Owner.

3.23 **DEFICIENCY REVIEW**

3.23.1 The Electrical Contractor shall confirm in writing that the work is complete and ready for inspection. The Consultant will schedule a site visit to review the work and provide a written deficiency list. Once deficiencies have been corrected, the Electrical Contractor shall confirm in writing to the Consultant that all deficiencies have been corrected. The Consultant will schedule a second site visit to review the correction of noted deficiencies. Should any noted deficiencies be found to be still outstanding, the Electrical Contractor shall correct them and again notify the Consultant in writing. Charges to the Electrical Contractor may result from repeat visits after the second visit.

3.23.2 The Electrical Contractor is required to complete all work above ceilings and allow time for deficiency reviews and correction of noted deficiencies in a timely manner in order to accommodate the current Construction Schedule. This includes time for reinspection as required prior to concealing (drywall enclosures, drywall ceilings and acoustic tile ceilings) of any service. The Electrical Contractor will be responsible for uncovering any concealed services for inspection.

3.24 **HOURLY LABOUR RATE**

3.24.1 Hourly labour rate shall be the actual rate paid to the worker as posted by the local Union Agreement plus a burden mark-up of 100% to compensate for contributions, assessments, employment insurance, health insurance, pension plans, WSIB, taxes, vacation pay, travel, parking, welfare, union package and membership dues, supervision, material handling, training, rest periods, down time, breaks, personal hygiene, small tools, clean up time, profit, other benefits paid to the worker and all other costs incurred by the Company including meetings, office time. Travel time to and from the site shall be at no charge to the Owner. For the purpose of electrical work, the journeyman electrician rate will be used for all trades completing any electrical work.

3.25 **LIST OF ELECTRICAL SUBCONTRACTORS AND MANUFACTURERS**

3.25.1 In the Bid documents, name the Subcontractors and Manufacturers for the items listed below. Use only one name for each item. See Clause “Material and Equipment”. Where the name of a manufacturer is not entered on the Bid Form, the Contractor will be required to use the base specified manufacturer.

3.25.2 **Subcontractors**

N/A

3.25.3 **Manufacturers**

Disconnect Switches
Panelboards
Wiring Devices

END OF SECTION

1 General

1.1 **GENERAL REQUIREMENTS**

1.1.1 Conform to the requirements of Section 16001, “Electrical General Provisions”.

1.2 **DESCRIPTION OF SYSTEM**

1.2.1 Provide all new wiring and raceways. Where possible, conceal all wiring and raceways above ceilings, in walls and partitions. See Section 16001, “Electrical General Provisions”.

2 Products

2.1 **MATERIALS**

2.1.1 Use materials specified herein or approved equal as defined in Clause “Material and Equipment”.

2.1.2 All outlet boxes, wiring devices, equipment and accessories must be C.S.A. approved and be designed for the application intended.

2.2 **RACEWAYS**

2.2.1 Use E.M.T. in concealed locations in concrete block walls, drywall partitions and for main and branch circuit wiring above ceiling spaces.

2.2.2 Use minimum 1/2″ (16 mm) conduit for power wiring and 3/4″(21 mm) conduit for motor circuits.

2.2.3 Raceways for motors and equipment are to be dedicated home runs back to source and shall not be grouped with adjacent motors and equipment.

2.2.4 Refer to Section 16700 for communication raceways.

2.2.5 Use set screw steel couplings and connectors. Use raintight steel couplings and connectors complete with "O" rings, in sprinklered buildings.

2.2.6 Use red conduit for Fire Alarm wiring concealed above ceilings, in concrete walls and in mechanical and electrical rooms.

2.2.7 For new devices on existing block or poured concrete walls exposed in finished areas, provide metallic single compartment raceway and appropriate bases.

2.2.8 Use conduit expansion coupling for expansion joint crossing.

2.2.9 Use liquid tight flexible metal conduit for all final connections to motors and other equipment subject to vibration or which has adjustable mountings. Minimum size 1/2″ (16 mm).

2.2.10 Use rigid PVC underground and in concrete floors, unless otherwise noted. Provide marking tape for underground installations in accordance with Ontario Electrical Safety Code.

2.2.11 For exterior above grade installations, use rigid aluminum conduits and fittings. All boxes and conduit bodies shall be die-cast, copper-free aluminum with aluminum covers and neoprene gaskets.

2.2.12 Fasten all raceways with approved supports. Use clamps and all mounting hardware of the same material as the conduit or compatible material to prevent galvanic corrosion.

2.3 CONDUCTORS

2.3.1 Aluminum conductors are NOT permitted on this project.

2.3.2 Use minimum copper #12 AWG RW-90XLPE **stranded** for branch circuiting and receptacle wiring.

2.3.3 Use RWU-90XLPE wire in all below grade locations.

2.3.4 Use minimum size of #14 AWG RW-90XLPE for control wiring.

2.3.5 Type AC-90 cable may be used for final drops (maximum 2 m [6.5′]) to lighting fixtures and devices in accessible ceiling spaces. **DO NOT USE AS MAIN BRANCH WIRING FROM PANELBOARDS OR FOR BRANCH CIRCUIT WIRING (i.e. RECEPTACLES, ETC.).**

2.3.6 For wiring to heating equipment, recessed lighting fixtures or where body of fluorescent fixture is used as raceway, use conductors with high temperature insulation of type approved by Electrical Safety Authority.

2.3.7 Use all wire and cable insulation rated 600 volts minimum unless specified otherwise.

2.4 OUTLET BOXES

2.4.1 Use only masonry approved boxes in concrete and masonry construction.

2.4.2 Use 100 mm (4″) square or utility type boxes for surface-mounted boxes and 100 mm (4″) octagonal boxes for ceiling outlet boxes. Use multi-gang boxes for grouped devices. Use wrap-around covers for utility boxes. Use cast aluminium FS type boxes where surface mounted in finished areas.

2.4.3 Use flush-mounted boxes complete with adjustable ears, extension rings and plate rings as required. Do not use shallow or narrow boxes.

2.4.4 Provide FS type boxes c/w rain tight fittings where surface mounted in service rooms or for any surface boxes in sprinklered buildings not located above ceilings.

2.5 WIRING DEVICES

2.5.1 Use specification grade wiring devices, types and ratings shown on the Drawings.

2.5.2 Switched receptacles to be black. Use red devices for receptacles\switches fed from emergency circuits.

2.5.3 Confirm colour of wiring devices and plates with Consultant prior to ordering.

2.5.4 **Receptacles**

2.5.4.1 125 volt 20 amp white self-testing GFCI Duplex Receptacle (CSA 5-20R) Hubbell Catalogue No. GFST20W

2.5.5 **Cover Plates**

2.5.5.1 In general, use 302 stainless steel face plates for all flush-mounted devices and die-cast face plates for all surface-mounted devices.

2.5.5.2 All receptacles exposed to weather to have die-cast aluminum duplex gasketted spring door in-use covers.

2.5.6 The following manufacturers of the above equipment will be considered as equal subject to requirements of Clause “Material and Equipment”:

Cooper
Hubbell
Leviton
Pass & Seymour

2.6 **DISCONNECT SWITCHES**

2.6.1 Unless specified otherwise, fused or unfused disconnect switches to be conditionally hp rated, heavy duty type with visible break industrial safety switches in general purpose or weatherproof enclosures as required.

2.6.2 For 120V mechanical equipment, provide Hubbell Cat. #HBL1379D disconnect switch with aluminum housing and lockable switch.

2.6.3 For equipment above ceilings such as fans and heat pumps single phase and three phase 30A and below: Hubbell Cat # HBL1372 disconnect switch with aluminum housing or equivalent to be approved by Consultant.

2.6.4 For exterior roof mounted equipment single phase and three phase 30A and below: Hubbell Cat # HBL13R series NEMA 3R disconnect switch with aluminum housing. Or equivalent to be approved by Consultant.

2.6.5 The door to be mechanically interlocked with the operating handle to prevent it from being opened when the switch is in the “ON” position. The handle is to be capable of being padlocked in the “OFF” or “ON” position.

2.6.6 Provide stainless steel bolt and locknut for all exterior disconnect switches to lock disconnect switch in “ON” position.

2.6.7 The following manufacturers of the above equipment will be considered as equal subject to requirements of Clause “Material and Equipment”:

Eaton
Schneider
Siemens

2.7 **OVERCURRENT PROTECTIVE DEVICES - FUSES**

2.7.1 Provide fuses for all fusible equipment in this Contract.

2.7.2 Fuse interrupting rating is to be 200,000 amps RMS symmetrical unless otherwise noted.

2.7.3 Rated as noted on the Drawings, 600 volts AC, fuses will be CSA certified HRCI J/Class J Time Delay with dimensions and current limiting performance in accordance with CSA Specification C22.2 No. 106-05 or UL Standard 198C for Class J fuses. HRCI/JY fuses are not acceptable.

2.7.4 The following manufacturers of the above equipment will be considered as equal subject to requirements of Clause “Materials and Equipment”:

Cooper Bussmann
General Electric Power Controls
Littlefuse
Mersen

3 Execution

3.1 **GENERAL**

3.1.1 Unless shown otherwise, the minimum size of all raceways and conductors to be in accordance with the Ontario Electrical Safety Code.

3.2 **CONDUIT INSTALLATION**

3.2.1 Conceal all conduits except in equipment rooms, unfinished area, and where specifically noted. Flush mount all devices, starters, etc., in finished areas. Install all exposed conduits parallel to building walls and partitions.

3.2.2 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

3.2.3 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.

3.2.4 Run parallel or perpendicular to building lines.

3.2.5 Run conduits in flanged portion of structural steel. Do not pass conduits through structural members except as indicated.

3.2.6 Group conduits wherever possible on suspended surface channels.

3.2.7 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers. Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.

3.2.8 Horizontal runs of conduit will not be permitted in walls unless noted otherwise.

3.2.9 In any case, horizontal runs must be located above level of door or transom frames in area.

3.2.10 Vertical conduits must be supported at each floor slab and at the top and bottom of each riser.

3.2.11 Conduits must be supported from building structure. Provide independent unistrut under obstructions such as ductwork for support as required. Support unistrut from structural members. Do not secure to underside of metal pan roof deck.

3.2.12 Conduit placement should follow the following priority:

- Below grade
- In walls or partitions
- In ceiling cavity
- Exposed

3.2.13 Maintain continuity of ground through all connection points. Use sealer lubricant on all threaded connections embedded in concrete, buried in ground or exposed outdoors.

3.2.14 Leave all conduit systems finished complete with outlet boxes, coverplates, bushings, caps, nylon fish wire, etc. Provide bushings for all sleeves.

3.3 CONDUCTORS

3.3.1 Join #8 AWG and larger conductors with compression connectors properly sized. On #10 AWG and smaller, relaxed wing-nut type connectors may be used. Ideal Industries 451, 452 or 453.

3.3.2 Size conductors for a maximum of 2% voltage drop from the supplying panel to the furthest outlet in the circuit. In calculating voltage drop, use 80% of overcurrent rating or design load where known, whichever is less.

3.3.3 Draw wiring into raceways only after all other work that may cause injury to the wire is completed. Use only wiring lubricants that do not shorten insulation life. Use continuous lengths for feeders to panels and large equipment. Do not splice without permission from Consultant.

3.4 GROUNDING

3.4.1 Ground all components of the Electrical system in accordance with the requirements of Section 10 of the Electrical Safety Code latest edition and the Inspection Authority.

3.4.2 **Provide a separate ground conductor in all raceways.**

3.4.3 Ground secondary neutrals of transformers to building ground conductor.

3.4.4 Where attached to equipment, conduits, cabinets, etc., use suitable approved solderless lugs, compression connectors. No soldered or split bolt type connections are to be used on grounding circuits at any point.

3.4.5 All compression connectors, lugs, etc., used in grounding circuits in any location are to have bolts, nuts, etc., of silicone bronze alloy equal to “Everdur” metal.

3.4.6 Clean all surfaces to which bus or cable are to be bolted, of all paint, rust, etc., and work to a bright, flat surface.

3.4.7 Conduit expansion joints and telescoping sections or metal raceways not thoroughly bonded otherwise, are to be provided with approved bonding jumpers or not less than #8 AWG stranded bare copper.

3.4.8 Provide a separate #14 green ground wire for all outlets connected to a GFCI circuit breaker.

3.5 **OUTLET BOXES**

3.5.1 Support all boxes independently of the conduits running to them. Use flush boxes in areas where concealed conduit is used.

3.5.2 Check the Drawings to ensure that no outlets are roughed-in at inaccessible locations, where built-in furniture, counters, etc., are to be installed. In such locations, install the outlets above and clear of the trim by approximately 100 mm (4″) unless shown otherwise on the Drawings.

3.5.3 **DO NOT INSTALL OUTLET BOXES OF ANY SYSTEM BACK TO BACK**. Offset as necessary to prevent sound transmission between areas.

3.6 **WIRING DEVICES**

3.6.1 Install light switches on lock jamb side of the door as finally hung. Check door swing before roughing-in. Install switches with the “ON” position up. Locate switch as close as practical to door jamb but not closer than 1″. Coordinate location with built-in and Owner supplied equipment and furnishings.

3.6.2 When two or more devices are grouped together, mount under a common coverplate unless shown otherwise.

3.6.3 Mount light switches at height as indicated on Drawings.

3.6.4 Mount duplex receptacles 25 mm (1″) above a countertop backsplash to bottom of device coverplate.

END OF SECTION

1 General

1.1 **GENERAL REQUIREMENTS**

1.1.1 Conform to the requirements of Section 16001, “Electrical General Provisions” and Section 16100, “Basic Materials and Methods”.

1.2 **DESCRIPTION OF WORK**

1.2.1 Provide a switchgear, distribution panelboards as shown on the Drawings.

1.2.2 Provide panelboards and dry type transformers.

1.3 **SPRINKLER SHIELDS**

1.3.1 This building will be fully sprinklered. All surface mounted panels and enclosures will include sprinkler shields. Ensure all conduit and fittings in sprinklered areas meet the requirements outlined in 16001 clause "Sprinkler Proof Equipment"

2 Products

2.1 **MATERIALS**

2.1.1 Use materials specified herein or approved equal.

2.1.2 This building will be fully sprinklered. Use sprinkler proof electrical equipment to prevent the sprinkler system water from entering electrical equipment for all surface mounted equipment.

2.1.3 Unless noted otherwise on the Drawings or in Specifications, user operated devices, display and controls shall be located between 125mm (5") and 1830mm (72") from bottom of floor mounted equipment.

2.2 **DISTRIBUTION EQUIPMENT**

2.2.1 **Distribution and Panelboard Circuit Breakers**

2.2.1.1 Unless noted otherwise on Drawings or panel schedules, circuit breakers are to be moulded case as rated below. Series rated breakers are not acceptable unless stated otherwise on the Drawings (ground fault breakers excluded).

2.2.1.2 Breakers are to be suitable for the panelboards provided. All breakers are to be bolted in place. Plug-in only type are not acceptable.

2.2.1.3 For 250V panelboards, main and branch breakers to be rated minimum 22,000 amperes RMS symmetrical at 208 or 240 volt.

2.2.1.4 All circuit breakers smaller than 400A to be moulded case thermal-magnetic type providing inverse time-current tripping curves. Multi-pole breakers to have common-trip device with single handle.

2.2.1.5 Shunt trip breakers to be 120V AC solenoid type. Electrically held shunt trip breakers are not acceptable.

2.2.1.6 Provide positive locking devices on the handles of breakers serving loads below. Trip units to remain free to function while locked in the ON position.

- N/A

2.2.1.7 Provide quantity of spare breakers as called for on the Panel Schedules or Drawings

2.2.2 The following manufacturers of the above equipment will be considered as equal subject to requirements of Clause “Material and Equipment”:

Eaton
Schneider
Siemens

3 Execution

3.1 **PANELBOARDS**

3.1.1 Provide new typewritten directories for all existing panelboards affected by work.

3.1.2 Contractor to provide updated schedules complete with room numbers. Trace out existing circuits as required.

[

3.1.3 Include room number and description of load for each breaker. For circuits serving mechanical equipment, indicate room number mechanical equipment serves. Coordinate on site with Division 15.

3.2 **ARC FLASH HAZARD WARNING LABELS**

3.2.1 Provide generic shock and arc flash warning labels on all new panelboards, MCC’s and disconnect switches and splitters in accordance with Ontario Electrical Safety Code 2-306.

3.2.2 Label shall be located so that it is clearly visible to persons before examination, adjustment, servicing, or maintenance of equipment. Locate label on the inside door of panelboards.

END OF SECTION

A P P E N D I X ‘A’

Designated Substances Survey/Asbestos Products Re-Assessment

DESIGNATED SUBSTANCES SURVEY

(per Section 30, OHSA)

ASBESTOS PRODUCTS RE-ASSESSMENT

(per Section 8, O.Reg. 278/05)

St. Philip Catholic School

Petrolia, Ontario

Prepared for:

St. Clair Catholic District School Board

1930 Wildwood Drive

Bright's Grove, Ontario

N0N 1C0

September 26, 2019

Project No.: 19-1713

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APPENDICES

1.0 INTRODUCTION

OH Solutions Inc. (OHS) was retained by the St. Clair Catholic District School Board to conduct a re-assessment of the condition of known friable asbestos-containing materials (ACM) and a visual inspection for mould at St. Philip School located at 420 Queen Street in Petrolia, Ontario.

The school is a single storey structure, with a total area of 23,000 square feet. The original building was constructed in 1956. In addition to the investigation for asbestos and mould, the school was evaluated for the presence of any other designated substances.

Under the *Occupational Health & Safety Act* (OSHA), an owner must determine whether any Designated Substances are present at a site and is required to prepare a list of all Designated Substances that are present. These substances may require special handling procedures. The current OHSA regulation lists the following eleven (11) substances as Designated Substances in the workplace: acrylonitrile, arsenic, asbestos, benzene, coke oven emissions, ethylene oxide, isocyanates, lead, mercury, silica and vinyl chloride.

Based on the estimated construction date and the reported use of the building, the review undertaken by OHS targeted asbestos, lead, mercury, and silica which, in our experience, are most likely to be present on-site.

The following report explains our survey methodology and summarizes the hazardous building materials found at the Site.

2.0 SURVEY METHODOLOGY

During this investigation the surveyor inspected the building for construction material suspected of containing asbestos after reviewing previous reports and database information. In addition, the surveyor inspected the building for construction materials suspected of containing other Designated Substances.

Note:

- Repetitive testing was generally not performed. Items, which were visually similar to others tested, were considered to be of like material and were not sampled again. However, due to the variable nature of some products, several samples may have been collected of some materials.

- No destructive testing was performed. The inaccessible spaces within the building were not inspected. This includes areas above plaster or

drywall ceilings (in the absence of access panels) as well as shafts, chases and bulkheads. Similarly, doors, motors and other equipment were not disassembled to determine composition.

- Vinyl sheet flooring and vinyl asbestos tiles have been recorded where observed, but may not be identified where they are present beneath multiple layers of flooring.

There was no access to the roof at the time of the assessment.

2.1 Asbestos

No additional asbestos bulk samples were collected as a part of this re-assessment.

2.2 Other Hazardous Building Materials and Designated Substances

All other hazardous building materials or Designated Substances were identified based on visual assessment and historical usage.

3.0 REGULATORY REQUIREMENTS

"Designated Substance" as defined by the Ontario *Occupational Health & Safety Act* (OHSA) means "a biological, chemical or physical agent or combination thereof prescribed as a Designated Substance to which the exposure of a worker is prohibited, regulated, restricted, limited or controlled." Under Section 30 of the OHSA an owner is required to determine whether any Designated Substances are present at a project site before beginning construction. If any portion of the project is tendered, the person issuing the tenders is required to list the Designated Substances present at the project site. The constructor is then required to ensure that every contractor and sub-contractor receives a copy of the list.

Designated Substances are regulated under Ontario Regulation 490/09, which identifies the occupational exposure limits for these materials. Under Subsection 3(3) of the Regulation, construction projects are excluded from the OELs and most of the other requirements of the Regulation. For this reason, the Ministry of Labour (MOL) has issued regulations and guidelines to cover asbestos, lead and silica on construction.

Ontario Regulation 278/05 classifies all disturbance of asbestos as Type 1, Type 2 or Type 3, each of which is associated with defined work practices. All asbestos material waste is subject to special handling and disposal practices, and must be removed prior to partial or full demolition. Removal of any quantity of asbestos of more than $1m^2$ requires notification of the MOL. Disposal of asbestos waste is

subject to waste management regulations under Ontario Regulation 347/90 as amended to Ontario Regulation 102/07.

The Guidelines: “Silica on Construction Projects” and “Lead on Construction Projects” identify precautions required for various activities that may disturb silica, or lead during construction, renovation or maintenance activities.

The MOL guideline for the control of lead exposures during the removal of lead on construction projects does not include criteria for categorizing lead paint. The Ontario Ministry of Labour (MOL) does not have a standard to state what percentage of lead a material must have to be considered lead-containing. The Environmental Abatement Council of Ontario (EACO) has issued a “Lead Guideline for Construction, Renovation, Maintenance or Repair”. This guideline recommends procedures to protect against lead exposure when concentrations of lead in paint exceed 0.1% by weight, but suggests that finishes with concentrations below 0.1% by weight do not require lead specific precautions provided the material is not disturbed in an aggressive manner (e.g. grinding or sandblasting) and that general dust control is adequate.

There are currently no regulations specifically covering exposure to mould or outlining mould remediation practices. In addition, there are no occupational exposure limits stating acceptable levels of exposure without adverse health effects.

However, Sections 25 and 27 of the Ontario *Occupational Health and Safety Act* states that an employer must take every reasonable precaution to ensure the health and safety of their workers. This includes exposure to moulds.

4.0 RESULTS

4.1 Asbestos-Containing Materials

Asbestos is a general name for several varieties of highly fibrous silicate minerals. Commercially significant types of asbestos include chrysotile, amosite and crocidolite. The fibres are valued for their heat and chemical resistance properties. The combination of fibrous structures, low heat conductivity, high electrical resistance, chemical inertness, strength and flexibility, as well as its effectiveness as a reinforcing or binding agent when combined with cement and/ or plastic, made asbestos popular for widespread industrial use.

One measure of the potential hazard of ACM is its friability. The Ontario Ministry of Labour asbestos regulation defines a friable material as one when dry can be crumbled, pulverized or powdered by hand pressure. The friability of ACM is considered a significant indicator of the ease with which fibres may be released

into the air. Non-friable products with bound asbestos pose no danger of releasing airborne fibres unless cut, broken up or otherwise physically abraded.

The following is a summary of the asbestos-containing or asbestos-suspect materials that were encountered at St. Philip School. A detailed summary of asbestos materials identified in the building are included in Appendix II.

4.1.1 Sprayed Fireproofing

No sprayed fireproofing was encountered in the survey of this facility.

4.1.2 Texture Finishes

No texture finishes was encountered in the survey of this facility.

4.1.3 Acoustic Ceiling Tiles

No asbestos-containing acoustic tiles were encountered in the re-assessment of this facility.

4.1.4 Mechanical Insulation

No friable asbestos-containing mechanical insulation was noted during this re-assessment.

Non-friable asbestos-containing tar was noted on a rain water leader fitting in LOC #7 Corridor. It should be noted that asbestos-containing material may still be present above inaccessible ceiling systems or chases.

4.1.5 Plaster and Drywall

In general, plaster samples were not collected. Due to the sporadic nature of asbestos in plaster, representative sampling would be impractical. All plaster finishes should be considered asbestos suspect.

Drywall compound used in construction prior to 1988 should be considered asbestos-suspect.

4.1.6 Asbestos Cement Sheets

No asbestos cement or “transite” products were encountered in the re-assessment of this facility.

4.1.7 Vinyl Floor Tiles

The vinyl floor tiles in the facility have been assumed to contain asbestos. These products are non-friable, and as such are not expected to release airborne asbestos fibre under normal conditions of building use. If a large quantity of floor tile is to be removed, it may be practical to verify the presence of asbestos at that time.

4.2 Lead

Painted finishes in the building were not sampled. Lead may be present in some finishes within the building.

4.3 Mercury

Mercury is present in thermostats and within fluorescent light tubes located within the building.

4.4 Silica

Common construction sand contains free crystalline silica and is present in concrete products, mortar, brick, etc. These construction products are typically found throughout building structures.

4.5 Acrylonitrile, Benzene, Isocyanates, Arsenic, Ethylene Oxide, Vinyl Chloride and Coke Oven Emissions

Evidence suggesting the presence of acrylonitrile, benzene, isocyanates, arsenic, ethylene oxide, vinyl chloride monomer or coke oven emissions was not observed at St. Philip School.

4.6 Mould

In recent years, contamination of buildings with mould has become a major concern. Mould growth will occur on any water damaged building material. Evidence does exist to support the relationship between exposure to mould in buildings and many health effects.

This re-assessment included the inspection of areas for visible mould growth. In the absence of occupants experiencing symptoms, the inspection for and remediation of visible mould present in the building will be an appropriate response to the issue. Where occupants are experiencing symptoms, in the absence of visible mould growth, some invasive inspection may be necessary to find potential sources of mould. In general this was beyond the scope of this assessment.

Although some evidence of water damage was present, visible mould was not evident in the course of this inspection.Locations where water stained/damaged tiles were identified are outlined in the following table:

Location	Quantity of Water Damaged Material
LOC 02 – Room 805 – Classroom	2 stained ceiling tiles

Location	Quantity of Water Damaged Material
LOC 11 – Room 799 – Boy's Washroom	3 stained ceiling tiles
LOC 15 – Room 817 – Staff Room	1 stained ceiling tile
LOC 16 – Corridor	1 stained ceiling tile
LOC 18 – Room 818 – Classroom	2 stained ceiling tiles
LOC 19 – Room 821 – Meeting Room	1 stained ceiling tile
LOC 21 – LAN Room	1 stained ceiling tile
South Corridor – New Addition	2 stained ceiling tiles
Central Corridor – New Addition	2 stained ceiling tiles
North Corridor – New Addition	11 stained ceiling tiles
Room 122	1 stained ceiling tile
Room 135	1 stained ceiling tile

5.0 RECOMMENDATIONS

The following recommendations are made with respect to the hazardous building materials and Designated Substances noted at St. Philip School:

5.1 Asbestos

5.1.1 Asbestos Management Program

Since asbestos-containing materials were identified at this facility, the building is subject to the requirement for an Asbestos Management Program, as specified under Ontario Regulation 278/05.

5.1.2 Specific Recommendations

5.1.2.1 Mechanical Insulation

Any activity, which will disturb asbestos-containing mechanical tar insulation, is governed by the procedures outlined in Reg. 278/05. Tar insulation may be removed, with manually powered tools, following the Type 1 procedures outlined in Reg. 278/05. .

5.1.2.2 Plaster and Drywall Compound

The sampling of plaster or drywall compound was not performed during this assessment. If any disturbance of these materials is planned, sampling should be performed in advance.

Plaster containing asbestos is considered a friable asbestos product. Any activity, which will disturb asbestos-containing plaster, is governed by the procedures outlined in Reg. 278/05. The disturbance of less than nine square feet of asbestos-containing plaster may be performed as a Type 2 operation, while any greater disturbance requires Type 3 precautions.

Removal of more than 1 square metre (9 square feet), of drywall compound containing asbestos requires Type 2 procedures under Reg. 278/05.

5.1.2.3 Vinyl Floor Tiles

Vinyl floor tiles may be removed, with manually powered tools, following the Type 1 procedures outlined in Reg. 278/05. The use of powered equipment on non-friable asbestos materials, an activity which could result in the release of airborne fibre, must be performed under Type 3 precautions.

5.2 Lead

Although samples were not collected, it should be assumed that lead is present within paint finishes at the site. As a result, the handling or disturbance of painted finishes should be evaluated to help ensure that workers are not adversely affected.

The lead-containing materials in the building will not generate airborne lead dust in the absence of disturbance. However, significant lead dust levels can result when uncontrolled work procedures are used on lead-based materials. The control of dust levels during the demolition of the buildings can be accomplished through proper work practises such as wetting the surface of the materials to reduce overall dust levels and providing workers with washing facilities and proper respiratory protection.

The procedures outlined in the MOL document 'Guideline – Lead on Construction Projects' (2004) should provide an adequate standard for the handling or disturbance of the material.

The disposal of construction waste containing lead is controlled under Ontario Regulation 347, as amended by O. Reg. 102/07, and may be subject to Leachate Criteria (Schedule 4) of this regulation.

5.3 Mercury

The presence of mercury in fluorescent light tubes and thermostats poses minimal risk to occupants or workers provided the equipment is handled properly and the mercury is not allowed to escape. In the event of future renovations, light tubes and thermostat tubes should be removed intact to prevent the mercury vapour from escaping.

It is good management practice to take precautions to prevent mercury vapours from becoming airborne during building demolition. Exposure to airborne mercury is regulated under Ontario Regulation 490/09, Regulation Respecting Mercury - made under the *Occupational Health and Safety Act*. The current TWAEV for mercury vapour is 0.025 mg/m^3 (except alkyl compounds).

Mercury waste must be handled and disposed of according to Ontario Regulation 347, as amended by O. Reg. 102/07, and may be subject to Leachate Criteria (Schedule 4) of this regulation.

5.4 Silica

Disturbance of materials containing silica will occur during demolition of walls and ceilings, saw cutting floor slabs and removal of lay-in acoustic ceiling tiles containing silica and is regulated under Ontario Regulation 490/09. The current TWAEV for amorphous fused silica is 0.1 mg/m^3 and is 0.05 mg/m^3 for crystalline silica (quartz). This can be accomplished through proper work practises such as wetting the surface of the materials to reduce overall dust levels and providing workers with washing facilities and proper respiratory protection.

5.5 Mould

Mould growth on building materials was not observed during this investigation. At this time, no further action is required regarding conditions observed. However water damaged acoustic tiles were observed throughout the school. OHS recommends that this material be removed to reduce the potential for mould growth on the water impacted surface.

Moisture issues are the only factor in the growth of mould that may be controlled by the building operator. Any existing moisture problems in the building must be addressed to prevent or control mould growth. The following general recommendations are made to reduce the potential for future mould growth within the building:

- Promptly respond to any water infiltration, including minor leaks.
- Where HVAC units permit, maintain relative humidity below 60%.
- Maintain caulking at sinks, bathrooms and at exterior locations.

In the event of a flood, remove water by pumping or vacuuming as soon as possible. Drying of construction and finishing materials must begin promptly (in less than 24 hours). It may be practical to remove and dispose of some wetted materials, (e.g. drywall and carpet) in some cases.

6.0 LIMITATIONS AND WARRANTY

OHS has prepared this report for the exclusive use of the Client in evaluating the Site at the time of OHS's assessment. OHS will not be responsible for the use of this report by any third party, or reliance on or any decision to be made based on it without the prior written consent of OHS. OHS accepts no responsibility for damages, if any, by any third party because of decisions or actions based on this report.

The findings and conclusions documented in this report have been prepared for specific application to this project and have been developed in a manner consistent with that level of care and skill normally exercised by qualified professionals currently practising in this area of environmental assessment. No other warranty, expressed or implied, is made.

The findings contained in this report are based upon conditions as they were observed at the time of investigation. No assurance is made regarding changes in conditions subsequent to the time of investigation.

If new information is developed in future work, OHS should be contacted to re-evaluate the conclusions of this report and to provide amendments as required.

Respectfully submitted,

OH Solutions Inc.

Kris Olson, P.Eng.
Senior Project Manager

APPENDIX I

BULK SAMPLING RESULTS

(From Previous Assessments)

PINCHIN
Environmental

Pinchin Environmental

Asbestos Samples Report

Project #: 13256 **Client Name:** St. Clair Catholic District School Board

Building #: 9 **Building Name:** St. Philip School Petrolia **Survey Date:** 09/13/2007

Sample Number	System	Material	Location Number	Has Asbestos	Phase One		Phase Two		Description
					Asb. Type	Result	Asb. Type	Result	
0001	Piping	Parging Cement	5	√	Chrysotile	50-75%	None Detected	NR	Parging cement pipe fittings
0002	Ceiling	Lay-in tiles	8		None Detected	ND	No Result	NR	Lay-in ceiling tiles
0003	Ceiling	Lay-in tiles	9		None Detected	ND	No Result	NR	Lay-in ceiling tiles
0004	Piping	Tar	7	√	Chrysotile	10-25%	None Detected	NR	Tar on rain water leader fittings
0005	Ceiling	Glued-on tiles	15		None Detected	ND	No Result	NR	Stuck-on ceiling tiles
0006	Piping	Caposite	16	√	Amosite	>75%	None Detected	NR	Caposite straight pipe insulation
0007	Piping	Cellulose	16		None Detected	ND	None Detected	NR	Cellulose straight pipe insulation
0008	Ceiling	Lay-in tiles	19		None Detected	ND	No Result	NR	Lay-in ceiling tiles
0009	Ceiling	Lay-in tiles	22		None Detected	ND	No Result	NR	Lay-in ceiling tiles
0010	Ceiling	Lay-in tiles	21		None Detected	ND	No Result	NR	Lay-in ceiling tiles
0013	Ceiling	Plaster	10		None Detected	ND	No Result	NR	Plaster - One layer
0014	Piping	Parging Cement	10	√	Chrysotile	50-75%	None Detected	ND	Parging cement pipe fitting

APPENDIX II

UPDATED ROOM-BY-ROOM ASBESTOS MATERIALS SUMMARY

Asbestos Status Report

(sorted by Building Number)

UPPER(BUILD:BuildingNumber) = 'SC 09'

Registered user: OH Solutions Inc.

Design	Description	Quantity		Cond.	Asbestos type	Access.	Action	Visible	Friable	Sample

Building Number : SC 09 **Building Name :** St. Philip School Petrolia **Survey Date :** 8/24/2017

Level : LOC 01 - First Floor **Room :** 801 - CLASSROOM **Asbestos Present :** No

Ceiling	Non-Asbestos Lay-in Tile									
Duct	Uninsulated									
Floor	Non-Asbestos Vinyl Tile									
Mechanical	Not Found									
Piping	Uninsulated									
Structure	Steel Deck & Joist									
Wall	Masonry									
Wall	Non-Asbestos Drywall Compound									
Wall	Wood									

Comments:

MERCURY THERMOSTAT IS PRESENT AT THIS LOCATION.

Level : LOC 02 - First Floor **Room :** 805 - CLASSROOM **Asbestos Present :** Potentially

Ceiling	Non-Asbestos Lay-in Tile									
Duct	Not Found									
Floor	Non-Asbestos Vinyl Tile									
Floor	Non-Asbestos Vinyl Tile - New									
Floor	Suspect Vinyl Floor Tile	15.0	SF	Good		A	8	No	No	
Mechanical	Not Found									
Piping	Uninsulated									
Structure	Not Found									

Asbestos Status Report

(sorted by Building Number)

UPPER(BUILD:BuildingNumber) = 'SC 09'

Registered user: OH Solutions Inc.

Design	Description	Quantity	Cond.	Asbestos type	Access.	Action	Visible	Friable	Sample
Wall	Masonry								

Comments: Vinyl Floor Tile Assumed to Contain Asbestos

MERCURY THERMOSTAT IS PRESENT AT THIS LOCATION.
Suspect vinyl floor tile in closet.

Level : LOC 03 - First Floor **Room :** 808 - MENTOR / CONFERENCE ROOI **Asbestos Present :** Potentially

Ceiling	Non-Asbestos Cellulose Tile
Ceiling	Non-Asbestos Lay-in Tile
Duct	Inaccessible
Floor	Non-Asbestos Vinyl Tile
Floor	Terrazzo
Mechanical	Inaccessible
Piping	Inaccessible
Structure	Inaccessible
Wall	Masonry
Wall	Non-Asbestos Drywall Compound - New

Comments: No access above ceiling.

Level : LOC 04 - First Floor **Room :** 807 - BOY'S CHANGEROOM **Asbestos Present :** Potentially

Ceiling	Non-Asbestos Lay-in Tile - New
Duct	Not Found
Floor	Non-Asbestos Vinyl Tile
Mechanical	Not Found
Piping	Not Found

Asbestos Status Report

(sorted by Building Number)

UPPER(BUILD:BuildingNumber) = 'SC 09'

Registered user: OH Solutions Inc.

Design	Description	Quantity		Cond.	Asbestos type	Access.	Action	Visible	Friable	Sample
Structure	Wood Deck & Joist									
Wall	Masonry									
Wall	Suspect Drywall Compound	250.0	SF	Good		A	8	Yes	No	

Comments:

Level : LOC 05 - First Floor **Room :** 803 - GYMNASIUM **Asbestos Present :** Potentially

Ceiling	Not Found									
Duct	Uninsulated									
Floor	Rubber									
Mechanical	Not Found									
Piping	Fibreglass Straight Run									
Piping	Poly Vinyl Chloride (PVC)									
Structure	Steel Beam, Deck & Joist									
Wall	Masonry									
Wall	Suspect Drywall Compound	100.0	SF	Good		A	8	Yes	No	

Comments:

Level : LOC 06 - First Floor **Room :** EQUIPMENT STORAGE **Asbestos Present :** No

Ceiling	Not Found									
Duct	Fibreglass									
Floor	Concrete									
Floor	Non-Asbestos Vinyl Tile									
Mechanical	Air Handling Unit									
Piping	Fibreglass									

Asbestos Status Report

(sorted by Building Number)

UPPER(BUILD:BuildingNumber) = 'SC 09'

Registered user: OH Solutions Inc.

Design	Description	Quantity		Cond.	Asbestos type	Access.	Action	Visible	Friable	Sample
Structure	Steel Beam, Deck & Joist									
Wall	Masonry									

Comments:

Level : LOC 07 - First Floor **Room :** CORRIDOR **Asbestos Present :** Yes

Ceiling	Non-Asbestos Drywall Compound									
Ceiling	Non-Asbestos Lay-in Tile									
Duct	Uninsulated									
Floor	Terrazzo									
Mechanical	Not Found									
Mechanical	Not Found									
Piping	Asbestos Tar Fitting	1.0	EA	Good		C	7	No	No	S0004
Piping	Fibreglass Fitting									
Piping	Fibreglass Rain Water Leader									
Piping	Fibreglass Straight Run									
Structure	Steel Beam, Deck & Joist									
Wall	Masonry									

Comments:

Level : LOC 10 - First Floor **Room :** 808 - GIRL'S CHANGEROOM **Asbestos Present :** Potentially

Ceiling	Non-Asbestos Lay-in Tile									
Ceiling	Non-Asbestos Plaster									S0013
Floor	Non-Asbestos Vinyl Tile									
Piping	Fibreglass Fitting									

Asbestos Status Report

(sorted by Building Number)

UPPER(BUILD:BuildingNumber) = 'SC 09'

Registered user: OH Solutions Inc.

Design	Description	Quantity		Cond.	Asbestos type	Access.	Action	Visible	Friable	Sample
Piping	Fibreglass Straight Run									
Structure	Wood Deck & Joist									
Wall	Masonry									
Wall	Suspect Drywall Compound	250.0	SF	Good		A	8	Yes	No	

Comments: Limited access above ceiling.

Level : LOC 11 - First Floor **Room :** 799 - BOY'S WASHROOM **Asbestos Present :** Potentially

Ceiling	Non-Asbestos 1 x 1 Tile
Ceiling	Non-Asbestos Lay-in Tile
Duct	Not Found
Floor	Terrazzo
Mechanical	Not Found
Piping	Fibreglass Fitting
Piping	Fibreglass Straight Run
Piping	Uninsulated
Structure	Wood Deck & Joist
Wall	Masonry

Comments: No access above ceiling.

Level : LOC 12 - First Floor **Room :** 800 - GIRL'S WASHROOM **Asbestos Present :** Potentially

Ceiling	Non-Asbestos 1 x 1 Tile
Ceiling	Non-Asbestos Lay-in Tile
Duct	Inaccessible
Floor	Terrazzo

Asbestos Status Report

(sorted by Building Number)

UPPER(BUILD:BuildingNumber) = 'SC 09'

Registered user: OH Solutions Inc.

Design	Description	Quantity		Cond.	Asbestos type	Access.	Action	Visible	Friable	Sample
Mechanical	Inaccessible									
Piping	Uninsulated									
Structure	Inaccessible									
Wall	Masonry									
Wall	Suspect Drywall Compound	50.0	SF	Good		A	8	Yes	No	

Comments: No access above ceiling.

Level : LOC 13 - First Floor **Room :** 809-813 - OFFICE **Asbestos Present :** Potentially

Ceiling	Non-Asbestos Lay-in Tile									
Duct	Inaccessible									
Floor	Non-Asbestos Vinyl Tile									
Mechanical	Inaccessible									
Piping	Fibreglass Fitting									
Piping	Fibreglass Straight Run									
Piping	Uninsulated									
Structure	Inaccessible									
Wall	Masonry									
Wall	Non-Asbestos Drywall Compound - New									

Comments: No access above ceiling.

Level : LOC 14 - First Floor **Room :** 814 - CLASSROOM **Asbestos Present :** No

Ceiling	Non-Asbestos Drywall Compound - New									
Ceiling	Non-Asbestos Lay-in Tile									

Asbestos Status Report

(sorted by Building Number)

UPPER(BUILD:BuildingNumber) = 'SC 09'

Registered user: OH Solutions Inc.

Design	Description	Quantity		Cond.	Asbestos type	Access.	Action	Visible	Friable	Sample
Duct	Not Found									
Floor	Non-Asbestos Vinyl Tile									
Mechanical	Not Found									
Piping	Uninsulated									
Structure	Not Found									
Wall	Masonry									
Wall	Non-Asbestos Drywall Compound - New									
Wall	Wood									

Comments:

Level : LOC 15 - First Floor **Room :** 817 - STAFF ROOM **Asbestos Present :** Potentially

Ceiling	Non-Asbestos Lay-in Tile									
Duct	Inaccessible									
Floor	Non-Asbestos Vinyl Tile									
Mechanical	Inaccessible									
Piping	Inaccessible									
Structure	Inaccessible									
Wall	Masonry									
Wall	Suspect Drywall Compound	100.0	%	Good		A	8	Yes	No	

Comments: No access above ceiling.

Level : LOC 16 - First Floor **Room :** CORRIDOR **Asbestos Present :** Yes

Ceiling	Non-Asbestos Lay-in Tile									

Asbestos Status Report

(sorted by Building Number)

UPPER(BUILD:BuildingNumber) = 'SC 09'

Registered user: OH Solutions Inc.

Design	Description	Quantity		Cond.	Asbestos type	Access.	Action	Visible	Friable	Sample
Ceiling	Suspect Drywall Compound	50.0	SF	Good		C	8	No	No	
Duct	Inaccessible									
Floor	Terrazzo									
Mechanical	Inaccessible									
Piping	Asbestos Caposite		LF	Good		D	7	No	Yes	S0006
Piping	Asbestos Parging Cement Fittings		EA	Good		D	7	No	Yes	V0001
Piping	Fibreglass Fitting									
Piping	Fibreglass Straight Run									
Piping	Non-Asbestos Cellulose									S0007
Structure	Wood Deck & Joist									
Wall	Masonry									
Wall	Suspect Drywall Compound	25.0	SF	Good		A	8	Yes	No	

Comments:

X = the unknown quantitiy of asbestos-containing materials suspected to be present above ceiling as previously reported in the 1994 survey. No access above second ceiling.

Level : LOC 17 - First Floor **Room :** 819 - CLASSROOM **Asbestos Present :** Potentially

Ceiling	Non-Asbestos Drywall Compound - New
Ceiling	Non-Asbestos Lay-in Tile
Floor	Non-Asbestos Vinyl Flooring - New
Mechanical	Not Found
Piping	Uninsulated
Piping	Uninsulated Rainwater Leader

Asbestos Status Report

(sorted by Building Number)

UPPER(BUILD:BuildingNumber) = 'SC 09'

Registered user: OH Solutions Inc.

Design	Description	Quantity		Cond.	Asbestos type	Access.	Action	Visible	Friable	Sample
Structure	Steel Beam, Deck & Joist									
Wall	Masonry									
Wall	Non-Asbestos Drywall Compound - New									
Wall	Suspect Drywall Compound	50.0	SF	Good		A	8	Yes	No	
Wall	Wood									

Comments:

Renovation

Level : LOC 18 - First Floor **Room :** 818 - CLASSROOM **Asbestos Present :** Potentially

Ceiling	Non-Asbestos Drywall Compound - New									
Ceiling	Non-Asbestos Lay-in Tile									
Ceiling	Suspect Drywall Compound	25.0	SF	Good		C	8	Yes	No	
Duct	Uninsulated									
Floor	Non-Asbestos Vinyl Tile									
Floor	Terrazzo									
Mechanical	Not Found									
Piping	Uninsulated									
Structure	Not Found									
Wall	Masonry									
Wall	Non-Asbestos Drywall Compound - New									
Wall	Suspect Drywall Compound	25.0	SF	Good		A	8	Yes	No	
Wall	Wood									

Asbestos Status Report

(sorted by Building Number)

UPPER(BUILD:BuildingNumber) = 'SC 09'

Registered user: OH Solutions Inc.

Design	Description	Quantity		Cond.	Asbestos type	Access.	Action	Visible	Friable	Sample
Comments:										
	MERCURY THERMOSTAT IS PRESENT AT THIS LOCATION.									
Level : LOC 19 - First Floor		**Room :** 821 - MEETING ROOM				**Asbestos Present :** Potentially				
Ceiling	Non-Asbestos Lay-in Tile									
Duct	Uninsulated									
Floor	Non-Asbestos Vinyl Tile									
Mechanical	Not Found									
Piping	Fibreglass									
Structure	Steel Deck & Joist									
Wall	Masonry									
Wall	Suspect Drywall Compound	100.0	SF	Good		A	8	Yes	No	
Comments:										
	Includes washroom									
Level : LOC 20 - First Floor		**Room :** 825/826 - FRENCH OFFICE / SCIENCE				**Asbestos Present :** Potentially				
Ceiling	Non-Asbestos Lay-in Tile									
Duct	Not Found									
Floor	Carpet									
Mechanical	Not Found									
Piping	Fibreglass Straight Run									
Structure	Steel Deck & Joist									
Wall	Masonry									
Wall	Suspect Drywall Compound	100.0	SF	Good		A	8	Yes	No	

Asbestos Status Report

(sorted by Building Number)

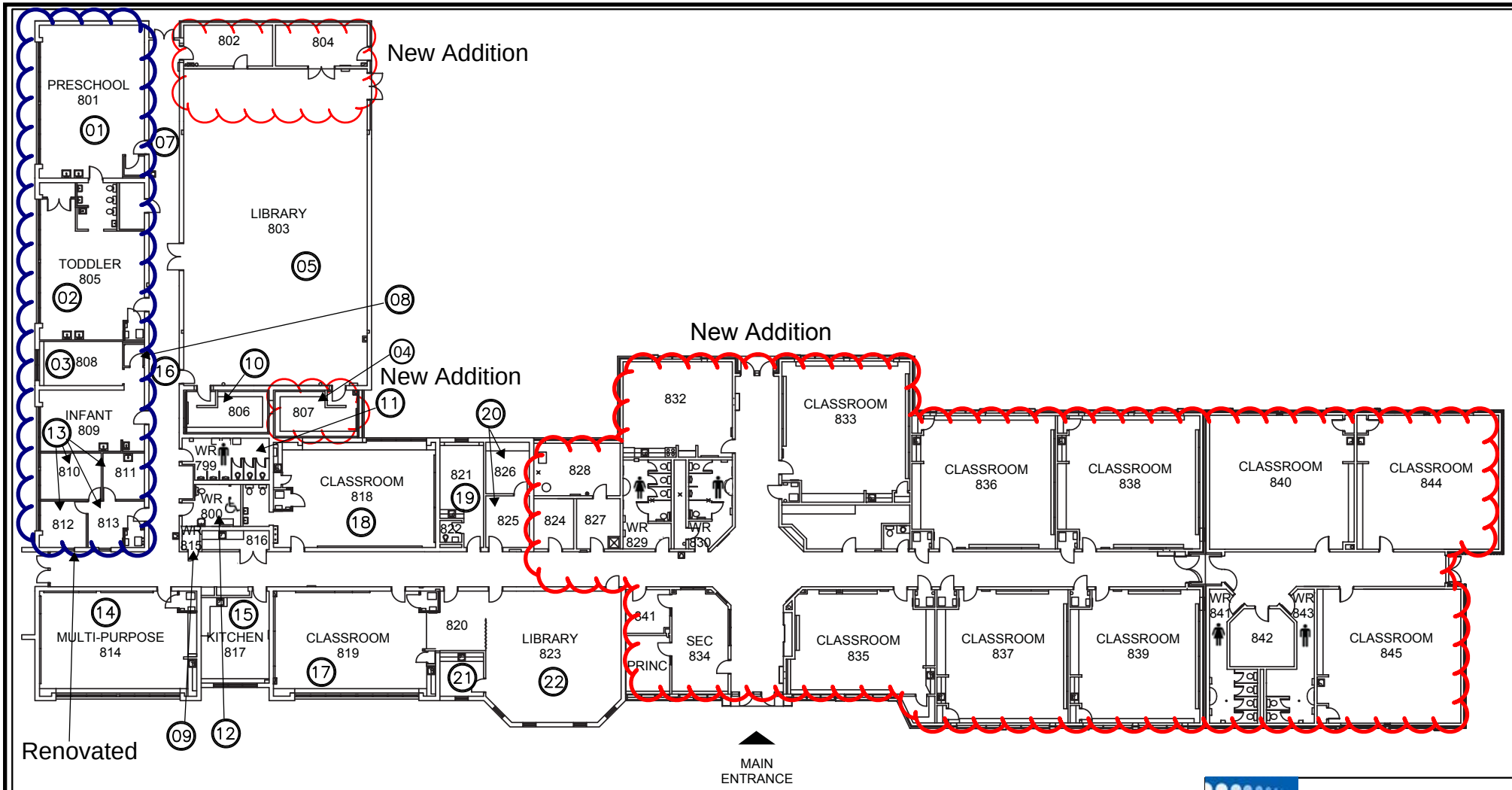
UPPER(BUILD:BuildingNumber) = 'SC 09'

Registered user: OH Solutions Inc.

Design	Description	Quantity		Cond.	Asbestos type	Access.	Action	Visible	Friable	Sample
Comments:										
Level : LOC 21 - First Floor		**Room :** HUB ROOM				**Asbestos Present :** No				
Ceiling	Non-Asbestos Lay-in Tile									
Duct	Uninsulated									
Floor	Non-Asbestos Vinyl Tile									
Mechanical	Not Found									
Piping	Fibreglass									
Structure	Steel Deck & Joist									
Wall	Masonry									
Comments:										
Level : LOC 22 - First Floor		**Room :** 823 - COMPUTER ROOM				**Asbestos Present :** Potentially				
Ceiling	Non-Asbestos Lay-in Tile									
Ceiling	Suspect Drywall Compound	10.0	SF	Good		C	8	Yes	No	
Duct	Uninsulated									
Floor	Carpet									
Mechanical	Not Found									
Piping	Not Found									
Structure	Steel Deck & Joist									
Wall	Masonry									
Wall	Suspect Drywall Compound	50.0	SF	Good		C	8	Yes	No	
Comments:										

APPENDIX III

DRAWINGS OUTLINING INSPECTION LOCATIONS



Occupational Hygiene Solutions
119 Thames Street South
Ingersoll, Ontario
N5C 2T3

St. Clair Catholic School Board

St. Philip School
Petrolia

Main Floor
Survey Locations

Project:	Prepared by:
18-1465	JE
Scale: N.T.S.	Date: Oct 2018

ST. PHILIP CATHOLIC SCHOOL

GYM ROOFTOP UNIT AND CONTROLS

ST. CLAIR CATHOLIC DISTRICT
SCHOOL BOARD

PETROLIA, ONTARIO
ISSUED FOR BID - FEBRUARY 27, 2020

ST. CLAIR CATHOLIC
DISTRICT SCHOOL BOARD
Lighting the Way ~ Rejoicing in Our Journey

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SHAPTON ENGINEERING LTD.

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London, Ontario
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paul@shaptoneng.com

MECHANICAL DRAWINGS

M1	MECHANICAL LEGEND & SCHEDULES
M2	PART FLOOR PLAN - AIR DISTRIBUTION
M3	PART ROOF PLAN - MECHANICAL
M4	PART FLOOR PLAN - HEATING DEMOLITION
M5	PART FLOOR PLAN - AIR DISTRIBUTION DEMOLITION

ELECTRICAL DRAWINGS

E1	ELECTRICAL LEGEND, DRAWING LIST, DETAILS, ABBREVIATIONS AND KEY PLAN

STRUCTURAL DRAWINGS

S1	PARTIAL ROOF FRAMING PLAN. DETAILS AND SECTIONS

C&B Project Number: 8922

PLOTTED SHEET SCALE

6 in 4 in 2 in 0 in 2 in 4 in 6 in

MECHANICAL LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
HWR	HOT WATER HEATING RETURN	NAME(E)	EXISTING PIPING TO BE REMOVED		EXISTING DUCTWORK TO REMAIN		UNIT HEATER	REM. HRV	REMOVE HEAT RECLAIM VENTILATOR
HWS	HOT WATER HEATING SUPPLY		SHUT OFF VALVE		EXISTING DUCTWORK TO BE REMOVED	EX. UH	MECHANICAL EQUIPMENT TAG	REM. EF	REMOVE EXISTING EXHAUST FAN
G	NATURAL GAS	T	THERMOSTAT		NEW DUCTWORK	REM. NP	REMOVE EXISTING HEAT PUMP	RG-1 / 705	- TYPE - AIR QUANTITY (L/S) RETURN GRILLE DESIGNATION
HPWS	HEAT PUMP WATER SUPPLY		FLEXIBLE PIPE CONNECTION		INTERNALLY INSULATED DUCTWORK	BAL. SD	BALANCE EXISTING DIFFUSER		
HPWR	HEAT PUMP WATER RETURN	CO2	CARBON DIOXIDE SENSOR		HEAT PUMP UNIT	EX. WFC	EXISTING WALL FIN CONVECTOR		
NAME(E)	EXISTING PIPING TO REMAIN		CONCENTRIC REDUCER						

PACKAGED ROOFTOP UNIT

DRAWING REFERENCE	MANUFACTURER	MODEL	SUPPLY FAN				COOLING CAPACITY		NATURAL GAS HEATING CAPACITY		ENERGY RECOVERY		ELECTRICAL		ARI SEER	MIN. O.A. [l/s]	REMARKS
			AIR FLOW [l/s]	E.S.P. [Pa]	BHP	RPM	TOTAL [kW]	SENSIBLE [kW]	INPUT [kW]	OUTPUT [kW]	COOLING TOTAL CAPACITY [kW]	HEATING TOTAL CAPACITY [kW]	V/PH/HZ	MCA			
RTU-101	CARRIER	48HCRD11A2A5	1,981	124	1.99	867	32.9	25.7	65.6	53.9	8.2	15.5	208/3/60	66	12.0	280	C/W VIBRATION ISOLATION ROOF CURB

GRILLES, REGISTERS AND DIFFUSERS

DRAWING REFERENCE	MANUFACTURER	MODEL	PANEL SIZE (mm)	NECK SIZE (mm)	AIR VOLUME (L/s)	REMARKS
RG-1	PRICE	96D/S/A/B15	-	900x400	0-851	HEAVY DUTY GYM GRILLE, EXTRUDED ALUMINUM, 20MM BLADE SPACING, 45° DEFLECTION, LONG BLADES, ALUMINUM FINISH

ST. CLAIR CATHOLIC
DISTRICT SCHOOL BOARD
Lighting the Way ~ Rejoicing in Our Journey

No.	By	Revisions	Date
1	JDF	ISSUED FOR OWNER REVIEW	JAN. 28/2020
2	JDF	ISSUED FOR BID	FEB. 27/2020

A DETAIL NO.
B DWG. NO. - WHERE REQUIRED
C DWG. NO. - WHERE DETAILED

LICENCED PROFESSIONAL ENGINEER
J.D. FOSTER
100148736
FEB 27/2020
PROVINCE OF ONTARIO
8922

Chorley + Bisset
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250 CITY CENTRE AVE., SUITE 403
OTTAWA ON, K1R 6K7

Project Title
ST. PHILIP CATHOLIC SCHOOL
GYM ROOFTOP UNIT AND CONTROLS

ST. CLAIR CATHOLIC
DISTRICT SCHOOL
420 Queen St, Petrolia, ON N0N 1R0

Drawing Title
MECHANICAL LEGEND & SCHEDULES

Drawn	Checked	Approved	Drawing No.
BMD	JDF	JDF	M1
Scale	Date	Project No.	Rev. No.
AS NOTED	FEBRUARY 2020	8922	

FILE NAME 8922M001.DWG
DATE SAVED 27-Feb-2020 3:19 PM
DATE PLOTTED 27-Feb-2020 3:19 PM

24x36

PLOTTED SHEET SCALE

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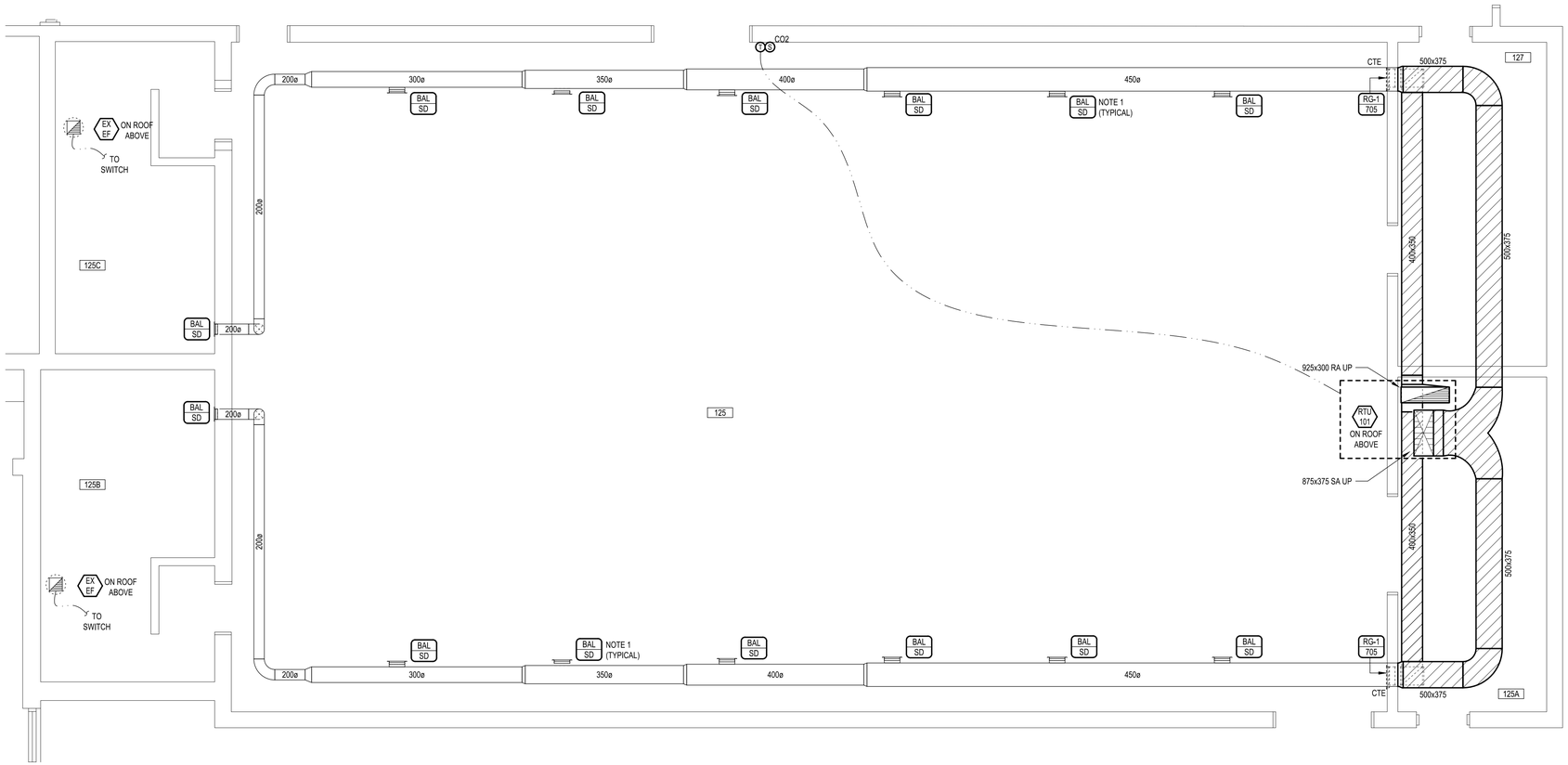


PART FLOOR PLAN AIR DISTRIBUTION

SCALE: 1:50

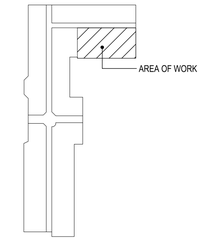
NOTE:

1. BALANCE TO MATCH AIRFLOW PRIOR TO RENOVATION.

FILE NAME: 8922M2000.DWG
DATE SAVED: 28-Feb-2020 1:25 PM
DATE PLOTTED: 27-Feb-2020 3:18 PM

24x36

ST. CLAIR CATHOLIC
DISTRICT SCHOOL BOARD
Lighting the Way ~ Rejoicing in Our Journey



KEY PLAN

No.	By	Revisions	Date
1	JDF	ISSUED FOR OWNER REVIEW	JAN. 28/2020
2	JDF	ISSUED FOR BID	FEB. 27/2020

A DETAIL NO.
B DWG. NO. - WHERE REQUIRED
C DWG. NO. - WHERE DETAILED

LICENCED PROFESSIONAL ENGINEER
J.D. FOSTER
100148736
Feb 27/2020
8922
PROVINCE OF ONTARIO

Chorley + Bisset
CONSULTING ENGINEERS
chorley.com

201 QUEENS AVE., UNIT 800
LONDON ON, N6A 1J1

250 CITY CENTRE AVE., SUITE 403
OTTAWA ON, K1R 6K7

Project Title

ST. PHILIP CATHOLIC SCHOOL
GYM ROOFTOP UNIT AND CONTROLS

ST. CLAIR CATHOLIC DISTRICT SCHOOL
420 Queen St, Petrolia, ON N0N 1R0

Drawing Title

PART FLOOR PLAN
AIR DISTRIBUTION

Drawn	Checked	Approved	Drawing No.
BMD	JDF	JDF	M2
Scale	Date	Project No.	Rev. No.
AS NOTED	FEBRUARY 2020	8922	

PLOTTED SHEET SCALE

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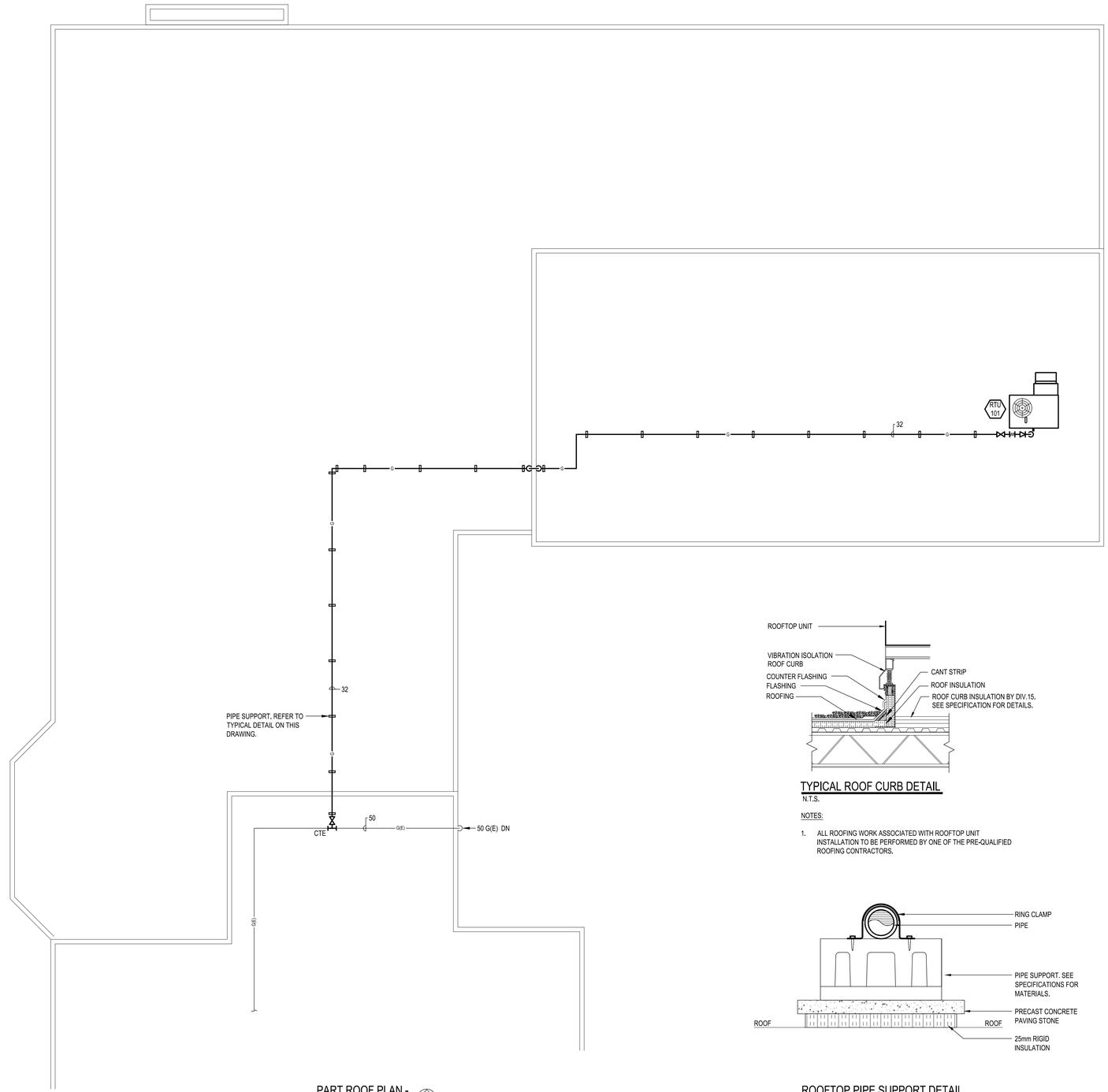

PART ROOF PLAN - MECHANICAL

SCALE: 1:100

TYPICAL ROOF CURB DETAIL

N.T.S.

NOTES:

1. ALL ROOFING WORK ASSOCIATED WITH ROOFTOP UNIT INSTALLATION TO BE PERFORMED BY ONE OF THE PRE-QUALIFIED ROOFING CONTRACTORS.

ROOFTOP PIPE SUPPORT DETAIL

N.T.S.

NOTE:

1. PROVIDE ROOFTOP SUPPORT FOR GAS PIPING AT EACH CHANGE IN DIRECTION AND ON MAX 3M CENTRES.
2. PROVIDE HEIGHT EXTENSION, BLOCK EXTENSION RODS, PIPE ROLLERS, SECURING BRACKET ACCESSORIES AS REQUIRED TO SUIT INSTALLATION.

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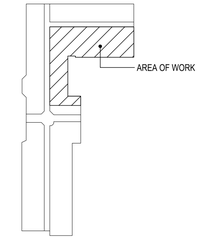

KEY PLAN

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J.D. FOSTER
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Feb 27/2020
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OTTAWA ON, K1R 6K7

Project Title

ST. PHILIP CATHOLIC SCHOOL
GYM ROOFTOP UNIT AND CONTROLS

ST. CLAIR CATHOLIC DISTRICT SCHOOL
420 Queen St, Petrolia, ON N0N 1R0

Drawing Title

PART ROOF PLAN
MECHANICAL

Drawn	Checked	Approved	Drawing No.
BMD	JDF	JDF	M3
Scale	Date	Project No.	Rev. No.
AS NOTED	FEBRUARY 2020	8922	

FILE NAME 8922M00.DWG
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DATE PLOTTED 27-Feb-2020 1:16 PM

24x36

PLOTTED SHEET SCALE

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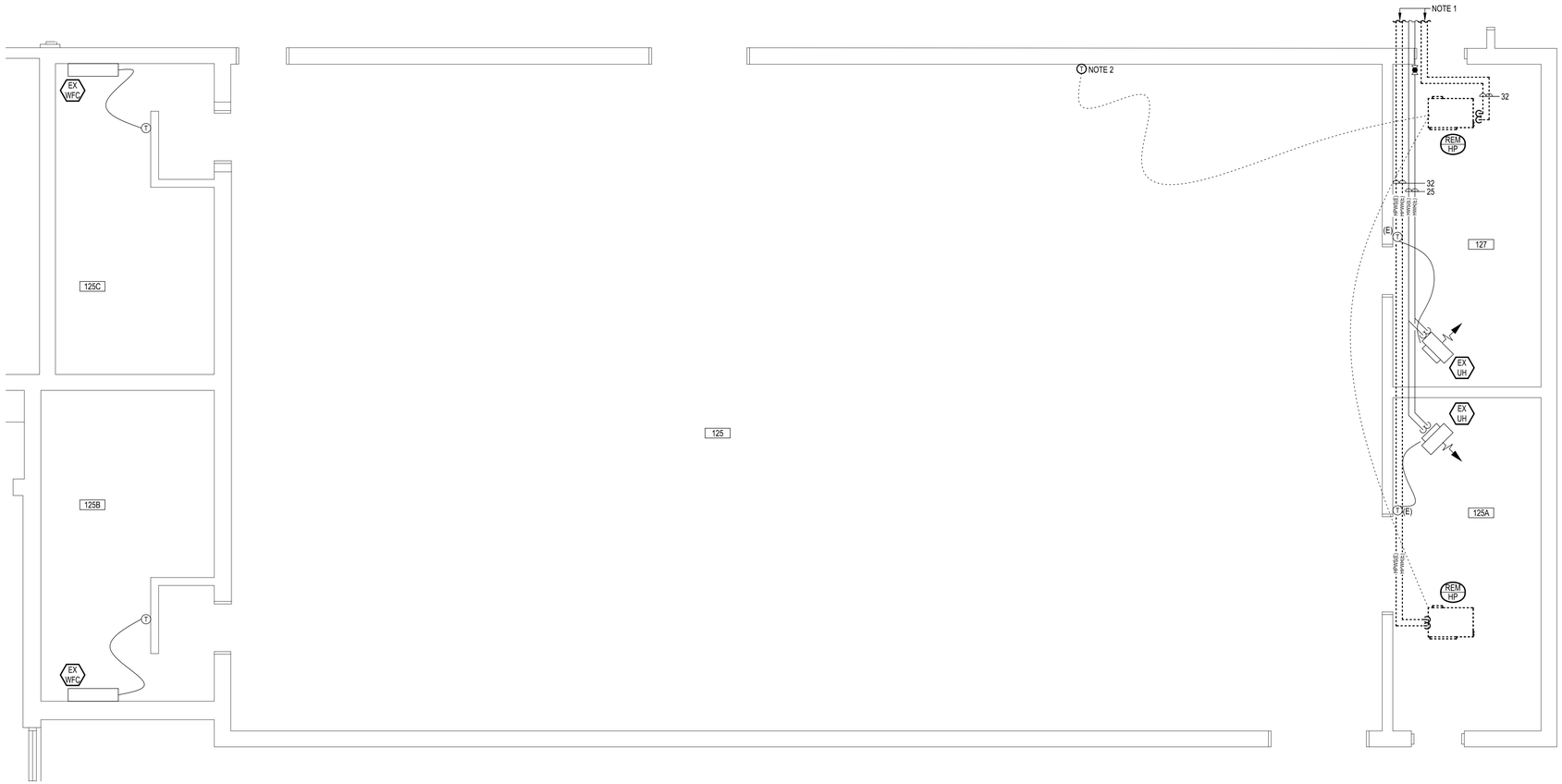

PART FLOOR PLAN HEATING DEMOLITION

SCALE: 1:50

NOTE:

1. REMOVE REDUNDANT HEAT PUMP, CONTROLS AND ALL ASSOCIATED ACCESSORIES. REMOVE PIPING BACK TO MAINS AND CAP.
2. REMOVE EXISTING THERMOSTAT, WIRING / TUBING AND ALL ASSOCIATED ACCESSORIES.

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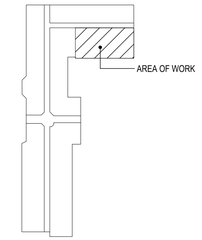

KEY PLAN

No.	By	Revisions	Date
1	JDF	ISSUED FOR OWNER REVIEW	JAN. 28/2020
2	JDF	ISSUED FOR BID	FEB. 27/2020

A DETAIL NO.
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LICENCED PROFESSIONAL ENGINEER
J.D. FOSTER
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OTTAWA ON, K1R 6K7

Project Title
ST. PHILIP CATHOLIC SCHOOL
GYM ROOFTOP UNIT AND CONTROLS

ST. CLAIR CATHOLIC
DISTRICT SCHOOL
420 Queen St, Petrolia, ON N0N 1R0

Drawing Title
PART FLOOR PLAN
HEATING DEMOLITION

Drawn	Checked	Approved	Drawing No.
BMD	JDF	JDF	M4
Scale	Date	Project No.	Rev. No.
AS NOTED	FEBRUARY 2020	8922	

FILE NAME: 8922BMD.DWG
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DATE PLOTTED: 27-Feb-2020 7:17 PM

24x36

PLOTTED SHEET SCALE

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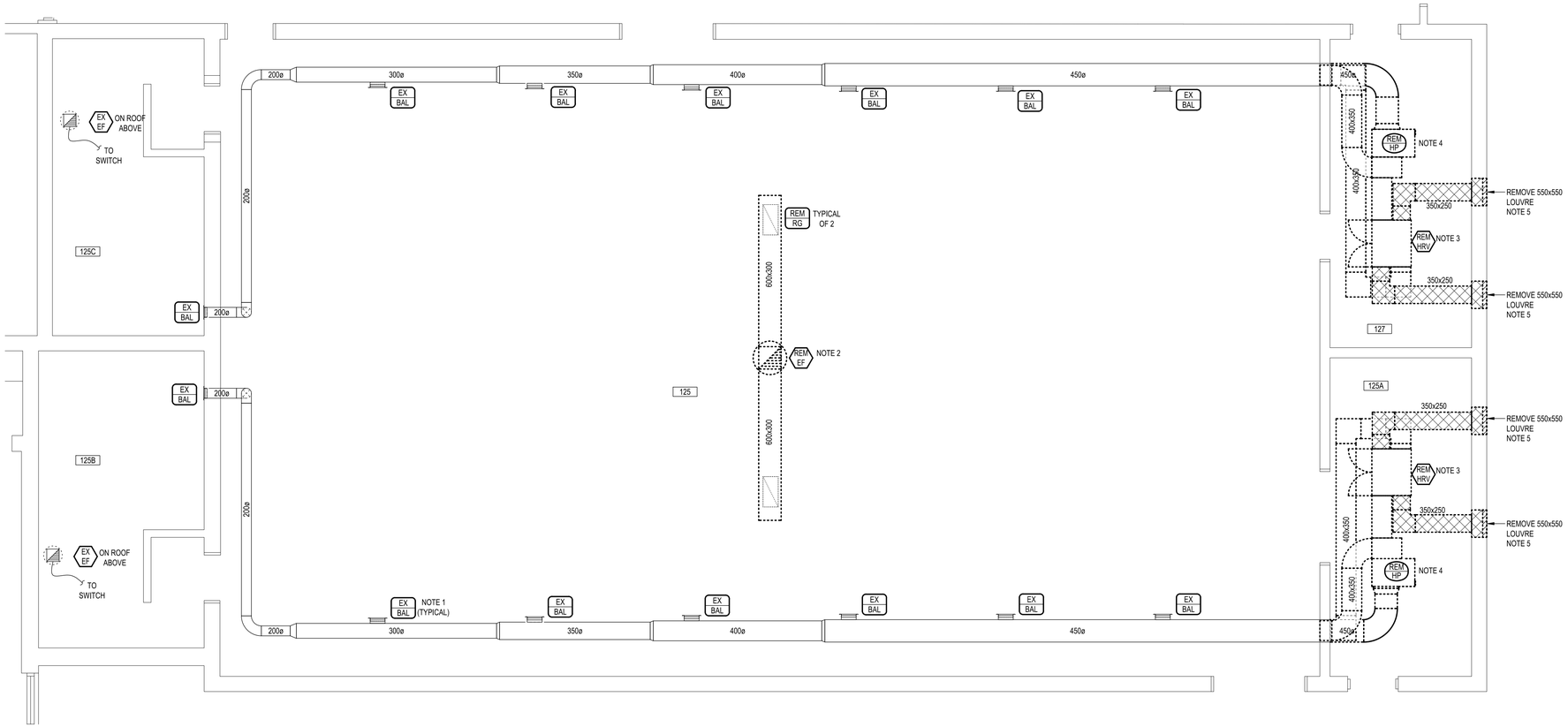

PART FLOOR PLAN
AIR DISTRIBUTION DEMOLITION

SCALE: 1:50

NOTES:

1. MEASURE & RECORD EXISTING AIR FLOW RATES PRIOR TO DEMOLITION.
2. REMOVE EXISTING EXHAUST FAN, CONTROLS, DUCTWORK, GRILLES AND ALL ASSOCIATED ACCESSORIES. REPAIR ROOF OPENING TO MATCH EXISTING CONSTRUCTION.
3. REMOVE EXISTING HRV, CONTROLS, DUCTWORK AND ALL ASSOCIATED ACCESSORIES.
4. REMOVE EXISTING HP, CONTROLS, DUCTWORK AND ALL ASSOCIATED ACCESSORIES.
5. REMOVE EXISTING LOUVRE. REPAIR WALL OPENING TO MATCH EXISTING CONSTRUCTION.

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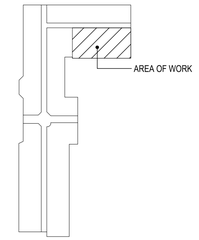

KEY PLAN

No.	By	Revisions	Date
1	JDF	ISSUED FOR OWNER REVIEW	JAN. 28/2020
2	JDF	ISSUED FOR BID	FEB. 27/2020

A DETAIL NO.
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LICENCED PROFESSIONAL ENGINEER
J.D. FOSTER
100148736
FEB 27/2020
8922
PROVINCE OF ONTARIO

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CONSULTING ENGINEERS
chorley.com
201 QUEENS AVE., UNIT 800
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OTTAWA ON, K1R 6K7

Project Title
ST. PHILIP CATHOLIC SCHOOL
GYM ROOFTOP UNIT AND CONTROLS

ST. CLAIR CATHOLIC
DISTRICT SCHOOL
420 Queen St, Petrolia, ON N0N 1R0

Drawing Title
PART FLOOR PLAN
AIR DISTRIBUTION DEMOLITION

Drawn	Checked	Approved	Drawing No.
BMD	JDF	JDF	M5
Scale	Date	Project No.	Rev. No.
AS NOTED	FEBRUARY 2020	8922	

FILE NAME: 8922M5M1.DWG
DATE SAVED: 24-Feb-2020 2:29 PM
DATE PLOTTED: 27-Feb-2020 7:17 PM

PLOTTED SHEET SCALE

6 in 4 in 2 in 0 in 2 in 4 in 6 in

ELECTRICAL LEGEND

SYMBOL	DESCRIPTION	MOUNTING
POWER		
	MOTOR	
	FUSED DISCONNECT SWITCH	
	ELECTRICAL PANEL	
COMMUNICATIONS		
	DATA OUTLET	460mm (18") A.F.F.
	DATA RACK	FLOOR MOUNTED
SECURITY		
SSCP	SECURITY SYSTEM CONTROL PANEL	EXISTING
WIRING AND CONDUIT		
	GENERAL CIRCUIT CONDUIT	

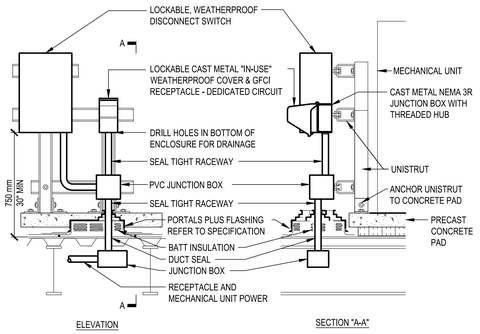
MECHANICAL EQUIPMENT SCHEDULE

ITEM	DESCRIPTION	LOCATION	hp	MCA	PHASE	VOLTS	CONTROL EQUIPMENT SUPPLIED AND INSTALLED BY DIVISION 16 STARTER/CONTROL TYPE	FED FROM	BREAKER SIZE	POLES	CONDUCTOR SIZE	CONDUIT SIZE	NOTES
EQUIPMENT SUPPLIED AND INSTALLED BY DIVISION 15, WIRED BY DIVISION 16													
BOILERS													
RTU-101	ROOF TOP UNIT	ROOF		66	3	208	DS, WP	PANEL C, NOTE 4	70	3	3#4	35mm	

NOTES:
1. DIVISION 16 TO OBTAIN COPIES OF MECHANICAL EQUIPMENT SHOP DRAWINGS AND COORDINATE ELECTRICAL SERVICES.
2. PROVIDE LOCAL NON-FUSED DISCONNECT SWITCHES AT MOTORS IN ACCORDANCE WITH SECTION 28-604 OF THE ONTARIO ELECTRICAL SAFETY CODE.
3. UNLESS INDICATED OTHERWISE ALL CONTROL WIRING IS BY DIVISION 15.
4. PROVIDE NEW BREAKER TO SUIT EXISTING SIEMENS ELECTRICAL PANEL.

MOTOR CONTROL ABBREVIATIONS

DS	UN-FUSED DISCONNECT SWITCH	MCA	MINIMUM CIRCUIT AMPACITY



RECEPTACLE ROOF MOUNTING DETAIL

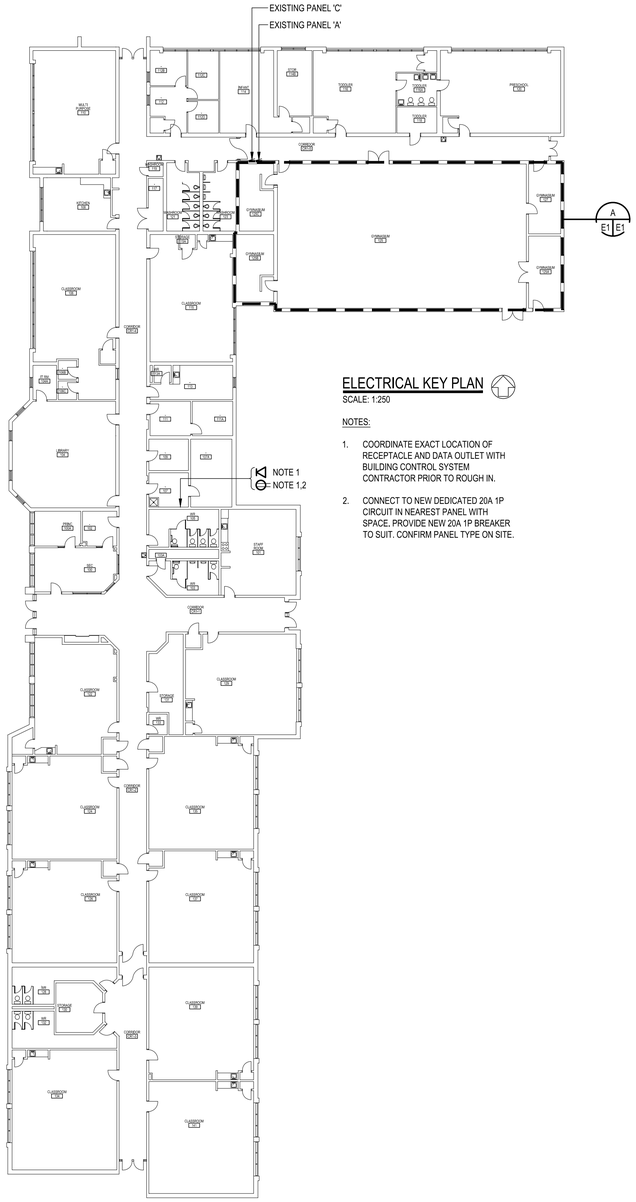
N.T.S.

NOTES:

1. MAINTAIN A MINIMUM CLEARANCE OF 308mm (12") ON ALL SIDES OF ROOF PENETRATION FROM WALLS, CURBS, AND OTHER PROJECTIONS TO FACILITATE PROPER FLASHING.
2. FLANGES OF ADJACENT FLASHINGS SHALL NOT BE CUT OR OVERLAPPED.
3. COORDINATE FLASHINGS INSTALLATION WITH GENERAL CONTRACTOR TO ENSURE PROPER METHODS AND MATERIALS ARE USED TO MAINTAIN ROOF WARRANTY.
4. COORDINATE PRECAST CONCRETE BASE REQUIREMENTS WITH OTHER TRADES.
5. ALL UNISTRUT AND ASSOCIATED MOUNTING HARDWARE TO BE ALUMINIUM.
6. COORDINATE WITH DIVISION 15 FOR SHARED USE OF FLASHING WHERE SPECIFIED AND PRACTICABLE.

ELECTRICAL GENERAL NOTES

1. REMOVE, PROTECT AND REINSTALL IN THE SAME OR NEW LOCATION ON NEW SURFACES ALL EXISTING ELECTRICAL EQUIPMENT THAT WILL BE REUSED. EQUIPMENT IDENTIFIED FOR REUSE THAT IS LOST OR DAMAGED MUST BE REPLACED AT NO COST TO THE OWNER.
2. CONCEAL ALL CONDUITS AND BOXES IN EXISTING WALLS WHERE POSSIBLE. PROVIDE V500/700 SERIES SURFACE RACEWAY FOR NEW DEVICES ON EXISTING WALLS THAT CANNOT HAVE CONCEALED SERVICES. PROVIDE APPROPRIATE SURFACE RACEWAY DEVICE BOXES.

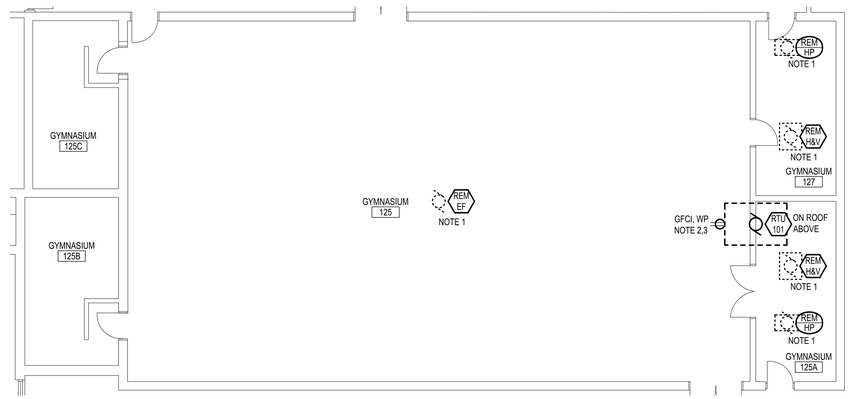


ELECTRICAL KEY PLAN

SCALE: 1:250

NOTES:

1. COORDINATE EXACT LOCATION OF RECEPTACLE AND DATA OUTLET WITH BUILDING CONTROL SYSTEM CONTRACTOR PRIOR TO ROUGH IN.
2. CONNECT TO NEW DEDICATED 20A 1P CIRCUIT IN NEAREST PANEL WITH SPACE, PROVIDE NEW 20A 1P BREAKER TO SUIT. CONFIRM PANEL TYPE ON SITE.



GYMNASIUM DETAIL

SCALE: 1:100

NOTES:

1. DISCONNECT AND MAKE SAFE FOR REMOVAL BY DIVISION 15. REMOVE ALL REDUNDANT STARTERS AND ACCESSORIES AND REMOVE REDUNDANT WIRING AND CONDUIT BACK TO SOURCE.
2. REFER TO RECEPTACLE ROOF MOUNTING DETAIL FOR SERVICE RECEPTACLE MOUNTING REQUIREMENTS.
3. GFCI RECEPTACLE CONNECTED TO STANDARD BREAKER. CONNECT TO NEW 20A 1P CIRCUIT IN PANEL 'C', PROVIDE NEW 20A 1P BREAKER TO SUIT EXISTING SIEMENS ELECTRICAL PANEL.
4. UPDATE ALL PANEL SCHEDULES AFFECTED BY WORK.

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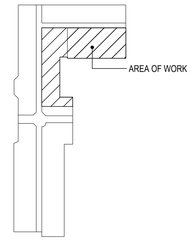

KEY PLAN

No.	By	Revisions	Date
1	JDF	ISSUED FOR OWNER REVIEW	JAN. 28/2020
2	JDF	ISSUED FOR BID	FEB. 27/2020

A DETAIL NO.
B DWG. NO. - WHERE REQUIRED
C DWG. NO. - WHERE DETAILED

LICENSED PROFESSIONAL ENGINEER
Z.J.R. LINDUP
100502103
Feb 27, 2020
PROVINCE OF ONTARIO

Chorley + Bisset
CONSULTING ENGINEERS
chorley.com
201 QUEENS AVE., UNIT 800 LONDON ON, N6A 1J1
250 CITY CENTRE AVE., SUITE 403 OTTAWA ON, K1R 6K7

Project Title
ST. PHILIP CATHOLIC SCHOOL
GYM ROOFTOP UNIT AND CONTROLS

ST. CLAIR CATHOLIC DISTRICT SCHOOL
420 Queen St, Petrolia, ON N0N 1R0

Drawing Title
ELECTRICAL LEGEND, DRAWING LIST, DETAILS, ABBREVIATIONS, KEY PLAN AND FLOOR PLANS - ELECTRICAL

Drawn	Checked	Approved	Drawing No.
ZJRL	ZJRL	ZJRL	E1
Scale	Date	Project No.	Rev. No.
AS NOTED	FEBRUARY 2020	8922	

PLT NAME: 8922E001.DWG
DATE SAVED: 27-Feb-2020 4:27 PM
DATE PLOTTED: 27-Feb-2020 4:32 PM

PLOTTED SHEET SCALE

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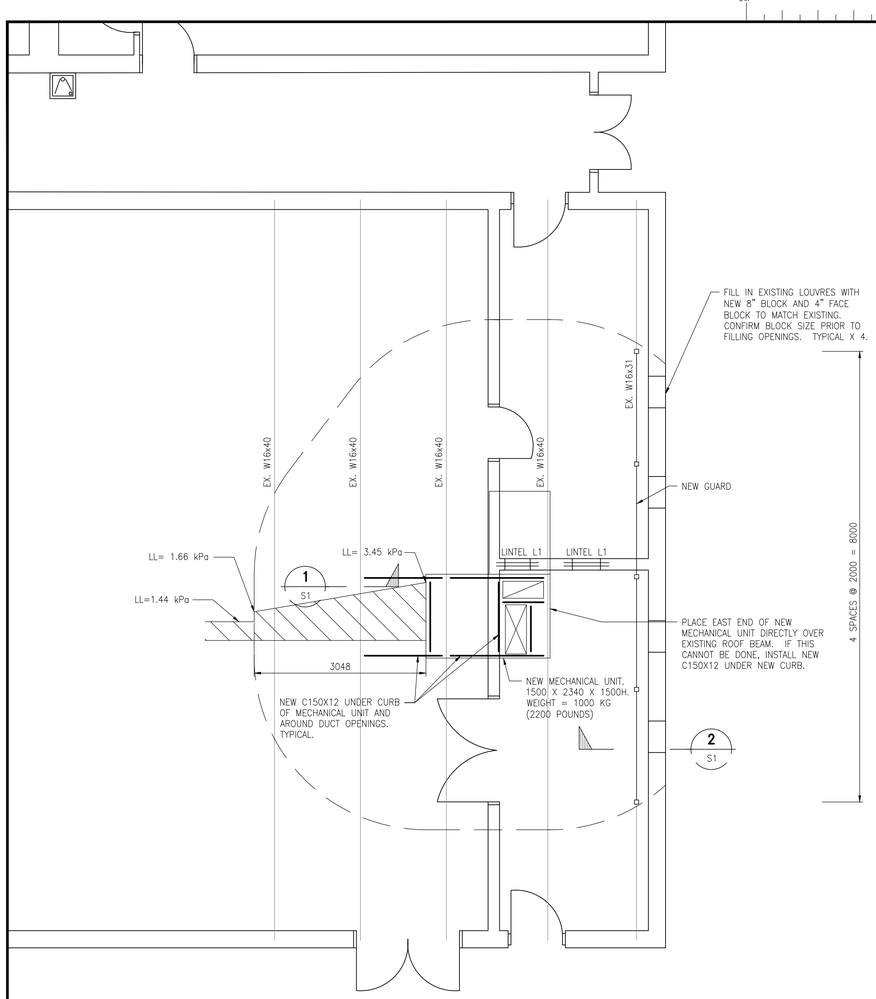


PART ROOF FRAMING PLAN

Scale: 1:50

GENERAL NOTES

ORIGINAL BUILDING ADDITION WAS CONSTRUCTED IN 1999.

1. ORIGINAL ROOF LOADING: LIVE LOAD = 1.44 KPa (30 PSF)
   DEAD LOAD = 1.34 KPa (28 PSF)
2. EXISTING ROOF DECK IS 1 ½" – 22 GA. ACCOUSTIC STEEL DECK.
2. CURRENT ROOF LOADING (IN AREAS OF SNOW–DRIFT AROUND NEW MECHANICAL UNITS ONLY).

   LL= 1.66 kPa (PLUS SNOW DRIFT)

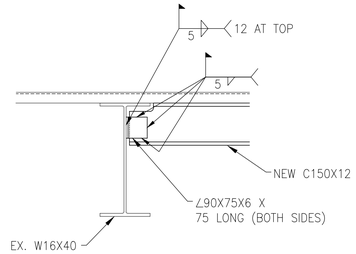
STRUCTURAL STEEL NOTES

1. FABRICATION AND ERECTION OF STRUCTURAL STEEL SHALL BE IN ACCORDANCE WITH CAN/CSA S16–09.
2. ALL STRUCTURAL STEEL WWF AND W SHAPES SHALL CONFORM TO CAN/CSA–G40.21–M04 TYPE 350W EXCEPT AS NOTED.
3. HOLLOW STRUCTURAL STEEL SECTIONS SHALL CONFORM TO CAN/CSA–G40.21–M04 TYPE 350W, CLASS C (UNLESS NOTED AS CLASS H).
4. PLATES, CHANNELS AND ANGLES SHALL CONFORM TO CAN/CSA–G40.21–M04 TYPE 300W UNLESS NOTED OTHERWISE.
5. ALL WELDING SHALL BE DONE BY AN ORGANIZATION FULLY APPROVED BY THE CANADIAN WELDING BUREAU UNDER CSA–W47.1 IN DIVISION ONE OR TWO. WELDING AND WELDING MATERIALS SHALL CONFORM TO CSA–W59–M03.
6. STRUCTURAL STEEL CONTRACTOR TO OBTAIN HOT WORK PERMIT PRIOR TO ANY GRINDING OR WELDING.
7. CONTRACTOR TO PLACE EXHAUST FANS AT EXTERIOR DOORS TO EXHAUST WELDING SMOKE OUTSIDE.
8. STRUCTURAL STEEL CONTRACTOR TO USE WELDING BLANKETS AS REQUIRED TO PROTECT EXISTING FINISHES.
9. PRIME PAINT ALL WELDS AND NEW STEEL TO MATCH EXISTING PAINT.

LINTEL NOTES

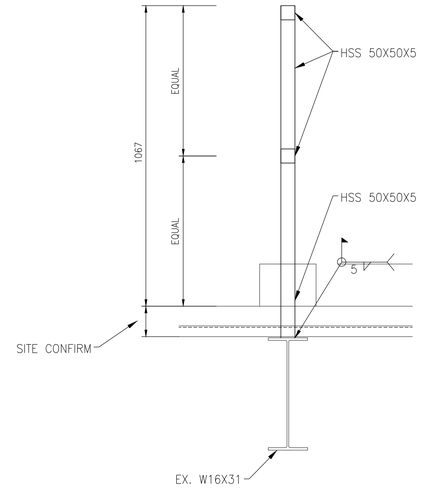
1. PROVIDE 200MM OF SOLID BEARING AT EACH END.
2. PROVIDE NEEDLING AND SHORING OF WALL ABOVE AS REQUIRED TO INSTALL NEW LINTELS.
3. STITCH WELD BACK TO BACK ANGLES
4. PRIME PAINT ANGLES UNLESS NOTED TO BE HOT–DIPPED GALVANIZED (HDG). GALVANIZED ANGLES TO BE HOT–DIPPED GALVANIZED AFTER FABRICATION.
5. THE LINTEL SCHEDULE BELOW IS FOR TENDER PURPOSES ONLY. STRUCTURAL STEEL CONTRACTOR TO CONFIRM NUMBER OF LINTELS, BLOCK SIZE AND LENGTH OF EACH LINTEL REQUIRED PRIOR TO SUBMITTING DRAWINGS TO CONSULTANTS FOR THEIR REVIEW.

LINTEL SCHEDULE			
LINTEL NUMBER	NUMBER REQUIRED	BLOCK WALL	ANGLES
L1	2	8" BLOCK	2∠'s 90x90x6



SECTION 1

Scale: 1:10 — S1



SECTION 2

Scale: 1:10 — S1

ST. CLAIR CATHOLIC DISTRICT SCHOOL BOARD

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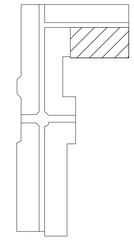

KEY PLAN

No.	By	Revisions	Date
1	SE	ISSUED FOR OWNER REVIEW	01-29-20
2	SE	ISSUED FOR BID	02-27-20

A / B C — A DETAIL NO. / B C DWG. NO. - WHERE REQUIRED / C DWG. NO. - WHERE DETAILED

REGISTERED PROFESSIONAL ENGINEER — P.W. SHAPTON — Feb. 27/20 — PROVINCE OF ONTARIO

SHAPTON ENGINEERING LTD.
9 Shawna Road,
London, Ontario
N5X 3G6
tel (519) 494-7285
paul@shaptoneng.com

Project Title
ST. PHILIP CATHOLIC SCHOOL
GYM ROOFTOP UNIT

ST. CLAIR CATHOLIC DISTRICT SCHOOL
420 Queen St, Petrolia, ON N0N 1R0

Drawing Title
PARTIAL ROOF FRAMING PLAN, DETAILS AND SECTIONS

Drawn	Checked	Approved	Drawing No.
HAV	PWS	PWS	S1
Scale	Date	Project No.	Rev. No.
AS NOTED	DEC. 2019	19-125	

FILE NAME: 19-125.DWG
DATE SAVED: 27-Feb-2020 11:02 AM
DATE PLOTTED: 27-Feb-2020 11:03 AM