



DURHAM DISTRICT SCHOOL BOARD

TENDER T22-13

**TENDER DOCUMENTS
FOR
LIBRARY AND VENTILATION UPGRADES
AT
CLAREMONT PUBLIC SCHOOL**

1675 Central Street
Claremont, ON
L1Y 1A8
Tel: 905-649-2000

CLOSING TIME & DATE:

BEFORE 11:00 A.M., LOCAL TIME – Thursday, March 3, 2022

**NOTE: BID DEPOSIT AND SURETY'S AGREEMENT TO BOND
IS A REQUIREMENT WITH THIS TENDER**

* **MANDATORY SITE MEETING:** **Wednesday, February 23, 2022 at 8:00 a.m.**
At: Claremont Public School

* **(Failure to attend "Mandatory Site Meeting" will result in bidder disqualification).**

NOTE: Contractors visiting the school **MUST** check in with the project manager at the site. Site meeting is **MANDATORY** and will be subject to COVID-19 protocols, **Vaccination protocol** and safety measures. **A Completed Certificate of Compliance must be completed and returned to michelle.chassels@ddsb.ca in our Human Resources Department prior to any site visit.**

[Ontario School Screening Tool - Visitor](#)



**DURHAM DISTRICT SCHOOL BOARD
PURCHASING DEPARTMENT**

TENDER T22-13

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1.0 BID SUBMISSION

1.1 Bid Administration Information

BID DOCUMENT ADMINISTRATION

Kelly Jennings, CSCMP
Senior Procurement Specialist
Durham District School Board
400 Taunton Road East
Whitby, ON L1R 2K6
Tel: (905) 666-6445
Fax: (905) 666-6476
Email: kelly.jennings@ddsb.ca

TECHNICAL SPECIFICATION INQUIRIES

Chris Thaler
Project Supervisor
Facilities Services
400 Taunton Road East
Whitby, ON L1R 2K6
Tel: (905) 666-6924
Fax: (905) 666-6439
Email: chris.thaler@ddsb.ca

Brad Timson, P. Eng.
Durham Energy Specialist Limited
106-209 Dundas Street East
Whitby, ON
L1N 7H8
Tel: 905-430-7151
Fax: 905-430-7154
Email: info@durhamenergy.com

Henry Street High School
Project Name: Ventilation Upgrades
Site Address: 600 Henry Street, Whitby, ON L1N 5C7

T22-13
Issued For: Bid
Date: January 14, 2022

1.2 Stipulated Bid Form

The following price(s) include all costs inclusive of all labour, material, **cash allowances**, overhead, and profit, etc., required to complete the Work as specified in the tender documents attached hereto. The DDSB reserves the right to alter the work on this contract by deducting or adding to the contract, based on unit pricing, where the Durham District School Board deems necessary. Any bid submitted with provision(s) and/ or condition(s) may constitute rejection of the submitted bid.

Stipulated Bid Price (including all applicable Duty, Excise Taxes, Freight, and Insurance)

I/We, the undersigned, having carefully examined the bid documents, having visited and investigated the Site, and examined all conditions, circumstances and limitations affecting the Work, offer to enter into a Contract with the Owner, to perform the Work required by the bid documents for the stipulated price of:

(Enter written value here)

DOLLARS (\$) _____)
(Enter numeric value here)

TOTAL CASH ALLOWANCE: \$45,000.00 to be included in stipulated price

In Canadian funds, **not including HST**. In case of a discrepancy between the written and numeric value stated above, the written tender amount will take precedence over the numeric tender amount.

Submitted to the Purchasing Department, Durham District School Board, 400 Taunton Road East, Whitby, Ontario L1R 2K6.

Name of Signing Officer (PRINT)

Signature

Name of Company

Telephone

Address of Company

e-Mail

Postal Code

Date

Corporate Seal

Having carefully examined the:

GENERAL CONDITIONS

DRAWINGS AND SPECIFICATIONS AND

ADDENDUMS AS ACKNOWLEDGED THROUGH THE BIDDING SYSTEM

and having visited the Project site where applicable; we, the undersigned hereby offer and agree to furnish all labour and material (both temporary and permanent) required to complete all Work outlined in the contract documents provided under the noted project.

In submitting this bid, we recognize the right of Durham District School Board to accept or reject any tender at the submitted price.

We, the bidding Contractor, agree that if this Tender is accepted, we will execute whatever additional or extra work may be required and make any deductions for the said work at the unit price(s) hereinafter set out in this form of Tender, unless the change request stipulates another method of determining the value of a change, in strict conformity in all respects with the requirements of the above Contract Documents.

Specified Start Date: Phase 1 Library Alteration - May 2, 2022
Phase 2 RTU Alteration - July 4, 2022

Specified Substantial Completion: Phase 1 Library Alteration - July 4, 2022
Phase 2 RTU Alteration - August 22, 2022

Total Completion By: Phase 1 Library Alteration - July 11, 2022
Phase 2 RTU Alteration - August 29, 2022

We agree to substantially complete the Work of this Contract within the timeframe specified above.

Yes _____ / No _____ (please indicate).

Contractor to indicate
HARMONIZED SALES TAX REGISTRATION NO. _____

SUPPLEMENTARY BID FORM

Contractors must submit the Supplementary Bid Form, included as 'Specification Section 00400 - Supplementary Bid Form', to Durham Energy Specialist Limited (info@durhamenergy.com) and the DDSB Purchasing Department (kelly.jennings@ddsb.ca) **within 4 (four) hours AFTER** the Tender closing.

Contractors acknowledge that the Form includes a price breakdown, unit rates, and a complete list of all subcontractors and major equipment suppliers we propose to employ on this project, and we recognize that the Form may be considered in the selection of the successful bidder.

2.0 INFORMATION TO BIDDERS

2.1 bidsandtenders Electronic Bid Submission Information

As per the Minister of Education direction, all Ontario School Boards are closed until an undetermined date. Due to the closure, all bid submissions are to be uploaded to bids&tenders effective immediately.

ELECTRONIC BID SUBMISSIONS ONLY shall be received by the Bidding System on the closing date, no later than 11:00:00 a.m. Local time. All Bidders shall have a Bidding System Vendor Account and be registered as a Plan Taker for this Bid opportunity, which will enable the Bidder to download the Bid Call Document, to receive Addenda/Addendum email notifications, download Addenda/Addendum and to submit their Bid electronically through the Bidding System.

The Bidding System will send a confirmation email to the Bidder advising that their Bid was submitted successfully. If you do not receive a confirmation email, contact technical support at Bids&Tenders via email: support@bidsandtenders.ca.

Late Bids shall not be accepted by Durham District School Board's Bidding System. To ensure receipt of the latest information and updates via email regarding this bid or if a Bidder has obtained this Bid Document from a third party, the onus is on the Bidder to create a Bidding System Vendor Account and register as a Plan Taker for the bid opportunity at <https://ddsb.bidsandtenders.ca>.

ADDENDUM/ADDENDA

ALL QUESTIONS & ANSWERS will be posted as an Addendum. All questions should be submitted through the bidding system portal by clicking on the submit question button at <https://ddsb.bidsandtenders.ca>. Bidders shall acknowledge receipt of any addenda when submitting their Bid through the Bidding System. Bidders shall check a box for each addendum/addenda and any applicable attachments that have been issued before a Bidder can submit their Bid Submission online.

Addendum/Addenda will typically be issued through the Bidding System up to five (5) days prior to Closing Date and Time.

In the event an Addendum is issued within five (5) days prior to Closing Date and Time, it may include an extension of the Closing Date and Time. It is the responsibility of the Bidder to have received all Addendum/Addenda that have been issued. Bidders should check online at <https://ddsb.bidsandtenders.ca> prior to submitting their Bid and up until Bid Closing Date and Time in the event additional Addendums are issued.

Durham District School Board encourages Bidders not to submit their Bid prior to five (5) days before the Bid Closing Date and Time, in the event that an Addendum is issued. If a Bidder submits their Bid at any time prior to the Bid Closing and an Addendum/Addenda is issued by Durham District School Board, the Bidding System shall WITHDRAW their Bid Submission and

change the status to INCOMPLETE (NOT accepted by Durham District School Board). The Withdrawn Bid can be viewed and re-submitted by the Bidder in the "MY BIDS" section of the Bidding System.

WITHDRAW/EDIT BIDS

Bidders may edit or withdraw their Bid Submission prior to the Closing Date and Time. However, the Bidder is solely responsible to:

- make any required adjustments to their Bid; and
- acknowledge the Addendum/Addenda; and
- ensure the re-submitted Bid is RECEIVED by the Bidding System no later than 11:00:00 a.m. local time, on the Bid Closing Date.

COMPANY CONTACTS

Additional company contacts are recommended for the reasons outlined below:

You are strongly urged when creating or updating a Bidding System Vendor Account to add additional company contacts to create their own login to the Bidding System. This will permit your invited contacts that have created their own login to manage (register, submit, edit and withdraw) bids which your Company is a Registered Plan Taker for. In the event you are on vacation, or due to illness, etc. these additional contacts may act on your Company's behalf and have the authority to receive addendum notifications from the Bidding System, and where permitted by the terms and conditions of the Bid Call Document, to submit Bids electronically through the Bidding System and/or withdraw and/or edit and/or acknowledge Addendum/Addenda, on your behalf.

Notwithstanding the above, it is recommended that you do not invite any additional contacts that you do not want to have access to view, edit, submit and/or withdraw or who may be in direct competition (for example, a company may have two divisions that could compete for the same Bid Opportunity).

If you are an invited company contact, it is imperative that you create your login from the link contained in the email invitation. Do NOT go directly to <https://ddsb.bidsandtenders.ca> website and create a separate vendor account. Contact support@bidsandtenders.ca for all technical issues.

BID CLOSING DATE AND TIME

All Bidders shall have a Bidding System Vendor Account and be registered as a Plan Taker for this Bid opportunity, which will enable the Bidder to download the Bid Call Document, to receive Addenda/Addendum email notifications, download Addendums and to submit their Bid electronically through the Bidding System.

Bid Submissions shall be received by the Board's Bidding System not later than 11:00:00 a.m. Eastern local time, on the specified Closing Date. The Closing Time shall be determined by the Bidding System web clock.

Bidders are cautioned that the timing of Bid Submission is based on when the Bid is RECEIVED by the Bidding System, not when a Bid is submitted by a Bidder, as Bid transmission can be delayed in an “Internet Traffic Jam” due to file transfer size, transmission speed, and other electronic considerations.

For the above reasons, Durham District School Board recommends that Bidders allow sufficient time to upload their Bid Submission and attachment(s) (if applicable) and to resolve any issues that may arise. The Closing Date and Time shall be determined by the Board’s Bidding System web clock.

Original Bid forms not completed in the prescribed manner may be considered INVALID. It is the sole responsibility of the Bidder to ensure a Bid is delivered on time. Late bids will not be accepted by the Board’s bidding system.

Copies of any pertinent bid deposit and bid surety will need to be included with your bid submission. Durham District School Board may request the originals to be sent in the mail, should your bid be awarded the contract.

Durham District School Board hereby consents to the use of an electronic signature for the signing of all documents requested hereunder. Acceptable forms of electronic signature include, but are not limited to, the typing of the Bidder’s authorized signing Officer’s name or the inclusion of an image of the Bidder’s authorized signing Officer’s signature, so long as the electronic signature is sufficient to identify the Bidder’s authorized signing Officer. The Bidder’s authorized signing Officer agrees that whatever form of electronic signature is provided constitutes a signature for the purposes of executing all documents requested hereunder.

2.2 Bid Deposit

A bid deposit shall be in the form of bank draft, bid bond, certified cheque or money order, payable to the DDSB, in the amount of 10% (ten percent) of the bid price.

All bid deposits will be returned to the unsuccessful bidders within a reasonable time after the bids have been opened except those which the DDSB elects to retain until the successful bidder(s) has executed the contract documents.

The bid deposit of the successful bidder(s) will be returned subsequent to the execution of the contract and provisions for the contract have been submitted.

The bid deposit shall be forfeited if the vendor/contractor awarded the contract fails to accept the contract or withdraws their bid after notification of acceptance of the bid.

Bids not accompanied by the required bid deposits shall be rejected.

2.3 Bid Documents

The Contractor whom is awarded the work agrees to adhere to the following documents as a basis for the construction as applicable:

- Standard Construction Document, CCDC 2 – 2008 Stipulated Price Contract
- DDSB Front End – Information to Bidders, Terms and Conditions, Specifications and Drawings
- DDSB Purchase Order

In the case of a discrepancy between the DDSB Front End documents and the CCDC 2 documents, the CCDC 2 will prevail.

2.4 Bid Opening - Public Tenders

Bid results will be posted on the DDSB's bidding system and available to all bidders.

2.5 COVID-19

It is the expectation of the DDSB that the Successful Bidder will order the necessary materials upon award of the Vendor/Contract. With respect to commencement of work at the Sites, the DDSB acknowledges that non-critical Construction has been deemed a non-essential service by the Ontario Government to Stop the Spread of COVID-19 and is a cause beyond the Vendor/Contractor's control.

If the Vendor/Contractor is delayed in the performance of the Work any cause beyond the Vendor/Contractors control other than one resulting from a default or breach of Vendor/Contract by the Vendor/Contractor, then the Contract Time shall be extended for such reasonable time as the Consultant may recommend in consultation with the Vendor/Contractor. The extension of time shall not be less than the time lost as the result of the event causing the delay, unless the Vendor/Contractor agrees to a shorter extension. The Vendor/Contractor shall not be entitled to payment for costs incurred by such delays unless such delays result from actions by the Owner, Consultant or anyone employed or engaged by them directly or indirectly.

The extension of the project schedule, due to COVID 19 shall not impact the Successful Bidder's bonding or jeopardize completing the project on time. The DDSB will work with the Consultant and the Successful Bidder to arrive at a mutually agreeable revised project schedule, due to any schedule delays caused by COVID 19.

Bidders shall bid this project, based on materials being ordered immediately upon award and work on site commencing on a date specified by Durham District School Board.

VACCINATION PROTOCOL

As per the announcement from the Province of Ontario regarding immunization for the education sector, the DDSB requires that all Proponents and their employees comply with provincial directions and with the DDSB's Protocol (Appendix "XX").

A completed Certificate of Compliance (Appendix "YY") is to be completed and returned to michelle.chassels@ddsb.ca in our Human Resources Department and must be delivered prior to any site visit and must be delivered by the Successful Proponent prior to the start of the project.

2.6 Insurance (General Liability)

The vendor/contractor shall provide and maintain, at their own expense, a policy of general liability insurance issued by an insurance company incorporated or licensed to conduct insurance business in the Province of Ontario during the entire contract period.

General liability insurance shall be in the name of the vendor/contractor, naming the DDSB and Durham Energy Specialist Limited as **additional insured**, with limits of not less than **five million (5,000,000.00) dollars** inclusive per occurrence for bodily injury, death, and damage to property including loss of use thereof.

In the case of any **Roof Replacement or New Roofing projects**, General Liability Insurance shall be in the name of the vendor/contractor, naming the DDSB as **additional insured**, with limits of not less than **ten million (10,000,000) dollars** inclusive per occurrence for bodily injury, death and damage to property including loss of use thereof.

The vendor/contractor shall provide the DDSB (Purchasing Department) with proof of insurance within 10 days of issuance of the written notification of intent to award the contract.

2.7 Mandatory Site Meeting

Bidders are required to attend the scheduled "Mandatory Site Meeting" as herein specified. Bidders must sign the "Site Meeting Log" to provide evidence to the DDSB for attendance. Failure to comply shall result in bidder disqualification.

2.8 Surety

Performance Bond

Performance surety shall be in the amount of fifty percent (50%) of the total amount and is a requirement of this tender.

An agreement to bond for a 50% performance bond issued by an approved surety company authorized to conduct business in the Province of Ontario shall accompany the bid submission. An irrevocable letter of credit for 50% of the value of the contract shall be accepted as surety, in lieu of a performance bond, issued by an approved bank or financial institution having office in Canada and authorized to conduct business in Ontario shall accompany the bid submission.

Where the vendor/contractor has provided an irrevocable letter of credit as surety, the aforesaid will be returned after completion of the work and final payment has been accepted by the vendor/contractor.

The vendor/contractor shall arrange, pay for, execute and furnish to the DDSB a performance bond in an amount equal to fifty percent (50%) of the bid sum with an approved surety company.

An irrevocable letter of credit for fifty percent (50%) of the bid sum shall be an acceptable alternative to a performance bond issued by an approved bank or financial institution in Canada and authorized to conduct business in Ontario.

Upon award of the contract, the vendor/contractor shall promptly provide to the DDSB (Purchasing Department) the surety bonds called for on the bid documents.

Labour and Material Payment Bond

Labour and material payment surety shall be in the amount of fifty percent (50%) of the total amount and is a requirement of this tender.

An agreement to bond for a 50% labour and material payment bond issued by an approved surety company authorized to conduct business in the Province of Ontario shall accompany the bid submission. An irrevocable letter of credit for 50% of the value of the contract shall be accepted as surety, in lieu of a labour and material payment bond, issued by an approved bank or financial institution having office in Canada and authorized to conduct business in Ontario shall accompany the bid submission.

Where the vendor/contractor has provided an irrevocable letter of credit as surety, the aforesaid will be returned after completion of the work and final payment has been accepted by the vendor/contractor.

The vendor/contractor shall arrange, pay for, execute and furnish to the DDSB a labour and material payment bond in an amount equal to fifty percent (50%) of the bid sum with an approved surety company.

An irrevocable letter of credit for fifty percent (50%) of the bid sum shall be an acceptable alternative to a labour and material payment bond issued by an approved bank or financial institution in Canada and authorized to carry on business in Ontario.

Upon award of the contract, the vendor/contractor shall promptly provide to the DDSB (Purchasing Department) the surety bonds called for in the bid documents.

Bids not accompanied by the required Performance and/or Labour and Material Agreement to Bonds' shall be rejected.

2.9 WORKPLACE SAFETY & INSURANCE BOARD (W.S.I.B.)

A Certificate of Clearance from the WSIB, shall be provided prior to the commencement of work indicating that all payments by the vendor/contractor to the WSIB Board have been made.

Clearance certificates shall be renewed by the vendor/contractor every ninety (90) days (minimum) and submitted automatically and routinely to the DDSB throughout the period of the contract.

3.0 DEFINITIONS

3.1 Definition of Contract Language:

Addendum, Addenda – A formal change(s) to the bid document issued by the DDSB requiring an acknowledgement of the addenda or addendum by the bidder.

Authorities Having Jurisdiction – Designated organization, office, or individual having statutory responsibility for enforcing the requirements of a standard.

Award – The selection of a bidder and respective goods/services as accepted by the DDSB.

Bid – The documents issued by the DDSB requesting/inviting bids for the goods/services specified herein.

Bid Document - The bid issued by the DDSB that states all DDSB requirements, such as specifications, scope of work, drawings, terms and conditions etc.

Bid Submission - An offer by a bidder in response to the bid document issued by the DDSB.

Contract – The purchase order and/or executed agreement authorizing the vendor/contractor to perform the work/supply of goods/services in accordance with all terms, conditions, specifications and prices as agreed upon.

DDSB - “DDSB” shall mean the Durham District School Board and all associated officials with the Manager of Purchasing or designate acting on its behalf for the administration and procurement purposes of this bid.

Facilities Services – Official plant and construction agency of the DDSB. Where the word “Engineer” occurs, it shall be construed to mean “The Superintendent of Education/Facilities Services of the DDSB,” or duly authorized officials.

Goods/Services - All labour, materials, products, articles, fixtures, services, supplies, and work required to be done, furnished or performed by the vendor/contractor, as specified in the bid and/or contract.

Purchasing Department – Official procurement agency of the DDSB.

RFP - means Request for Proposal.

RFT - means Request for Tender.

RFQ - means Request for Quote.

RFI - means Request for Information.

RFEI - means Request for Expression of Interest.

RFSQ – means Request for Supplier Qualification.

Substantial Completion – (Per the Construction Lien Act) The improvement to be made under the contract or a substantial part thereof is ready for use or is being used for the purpose intended; and when the improvement to be made under that contract is capable of completion or, where there is a known defect, correction, at a cost not more than,

- (i) 3 percent of the first \$1,000,000 of the contract price
- (ii) 2 percent of the next \$1,000,000 of the contract price
- (iii) 1 percent of the balance of the contract price

Total Completion – (Per the Construction Lien Act) The project is deemed to be completed and services or materials shall be deemed to be last supplied to the improvement when the price of Completion, correction of a known defect or last supply is not more than the lesser of:

- (i) 1 percent of the contract price; and
- (ii) \$1,000

Vendor/Contractor – The person, firm, company or corporation with whom the DDSB has entered into contract for the work/goods/services specified herein.

Work – The **Work** means the total construction and related services required by the Contract Documents.

4.0 TENDER COMPLIANCE

4.1 Addendum

Any clarification of the bid documents required by the bidder prior to submission of its bid shall be requested through the Procurement Lead of DDSB at the email address noted under sentence 1.1 Bid Administration. Bidders that fail to comply with the requirements to direct all communications to the Procurement Lead may be disqualified from this RFP process. Without limiting the generality of this provision, Bidders shall not communicate with or attempt to communicate with the following as it relates to this RFP;

- Any employee or agent of DDSB other than the Procurement Lead; or
- Any member of DDSB's governing body including without limitation the Director, Officers, Trustees, Superintendents and any advisors thereto.

Any such clarifications so given shall not in any way alter the bid documents and the Bidder and the DDSB hereby agree that in no case shall oral arrangements be considered.

During the period prior to submission of a bid, if the DDSB for any reason determines that it is necessary to provide additional information relating to this bid such information will be communicated to all bidders by way of **written** addenda posted to the DDSB's Bidding System. Each addendum shall form an integral part of this document.

The bidder shall check a box for each addendum/addenda and any applicable attachments that have been issued via the DDSB's Bidding System to acknowledge receipt. Addenda shall be issued at least (5) five business days before the bid closing date. Bidders are responsible for obtaining and confirming receipt of all addenda issued by the DDSB. Exceptions to the five-day notification must be approved by the Manager of Purchasing of the DDSB.

No officer, agent, employee or representative of the DDSB is authorized to amend or waive the terms of the bid document in any way unless the amendment or waiver is provided as a **written** addendum approved by the Buyer/designate.

Discrepancies/Omissions:

Any bidder finding discrepancies or omissions in this document shall at once notify the Procurement Lead – see 1.1 Bid Administration. If necessary, a written addendum will be posted to the DDSB's Bidding System to all Plan Takers. Bidder(s) may, during the bidding period, be advised by addendum of any additions, alterations or deletions to the specifications and other parts of this bid document. All such changes shall be covered by the bid and become a part of the bid document.

4.2 Substitutions

Goods and services are described or named in this specification to establish a standard of material and workmanship. The bid amount shall be based on the specified goods/services. Under no circumstances shall the bid for any alternate material or equipment be included in the bid amount. Proposed substitution of goods/services specified may be submitted by the bidder

to DDSB for review as a request for information during the allotted tender timeline. If the good/service proposed is accepted by DDSB, a formal addendum will be issued to all bidders to provide notification accordingly.

The following information shall be stated with any proposed alternate of goods/services specified:

- Manufacturer's name and Vendor/Contractor's name
- Change in price if any
- Reason for proposing alternate
- Detailed description of alternate including product literature shop drawing etc., if applicable.
- The DDSB reserves the right to accept or reject proposed alternate(s). Rejection by the DDSB is final.

4.3 Bid Acceptance

The DDSB reserves the right to award in whole or in part, whichever, in the DDSB's sole discretion, is in its own best interest. Equally, the Durham District School Board reserves the right to accept or reject any bid in whole or in part whichever, in the DDSB's sole discretion, is in its own best interest. The lowest or any bid will not necessarily be accepted.

4.4 Bid Clarification

The DDSB reserves the right, in its sole discretion, to seek clarification(s) and supplementary information from bidders after the bid submission deadline, without becoming obligated to allow any other bidders to clarify their bids. Such clarification, if any, is not an opportunity for the bidder to change or amend their bid in any substantive manner. The response(s) received by the DDSB from a bidder may, if accepted by the DDSB, form an integral part of that bidder's bid.

Any clarification of the bid documents required by the bidder prior to submission of its bid shall be requested through the Purchasing Department of the DDSB. Any such clarifications so given shall not in any way alter the bid documents and the vendor/contractor and the DDSB hereby agrees that in no case shall oral arrangements be considered.

4.5 Bid Completion

All blank spaces of bid form must be completed in full. Original Bid Forms not completed in the prescribed manner may be considered invalid.

4.6 Bid Deposit

Where applicable, A bid deposit shall be in the form of bank draft, bid bond, certified cheque or money order, payable to the DDSB, in the amount of 10% (ten percent) of the bid price.

All bid deposits will be returned to the unsuccessful bidders within a reasonable time after the bids have been opened except those which the DDSB elects to retain until the successful bidder(s) has executed the contract documents including the purchase order.

The bid deposit of the successful bidder(s) will be returned subsequent to the execution of the contract and provisions for the contract have been submitted.

The bid deposit shall be forfeited if the vendor/contractor awarded the contract fails to accept the contract or withdraws their bid after notification of acceptance of the bid.

Bids not accompanied by the required bid deposits shall be rejected.

4.7 Bid Dispute

DDSB manages bid dispute resolution utilizing the following processes:

- Negotiation
- Mediation
- Arbitration

The DDSB reserves the right to select the most suitable method of resolution to follow.

Bid dispute resolution will be managed by the DDSB through these processes designed to resolve a procurement related conflict, dispute or claim.

4.8 Bid Errors and Omissions

In the event of any omission in the bid documents:

- unit prices shall govern over total prices;
- figures shall govern over words; and
- the DDSB reserves the right to contact any bidder after closing to clarify the bidder's pricing without becoming obligated to contact any other or all bidders for clarification.

4.9 Bid Expenses

The DDSB shall not be liable for any expenses incurred in the preparation and submission of this bid. With respect to anything relating to this bid process, the bidder, by submitting a proposal, agrees to waive any and all claims for losses to the cost of preparing and submitting their bid.

4.10 Bid Irregularities (Major & Minor)

Major

Late bids are not permitted by the DDSB's Bidding System.

Minor

Bids not completed as requested may be rejected by the DDSB acting in its absolute discretion.

Bids must be signed, in the spaces provided, in ink or electronically, by a person who is authorized to bind the bidder. Any unsigned bids may be rejected.

Erasures or noticeable changes must be initialed by the bidder or the bid may be rejected.

4.11 Bid Opening – (Public Tenders Only)

Bid results will be posted on the DDSB's bidding system and available to all bidders.

4.12 Bid Protest Procedure

A protest in writing must be received within ten (10) days of the bid closing date and following a debriefing. Any protest in writing that is not received within the ten (10) day period indicated, will not be considered by the DDSB.

A protest in writing shall include the following:

- A specific identification of the provision and/or procurement procedure that is alleged to have been breached;
- A specific description of each act alleged to have breached the procedure process;
- A precise statement of the relevant facts;
- An identification of the issues to be resolved;
- The bidder's arguments and supporting documentation; and
- The bidder's requested remedy.

4.13 Bid Submission

Bid deposits and surety when required (refer to Information to Bidders section), must accompany bid submission.

The bidder declares that the bid is not collusive with any other bidder(s) submitting a bid.

Electronic bid submissions shall be received by the DDSB's Bidding System on original bid forms only. Alterations of the original document will not be permitted under any circumstances.

Any unsigned bids may be declared invalid.

All Bidders shall have a Bidding System Vendor Account and be registered as a Plan Taker for this Bid opportunity, which will enable the Bidder to download the Bid Call Document, to receive Addenda/Addendum email notifications, download Addendums and to submit their Bid electronically through the Bidding System.

Bid Submissions shall be received by the Board's Bidding System not later than 11:00:00 a.m. Eastern local time, on the specified Closing Date. The Closing Time shall be determined by the Bidding System web clock.

Bidders are cautioned that the timing of Bid Submission is based on when the Bid is RECEIVED by the Bidding System, not when a Bid is submitted by a Bidder, as Bid transmission can be

delayed in an “Internet Traffic Jam” due to file transfer size, transmission speed, and other electronic considerations.

For the above reasons, Durham District School Board recommends that Bidders allow sufficient time to upload their Bid Submission and attachment(s) (if applicable) and to resolve any issues that may arise. The Closing Date and Time shall be determined by the Board’s Bidding System web clock.

Original Bid forms not completed in the prescribed manner may be considered INVALID. It is the sole responsibility of the Bidder to ensure a Bid is delivered on time. Late bids will not be accepted by the Board’s bidding system.

Copies of any pertinent bid deposit and bid surety will need to be included with your bid submission. Durham District School Board may request the originals to be sent in the mail, should your bid be awarded the contract.

Durham District School Board hereby consents to the use of an electronic signature for the signing of all documents requested hereunder. Acceptable forms of electronic signature include, but are not limited to, the typing of the Bidder’s authorized signing Officer’s name or the inclusion of an image of the Bidder’s authorized signing Officer’s signature, so long as the electronic signature is sufficient to identify the Bidder’s authorized signing Officer. The Bidder’s authorized signing Officer agrees that whatever form of electronic signature is provided constitutes a signature for the purposes of executing all documents requested hereunder.

4.14 Bidder Qualification

The bidder may be required to demonstrate, in terms of experience and facilities, evidence of its ability, as well as that of any proposed subcontractor, to perform the work by the specified completion date for all bid requirements. The DDSB reserves the right to reject the bid of any bidder who does not furnish satisfactory evidence of the above in the opinion of the DDSB.

4.15 Blackout Period

During the evaluation period (closing date to the award date), the DDSB will not communicate with bidders on matters related to the competitive procurement process. Only the procurement lead of the DDSB will communicate with bidders for any bid related issues during this period.

4.16 Clarification of Proposals

DDSB shall have the right at any time after the Closing Date to seek clarification from any Vendor in respect of the bid, without contacting any other Vendor/Contractor.

Any clarification sought shall not be an opportunity for the Vendor/Contractor to either correct errors or to change its bid in any substantive manner. Subject to the qualification in this provision, any written information received by DDSB from a Vendor/Contractor in response to a request for clarification from DDSB may be considered, if accepted, to form an

integral part of the bid, at DDSB's sole and absolute discretion.

DDSB shall not be obliged to see clarification of any aspect of any Proposal.

4.17 Conflict of Interest

By submitting a bid, a bidder represents and declares that no member, officer or employee of DDSB has or will have an interest, directly or indirectly, in the performance of the contract, or in the good/services in connection with the said contract, or in any portion of the profits thereof, or in any monies derived therefrom. In addition, and for the purposes hereof, "Conflict of Interest" includes:

- (a) in relation to the bid process, the bidder has an unfair advantage or engaged in conduct, directly or indirectly, that may give the bidder an unfair advantage, including:
 - (i) having or having access to information in the preparation of the bid that is confidential to DDSB and not available to other bidders;
 - (ii) communicating with any person with a view to influencing preferred treatment in the bid process; or
 - (iii) engaging in conduct that compromises or could be seen to compromise the integrity of the open and competitive process and render that process non-competitive and unfair; or
- (b) in relation to the performance of the provision of the goods or services or performance of the contractual obligations, the bidder's other commitments, relationships or financial interests:
 - (i) could or could be perceived to exercise an improper influence over the objective, unbiased and impartial exercise of the bidder's independent judgments; or
 - (ii) could or could be perceived to compromise or impair or be incompatible with the effective performance of the provision of the goods or services or performance of the contractual obligations.

The bidder shall:

- (a) avoid any Conflict of Interest in the bid process and in the performance of its contractual obligations;
- (b) disclose to DDSB without delay any actual or potential Conflict of Interest that arises during the bid process or during the performance of its contractual obligations; and
- (c) comply with any requirements prescribed by DDSB to resolve any Conflict of Interest.

In addition to all other contractual rights or rights available at law or in equity, DDSB may immediately disqualify a bid or terminate the contract upon giving notice to the bidder where:

- (a) the bidder fails to disclose an actual or potential Conflict of Interest;
- (b) the bidder fails to comply with any requirements prescribed by DDSB to resolve a Conflict of Interest; or
- (c) the bidder's Conflict of Interest cannot be resolved.

This paragraph shall survive any termination or expiry of the contract.

4.18 Debriefing (Request for Proposal Only)

Not later than sixty (60) days following the date of posting of a contract award notification in respect of the bid, a bidder may contact the DDSB's bid document administrator requesting a debriefing from the DDSB. The debriefing will be conducted in accordance with the procedures outlined in the Broader Public Sector Procurement Directive.

4.19 Disqualification Clause

The DDSB reserves the right to disqualify and immediately remove from eligibility to submit bids for an indeterminate period, the name of any vendor, which will include the names of such vendor's principals, and the names of any other business which may be operated by such principals, for failure to carry out its obligations for the entire term under any previous award or resulting contract pursuant to a bidding process with the Board, in the sole and unfettered discretion of the Board.

4.20 Disqualification for Misrepresentation

DDSB may disqualify the Vendor/Contractor or rescind an Agreement subsequently entered if the Vendor/Contractor's Proposal contains misrepresentations or any other inaccurate, misleading or incomplete information.

4.21 Examination of Site

Bidders shall carefully examine work site/location and shall investigate nature of the work to be undertaken, the means of access, the obstacles to be met with, the rights and interests which may be interfered with during the performance of the work are referred to in the contract documents, or which are necessary for the full and proper completion of the work and the conditions under which it will be performed, and shall acquaint themselves with all by-Laws, acts, ordinances, rules, regulations and codes which may affect the work of the contract. The DDSB will not consider any claim for extra work, expense and errors incurred by the vendor/contractor resulting from failure to comply with these conditions before bidding.

The dimensions and information shown on the bid drawings where applicable are furnished in good faith by the DDSB but shall in no way relieve bidders of the responsibility for ascertaining to their own satisfaction, the nature of all conditions at the site.

4.22 Exclusivity

The DDSB does not relinquish total exclusivity of these requirements to this award, however, the majority and substantial portion will be given to the successful bidder(s) subsequent to the contract execution(s). The DDSB reserves the right to acquire other goods/services as required.

4.23 Expenses for Consultants And Other Contractors

Consultants and other vendor/contractors will not be reimbursed for any hospitality, incidental or food expenses, including:

- Meals, snacks and beverages
- Gratuities
- Personal telephone calls

4.24 Irrevocability Period

A bid submitted is irrevocable by the bidder and must remain in effect and open for acceptance for a minimum period of forty-five (45) days following the closing date unless otherwise specified.

4.25 Municipal Freedom of Information Protection of Privacy Act (MFIPA)

The bid and supporting documentation shall become the property of the DDSB after the award and shall not be returned. Information in a bid is subject to potential scrutiny by other parties after the award, subject to the Municipal Freedom of Information and Protection of Privacy Act, R.S.O. 1990, F-31. Bidders must identify any information in the bid which is considered confidential. Requests for information must be made in writing to the DDSB FOI Coordinator and will be subject to conditions of the Act.

4.26 Privilege Clause

DDSB reserves the right to reject any or all bid submissions. The lowest or any bid submission will not necessarily be accepted. DDSB reserves the right to cancel the bid at any point in the process without liability. DDSB reserves the right not to proceed with the bid process or to cancel the process after bids are received if the budget for the process is not sufficient, bid responses are deemed not to meet the requirements of the process, funding is curtailed, or for any other reason determined to be detrimental to the DDSB's best interests. In addition, DDSB reserves the right to invalidate any submission from a bidder:

- (i) who has threatened or is currently involved in any legal disputes with the DDSB with respect to any previously awarded bids, whether or not such legal disputes arise prior to or subsequent to the issuance of this bid; or
- (ii) whose past performance has been unsatisfactory with respect to any previously awarded bid, in the sole and unfettered discretion of the DDSB, whether or not such unsatisfactory performance occurs prior to or subsequent to the issuance of this bid.

4.27 Quantities

The quantities shown are estimates only based on previous volumes. The DDSB makes no guarantee of the quantities or volumes assigned to the successful bidder(s) in any contract awarded through this bid process. Payment will be based on actual quantities of goods/services received and accepted by the DDSB at the unit prices bid.

4.28 References

Bidders must provide a list of current references, as requested, preferably Ontario school boards. Also, bidders must include the name, address, contact person, email address, and telephone number of the reference provided.

4.29 Reserved Rights of DDSB

DDSB reserves the right to:

- (a) make public the names of any or all bidders;
- (b) request written clarification or the submission of supplementary written information in relation to the clarification request from any bidder and incorporate a bidder's response to that request for clarification into the bidder's bid;
- (c) assess a bidder's bid on the basis of:
 - (i) a financial analysis determining the actual cost of the bid when considering factors including quality, service, price and transition costs arising from the replacement of existing goods, services, practices, methodologies and infrastructure (howsoever originally established);
 - (ii) information provided by references;
 - (ii) the bidder's past performance on previous contracts awarded by DDSB;
 - (iv) the information provided by a bidder pursuant to DDSB exercising its clarification rights under this Bid process; or
 - (v) other relevant information that arises during this Bid process;
- (d) waive formalities and accept bids that substantially comply with the requirements of this Bid;
- (e) verify with any bidder or with a third party any information set out in a bid;
- (f) check references other than those provided by any bidder;
- (g) disqualify any bidder whose bid contains misrepresentations or any other inaccurate or misleading information;
- (h) disqualify any bidder or the bid of any bidder who has engaged in conduct prohibited by this Bid;
- (i) disqualify a bidder for any conduct, situation or circumstance that constitutes a Conflict of Interest, as solely determined by DDSB. "Conflict of Interest" shall have the meaning ascribed to it in paragraph 32;
- (j) make changes, including substantial changes, to this Bid, provided that those changes are issued by way of addenda in the manner set out in this Bid;
- (k) select any bidder other than the bidder whose bid reflects the lowest cost to DDSB;
- (l) cancel this Bid process at any stage;
- (m) cancel this Bid process at any stage and issue a new Bid for the same or similar deliverables;
- (n) accept any bid in whole or in part; or
- (o) reject any or all bids;

and these reserved rights are in addition to any other express rights or any other rights that may be implied in the circumstances.

In addition, DDSB reserves the right at any time during normal business hours, and as often as DDSB may deem necessary, to examine, the successful bidder's records with respect to the successful bidder's services under the bidder's purchase order and/or bid and any contract. The successful bidder shall permit DDSB to audit, examine, and make copies, excerpts or transcripts from such records, and to make audits of data relating to matters covered by a bid, any purchase order and/or any contract. The successful bidder shall maintain and retain all records and other documents related to a bid, any purchase order, and/or any contract for a period of seven (7) years from the date of final payment, except in cases where unresolved audit questions require a longer period of time for resolution, as determined by DDSB.

4.30 Taxation & Duty

Except as otherwise provided the prices bid shall be in Canadian funds and shall include all duty, customs clearances and all other charges now or hereafter imposed or in force. The harmonized sales tax (H.S.T.) shall be extra to the price(s) bid. All prices must be quoted F.O.B. the delivery point(s) as set out in the purchase order(s). Bidders must indicate on the price schedule of the bid document their H.S.T. registration number.

4.31 Tie Bids

In the event of a tie bid, a lottery, as determined by the DDSB, will take place witnessed by the respective bidders. If a bidder(s) is not available to attend, at least one other DDSB staff and member of DDSB Purchasing department will be present as a witness and the results recorded accordingly.

5.0 GENERAL PROVISIONS

5.1 Contract

Each bid will be received with the understanding that the acceptance in writing by the DDSB of the offer to furnish all or any part of the goods/services described therein shall constitute a contract between the bidder and the DDSB, which shall bind the bidder on their part to furnish and deliver the goods/services at the prices bid, in accordance with conditions of said accepted bid, prices, specifications, bid terms and conditions.

No alterations or variations of the terms of the contract shall be valid or binding unless otherwise authorized in writing by the DDSB.

It is mutually agreed and understood that the vendor/contractor shall not assign, transfer, convey, sublet or otherwise dispose of the contract or the right, title or interest therein, or the power to execute such contract, to any other person, firm, company or corporation without the previous written consent of the DDSB.

For the purposes hereof, the transfer or issuance of shares by a vendor / contractor of more than fifty percent (50%) of the voting securities of a vendor / contractor to any third party other than to an affiliate (as such term is defined in the Business Corporations Act (Ontario)) or the shareholder or shareholders of the vendor / contractor as of the Closing Date, whether or not such transfer or issuance of voting securities takes place in one or more transactions shall, for the purposes of the contract, be deemed to be an assignment of the contract requiring the consent of DDSB, unless such transfer or issuance of shares is made pursuant to an initial public offering of common shares under the Securities Act (Ontario).

5.2 Documents Conflicts

In the event of conflict(s) within bid documents the following shall apply:

- The terms and conditions shall govern over the specifications
- The specifications shall govern over drawings
- Figured dimensions shown on a drawing shall govern even though they may differ from dimensions scaled on the same drawing
- The executed contract/purchase order agreement between the DDSB and vendor/contractor shall govern over all documents

Amendments to the contract, in the form of change orders, shall take precedence over the documents or portions thereof. Change orders, appendices and addenda to any contract document shall be considered part of such document.

None of the conditions contained in the bidder's standard or general (printed) conditions of sale shall have any affect unless explicitly agreed to by the DDSB and set forth in the purchase order or specifically referred to therein.

Henry Street High School
Project Name: Ventilation Upgrades
Site Address: 600 Henry Street, Whitby, ON L1N 5C7

T22-13
Issued For: Bid
Date: January 14, 2022

5.3 Drawings

The DDSB shall furnish additional instructions, by means of drawings or otherwise, necessary for the proper execution of the work, consistent with the contract.

The vendor/contractor shall submit a schedule establishing the dates for the submission of shop drawings for the beginning of manufacture and installation of materials and for the completion of the various parts of the work. The vendor/contractor shall advise the DDSB where circumstances necessitate a change to the schedule

6.0 EXECUTION OF THE WORK

6.1 Conduct of Work

The vendor/contractor shall have complete control of the work and shall effectively direct and supervise the work so as to ensure conformance with the contract documents. The vendor/contractor shall be solely responsible for construction means, methods, techniques, sequences and procedures and for coordinating the various parts of the work under the contract.

The vendor/contractor shall review the contract documents and shall promptly report to the DDSB any error, inconsistency or omission discovered.

The vendor/contractor is required, before bid closing, and by personal examination, to thoroughly acquaint themselves with all existing conditions at the site which may in any way affect the proper completion of the work specified.

The vendor/contractor shall maintain good order and discipline among their employees engaged on the work and shall not employ on the work; anyone not skilled in the task assigned.

The vendor/contractor must comply with all safety standards established by law and with safety standards established by industry associations where applicable.

The vendor/contractor shall conduct the work with all skill and diligence and shall cooperate with the DDSB and the DDSB's representatives in every legitimate way to conduct their respective business in an effective, successful and harmonious manner, so as to complete the work specified.

The vendor/contractor shall provide site and material security at their expense.

The vendor/contractor shall be fully responsible for protecting the work from inclement weather and the barricading of the site.

6.2 Confidentiality

The parties agree that any information concerning the business or affairs of the other party or its directors, officers, agents, principals, elected officials or employees and clients, as applicable, about which the other party becomes aware of in the course of bidder supplying the equipment shall:

- Be treated as confidential;
- Not be disclosed to any third party or to the bidder's personnel of the purchaser's staff except as may be required under the agreement; and
- Not be used for any purpose other than that contemplated by this agreement and for the benefit of the other party.

The parties agree that any combination of information which includes such information shall be treated as confidential even if individual parts thereof are not confidential. The parties shall use

all reasonable efforts to keep such information confidential, using a standard of care no less than the degree of care that the recipient would be reasonably expected to use for its own confidential information. The parties shall ensure that all recipients of the said information, including the Vendor/Contractor's personnel or the purchaser's staff assume obligations identical in principle with those which the parties assume under this Section.

In the event a party is required by any applicable law to make disclosure of any such information, the party required to make disclosure shall consult with the other party to the extent reasonably practicable in advance as to the contents and timing of such disclosure.

Exceptions

While neither party shall disclose any confidential information of the other, it shall not constitute a breach of the obligations hereto if such confidential information was:

- Already lawfully in the public domain or becomes known within the public domain from no breach of such party;
- Already known to such party at the time of disclosure;
- Independently developed by the party without reference to or use of the information;
- Lawfully received by the party from a third party; or
- Made public with the prior consent in writing of the other party.

6.3 Emergencies

In an emergency affecting or threatening the safety of life, the work or adjoining property, the DDSB has the authority to stop the progress of the work.

Upon commencement of the work, the Contractor shall provide DDSB with a list of emergency contacts for the related project Work. The Contractor will notify DDSB in the event of any revisions said list provided at the commencement of the project.

6.4 Health & Safety, Laws, Notices, Permits and Fees

The vendor/contractor shall obtain the permits, licences and certificates and pay the fees required for the performance of the work which are in force subsequent to the date of bid closing.

The vendor/contractor shall give the required notices and comply with the laws, ordinances, rules, regulations, codes and orders of the Authorities Having Jurisdiction, which are or become applicable during the performance of the work and which relate to the work, to the preservation of the public health, and to construction safety, in accordance with the Occupational Health & Safety Act.

6.5 Hot Work Permit

Contractor is required to supply a Hot Work Permit for any temporary operation involving open flames or producing heat and/or sparks. This includes but is not limited to: brazing, cutting,

grinding, soldering, torch-applied roofing and welding. If the contractor does not have their own Hot Work Permit that meets or exceeds the DDSB standard, then the DDSB can supply one for the contractor to fill out and post on site. All Contractors must employ a Hot Work Policy when conducting work on facilities owned and operated by the DDSB. The sample hot work permit enclosed herein, supported by the Ontario School Board Insurance Exchange (OSBIE) outlines DDSB's minimum requirements for company hot work policy protocols. A copy of the enclosed permit is available to be supplied by the DDSB upon request.

HOT WORK PERMIT

STOP!
 Avoid hot work or seek an alternative/safer method, if possible.

This Hot Work Permit is required for any temporary operation involving open flames or producing heat and/or sparks. This includes, but is not limited to: brazing, cutting, grinding, soldering, torch-applied roofing and welding.

Part 1

Instructions	Required Precautions Checklist
<p>1. Firesafety supervisor:</p> <p>A. Verify precautions listed at right (or do not proceed with the work).</p> <p>B. Complete and retain Part 1. (Part 1A is for quality assurance documentation, if necessary.)</p> <p>C. Issue Part 2 to person performing hot work.</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Available sprinklers, hose streams and extinguishers are in service/operable. <input type="checkbox"/> Hot work equipment in good working condition. <p>Requirements within 35 ft. (11m) of hotwork</p> <ul style="list-style-type: none"> <input type="checkbox"/> Flammable liquid, dust, lint and oily deposits removed. <input type="checkbox"/> Explosive atmosphere in area eliminated. <input type="checkbox"/> Floors swept clean. <input type="checkbox"/> Combustible floors wet down, covered with damp sand or fire-resistive sheets. <input type="checkbox"/> Remove other combustible material where possible. Otherwise, protect with welding pads, blankets and curtains, fire-resistive tarpaulins or metal shields. <input type="checkbox"/> All wall and floor openings covered. <input type="checkbox"/> Welding pads, blankets and curtains installed under and around work. <input type="checkbox"/> Protect or shut down ducts and conveyors that might carry sparks to distant combustible material. <p>Hot work on walls, ceilings or roofs</p> <ul style="list-style-type: none"> <input type="checkbox"/> Construction is noncombustible and without combustible covering or insulation. <input type="checkbox"/> Combustible material on other side of walls, ceilings or roofs is moved away. <p>Hot work on enclosed equipment</p> <ul style="list-style-type: none"> <input type="checkbox"/> Enclosed equipment cleaned of all combustible material. <input type="checkbox"/> Containers purged of flammable liquid/vapor. <input type="checkbox"/> Pressurized vessels, piping and equipment removed from service, isolated and vented. <p>Fire watch/hot work area monitoring</p> <ul style="list-style-type: none"> <input type="checkbox"/> Fire watch will be provided during and for 60 min. after work, including any break activity. <input type="checkbox"/> Fire watch is supplied with suitable extinguishers, and where practical, a charged small hose. <input type="checkbox"/> Fire watch is trained in use of equipment and in sounding alarm. <input type="checkbox"/> Fire watch may be required in adjoining areas, above and below. <input type="checkbox"/> Monitor hot work area for an additional three (3) hours after the 60-min. fire watch.
<p>Hot work by</p> <p><input type="checkbox"/> Employee</p> <p><input type="checkbox"/> Contractor _____</p> <p>Date _____ Job number _____</p> <p>Location/building and floor</p> <p>_____</p> <p>Nature of job</p> <p>_____</p> <p>Name (print) and signature of person performing hot work</p> <p>_____</p>	<p>Other precautions taken:</p> <p><input type="checkbox"/> _____</p> <p>_____</p>
<p>I verify the above location has been examined, the precautions checked on the Required Precautions Checklist have been taken to prevent fire, and permission is authorized for this work.</p> <p>Name (print) and signature of firesafety supervisor/operations supervisor</p> <p>_____</p>	
<p>Permit Expires _____ Date _____ Time _____ a.m. _____ p.m. _____</p>	<p>Note: Emergency notification on back of form. Use as appropriate for your facility.</p> <p>To order additional hot work permits, order online at rm@osbie.on.ca or contact the Risk Management Department at 1-800-668-6724.</p>



6.6 No Smoking and/or Vaping

All DDSB facilities and properties are “Non-Smoking” and all vendors/contractors and their employees must abide by this policy.

6.7 Operation of Tools, Equipment & Vehicles On DDSB Property

The vendor/contractor will perform service or cleaning after hours if there are restrictions to access during regular school hours. The vendor/contractor will not operate power tools, maintenance equipment, snow blowers, lawn mowers, tractors, vehicles or heavy equipment on DDSB property during occupied hours without first reporting to the Principal or the Principal's designate at the school site. The tools and equipment mentioned above should not be left unsecured or unsupervised on DDSB property.

Drivers of motor vehicles shall not operate these vehicles beyond the parking area without DDSB permission. These vehicles will be operated with due caution at all times while on school property. Speed limits must not exceed 8 kilometers (5 miles) per hour at any time. Delivery and service vehicles must not enter or leave school grounds when students are in the area unless directed by, or with the permission of the Principal or delegate. Drivers will wait for the yard to clear before entering or leaving i.e. recess, etc.

No power actuated fastening device (i.e. ramset) will be permitted unless prior written approval is received from the DDSB's designated representative.

Delivery vehicles must shut down their engines when stopped in school yards or when stopped on any street adjacent to any DDSB buildings. When returning to an unattended vehicle and before it is driven, the driver must circle the vehicle to ensure that no child is hiding behind or under the vehicle. Any accidents, no matter how minor, must be reported immediately to the school Principal.

No vehicle should reverse unless there is a person available to guide the driver (except in designated parking areas).

6.8 Police Record Check

Subsequent to contract award, police record checks may be required for the vendor/contractor's staff entering DDSB sites. The vendor/contractor shall be required to comply at no cost to the DDSB.

6.9 Protection of Work & Property

Completion of the work shall in no way interfere with the use of adjacent buildings or surrounding areas. The vendor/contractor shall adequately protect adjacent property from damage or injury. If damage or injury does occur, the vendor/contractor will return the damaged or injured property to its original or an equivalent state, at the expense of the vendor/contractor. The vendor/contractor shall provide, erect and maintain all necessary guardrails, barriers, night-lights, sidewalk and curb protection, etc. as may be necessary or as the bylaws, regulations or statutes may require. Should the job be stopped for any cause, the vendor/contractor will be responsible for and will provide all necessary protection to prevent damage by weather or other causes until the project can be safely completed. Nothing contained in this paragraph limits or releases the contractor from any liability.

The vendor/contractor will accept full responsibility for the prevention of pilferage and theft, will instruct all trades accordingly, and will be responsible for any losses due to theft.

The vendor/contractor will be responsible for repairing all damages its employees, representatives or its sub-contractors may cause to the property during the execution of the work.

6.10 Quality

Product quality will be of the essence of any contract issued to successful bidder(s) through this bid process. The Contractor shall maintain quality control over the area of construction and products provided within until accepted by DDSB.

If product substitutions are necessary after contracts are awarded, any proposed substitute must be approved by the DDSB project representative(s). A formal request (in written or electronic format) for substitution shall be submitted by the Contractor for DDSB review – See subsection 4.2 - “Substitutions”

6.11 Samples

Bidders must provide samples, upon request, for all products during pre-award evaluations. Failure to do so may result in that bidder’s product not being considered for award.

Please note: Samples of small intrinsic value will become the property of the DDSB upon receipt. Bidders must indicate to the DDSB, prior to sample submission, whether title of the product will be relinquished by the bidder.

6.12 Storage of Materials & Equipment

Materials shall be stored, covered and protected from fire, weather and other damaging conditions at all times. The DDSB may provide temporary storage space for materials if available.

The vendor/contractor shall be responsible for all materials and equipment being used on site, and for safeguard of such in case of damage to DDSB property. Refer also to “INDEMNIFICATION”.

6.13 Materials

Unless otherwise specified in bid documents, materials and supplies must be new items (not refurbished, not previously used, not re-manufactured), in good operating condition, fit for the purpose for which they are being acquired, and free from defects in workmanship and material. Any item which fails in any way to meet the specifications of the bid is subject to rejection. The decision of the DDSB pertaining to items being rejected shall be final.

Inferior items shall be removed at once, by the vendor/contractor at their own expense. Should the vendor/contractor refuse to remove any items so rejected, the DDSB may then take action to remove such items at the vendor/contractor's expense.

6.14 Laws and Regulations

The vendor/contractor shall comply with all relevant Federal, Provincial and Municipal statutes regulations and by-laws pertaining to the work and the performance of the contract. The vendor/contractor shall be responsible for ensuring similar compliance by Vendor/Contractors and subcontractors.

The contract shall be governed by and interpreted in accordance with the laws of the Province of Ontario.

6.15 Supervision

The vendor/contractor shall ensure that adequate and competent supervision is provided at all times by a competent supervisor as defined under the Occupational Health and Safety Act (Ontario). The supervisor shall be an employee of the Prime Contractor whom DDSB has awarded the Work to. The person will represent and be an agent for the vendor/contractor for all purposes, and directions given to/by the supervisor shall bind the vendor/contractor.

The vendor/contractor shall conduct the work with all skill and diligence and shall cooperate with the DDSB and the DDSB's representatives in every legitimate way to conduct their respective business in an effective, successful and harmonious manner, so as to complete the work specified.

6.16 Workers' Rights

The vendor/contractor will abide by the hours of work and minimum wage rates for occupations involved in accordance with the regulations of the Ministry of Labour or other appropriate legislation of the Province of Ontario or the Government of Canada.

6.17 Workmanship

Quality workmanship is required. The vendor/contractor shall employ qualified trades/workers experienced in the use of the specific goods/services relative to the contract.

6.18 Work Schedule

The vendor/contractor shall submit to the DDSB for approval, when requested, a written "work schedule" before commencing work. Failure to do so may constitute withdrawal of the contract.

6.19 Unforeseen Conditions & Toxic/Hazardous Substances

If the Contractor encounters an unforeseen condition or hazardous substance at the Place of Work:

1. Immediately identify the condition to the DDSB's project representative.
2. The DDSB will review with the Contractor and provide further direction based on review with DDSB Health & Safety and the consult of a third-party inspection and testing firm if required.

NOTE: WORK IS NOT TO PROCEED until further advised by the DDSB's project representative.

This procedure must be followed and is in place to ensure all workers (the employees of the DDSB and/or the vendor/contractor) are adequately protected under the provisions of the Occupational Health & Safety Act of Ontario.

6.20 Warranty

The successful bidder(s) warrants to the DDSB that:

- All goods/services, materials and equipment supplied under the contract are free of all defects in manufacture and workmanship for a period of not less than 2 years from date of delivery, installation or performance (whichever is the later);
- The vendor/contractor(s) shall promptly remedy any defect or deficiency in any goods/services, materials or equipment supplied under the contract to the full and complete satisfaction of the DDSB within seven (7) calendar days following notice to do so from the DDSB at no additional cost to the DDSB, unless otherwise specified;
- In the event that the vendor/contractor(s) does not promptly honour the above warranties to the satisfaction of the DDSB, the DDSB 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.

6.21 Guarantee

The vendor/contractor guarantees that with ordinary use the said work shall, for the period of twelve (12) months, unless otherwise specified from date of final acceptance by the DDSB, remain in such condition as will meet with the approval of the DDSB's representative and that the vendor/contractor will, upon request, repair any imperfection due to materials used in the construction or workmanship.

The decision of the DDSB as to the nature, extent and cause of such imperfections and the necessity for correcting the same shall be final.

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 DDSB after successful and satisfactory installation or attachment.

6.22 Product Data

Provide product data sheets, which show dimensions, appearance, and specifications for goods/services included in your bid submission, where requested by the DDSB.

6.23 Customs

All commercial customs documents, including but not limited to commercial invoices, Canada Customs Invoices, and bills of lading, as applicable, shall be fully and satisfactorily completed in accordance with Canada Border Services Agency requirements. The vendor/contractor shall obtain from the DDSB and show on the relevant commercial documents all that are accessible of the following: The Purchase Order Number or the department/school name of the DDSB purchasing the goods. Goods eligible for duty free entry into Canada according to NAFTA shall be accompanied by a fully completed NAFTA Certificate of Origin or Statement of Origin, stamped or printed. Penalties assessed by CBSA due to incomplete, inaccurate or missing information on a commercial customs document shall be the responsibility of the vendor/contractor and shall be charged to and paid by the vendor/contractor or shall be deducted from any payment owing to the vendor/contractor.

6.24 Workplace Hazardous Materials Information System (W.H.M.I.S)

The successful bidder must provide Material Safety Data Sheets and any required labeling for products that are designated as hazardous in the workplace in accordance with W.H.M.I.S. Legislation.

Prior to the initial shipment of good/services hereunder, the vendor/contractor shall provide the DDSB with, and during the term of this contract the vendor/contractor shall provide and continuously update, a list of all goods/services containing hazardous materials, or any physical agents or devices or equipment producing or emitting physical agents or any substance, compound or product that is deemed to be or contains a designated substance under the Occupational Health and Safety Act (Ontario).

In accordance with the Workplace Hazardous Materials Information System (WHMIS) Regulation, the vendor/contractor shall provide the appropriate Material Safety Data Sheets including all updates, during the term of the contract. All Material Safety Data Sheets documentation shall be provided to the DDSB in the format requested.

6.25 Workplace Safety & Insurance Board (W.S.I.B.)

The vendor/contractor MUST submit to the DDSB (Purchasing Department) at the time of entering into the Contract, a satisfactory clearance certificate from the Workplace Safety and Insurance Board confirming that all assessments or compensation payable to the Workplace Safety and Insurance Board have been paid, and the DDSB may, at any time during the performance or upon completion of the contract, require a further declaration that all such assessments or compensations have been paid.

The DDSB requires all vendor/contractors who provide labour and installation services on any of the DDSB properties, as part of the contract, to be in full compliance with all requirements imposed upon them by the Workplace Safety Insurance Board (WSIB).

Therefore, all of the vendor/contractor's personnel must be covered by the insurance plan under the Workplace Safety and Insurance Act, 1997.

A Certificate of Clearance from the WSIB, shall be provided prior to the commencement of work indicating that all payments by the vendor/contractor to the WSIB Board have been made.

Clearance certificates shall be renewed by the vendor/contractor every ninety (90) days (minimum) and submitted automatically and routinely to the DDSB throughout the period of the contract.

Prior to final payment, a Certificate of Clearance must be issued indicating all payments by the vendor/contractor to the DDSB in conjunction with the subject contract have been made and that the DDSB will not be liable to the WSIB for future payments in connection with the vendor/contractor's fulfillment of the contract.

For Independent Operators who have elected not to have WSIB coverage, the following shall be provided upon request by the DDSB:

- › a letter from the WSIB confirming Independent Operator status;
- › and evidence of having obtained WSIB optional Insurance.

The DDSB has the right to reject any bid it deems to have not provided sufficient WSIB coverage.

The vendor/contractor will ensure that any and all subcontractors also have valid WSIB coverage.

6.26 Clean Up

The vendor/contractor will:

- Keep the job site free from accumulations of waste materials or rubbish caused by employees or work, and at the completion of the day, will remove all rubbish from/and about the site and all tools and surplus materials, and will leave the work "construction clean", or its equivalent, unless otherwise specified.
- Clean up on a room-by-room basis as work is completed in that location.
- Use tarps and cover sheets in locations with existing furnishings and equipment. Care must be taken not to damage, dirty or mark floors or walls if furnishings and equipment need to be moved.
- Supply waste/recycling bins and must not use the DDSB's waste/recycling bin without written approval by the designated representative. In the case of a dispute, the DDSB reserves the right to remove waste and/or repair/clean up where the vendor/contractor has failed to do so and charge all costs to the vendor/contractor as shall be determined to be fair and just.

- Be responsible for the disposal of material removed from the site in accordance with all legislation and regulations regarding waste handling and disposal. The vendor/contractor will not burn any materials on-site and will not allow debris and/or fumes to enter the school's ventilation system or sewers.
- The vendor/contractor shall maintain the place of work in a tidy condition and free from accumulations of waste products and debris.
- At the completion of the work, the vendor/contractor shall remove their surplus materials, tools, construction machinery and equipment and also remove waste products and debris caused by the vendor/contractor, their subcontractors or employees.

7.0 PAYMENT

7.1 Invoicing

Invoicing and ordering format to be in accordance with the latest revision of the Construction Act and DDSB's Contractor Prompt Payment Procedures.

In addition to the requirements of the Construction Act, the following required documentation, and any further required documentation or information that the DDSB and the Contractor may agree upon, must be included in order for the Proper Invoice to be considered complete:

- (i) Completed DDSB Formal Application of Payment by Contractor form including substantial performance calculations when applying for substantial performance.
- (ii) Contractor's Proper Invoice including itemized breakdown, claims and reference to Purchase Order number where applicable.
- (iii) Cash Allowance breakdown including supporting invoices for claims.
- (iv) Change Order breakdown including front page copy of signed change orders being claimed, including signatures of Contractor, Consultant and Owner.
- (v) WSIB Clearance Certificate including correct project name, date covering the time frame the work was completed, listing DDSB as the Owner.
- (vi) Completed Statutory Declaration CCDC form 9A, with date.

7.2 Liens (Construction Act)

The Contractor shall comply with the terms and conditions of the latest revision of the Construction Act (Ontario) as amended from time to time.

7.3 Payments to Vendors

The DDSB, at its discretion, will make payments to vendor/contractors electronically or by cheque.

Vendor/contractors are required to provide the DDSB, upon request, with the necessary banking information (e.g. void blank cheque) in order that payments, at the discretion of the DDSB, can be made electronically.

7.4 Purchase Orders

Purchase orders will be issued by the DDSB for all goods/services required. No payment will be made unless the vendor/contractor can produce a valid purchase order. All invoices submitted for payment must reference the purchase order number issued by the DDSB.

7.5 Certificate of Substantial Performance

The DDSB reserves the right to request the vendor/contractor to publish the date of substantial performance of the project. The date will be agreed to by the vendor/contractor, and the DDSB. Publication of the project must be in accordance with the Construction Act.

Where there is no certification or declaration of substantial performance of a contract, or where the required publication has not occurred, lien rights expire at the conclusion of the sixty (60) day period following the date the contract is completed, as signified by the payment of the final progress claim.

7.6 Right to Audit

The bidder must provide a formula or means for which the DDSB can verify, at any point during the contract, that the pricing or percentage mark-up is being maintained by the bidder. This formula may be used by the DDSB for random spot checks to validate pricing.

The DDSB reserves the right to periodically audit invoices from Vendor/Contractors, issued to the vendor/contractor, to verify adherence to contract pricing.

In the event that pricing discrepancies exist, the vendor/contractor, at their expense, shall correct all invoices and issue payment or credit notes to the DDSB within thirty (30) days of the request by the DDSB.

Where a full audit of all invoices is required, the vendor/contractor shall perform the audit to the DDSB's satisfaction within thirty (30) days of the request and issue payment or credit note covering all amounts overcharged within sixty (60) days of request for audit.

The DDSB, in its sole discretion, in each case shall determine whether payment by cheque or credit note is appropriate.

Should the vendor/contractor fail to perform any of the audit requirements noted above, the DDSB reserves the right to terminate the contract, without incurring any cost or liability, giving thirty (30) days written notice.

8.0 CHANGES IN THE WORK

8.1 Change Orders

The DDSB may, without invalidating the contract, direct the vendor/contractor to make changes in the work.

When a change causes an increase, or decrease in the work, the contract price shall be increased or decreased by the unit price(s) quoted, or in the absence of applicable unit price(s), by an amount to be agreed upon between the DDSB and the vendor/contractor.

Any changes in the contract will be in the form of a written change notice from the DDSB Purchasing Department.

Where changes in the work are made after the award of contract and are not to be valued by the unit prices, the vendor/contractor agrees to provide bids for the proposed changes to the DDSB (Purchasing Department) indicating the complete breakdown of material and labour costs, mark-up, profit etc.

Mark-up for changes shall be applied as follows:

Prime Contractor's Own Work:
Prime Contractor Overhead = 10%
Prime Contractor Profit = 5%

Sub-Contractor's Work:
Sub-Contractor Overhead = 5%
Sub-Contractor Profit = 5%
Contractor Overhead (only) on Work of Subcontractor = 10%

8.2 Force Majeure / Delays in The Work

1.1 Force Majeure

For the purposes hereof, "Force Majeure" means the occurrence of an event or circumstance ("Force Majeure Event") that prevents or impedes a party from performing one or more of its contractual obligations under this Agreement, if and to the extent that the party affected by the impediment (the "Affected Party") proves:

- (a) that such impediment is beyond its reasonable control; and
- (b) that it could not reasonably have been foreseen at the time of the conclusion of the Agreement; and

- (c) that the effects of the impediment could not reasonably have been avoided or overcome by the Affected Party.

1.2 Non-Performance by Third Parties

Where a party fails to perform one or more of its contractual obligations because of a default by a third party whom it has engaged to assist such party in performing the Agreement, such party may only invoke Force Majeure only to the extent that the requirements under Article 1.1 are established both for such party and for the third party.

1.3 Presumed Force Majeure Events

In the absence of proof to the contrary, the following events affecting a party shall be presumed to fulfill conditions (a) and (b) of Article 1.1, and the Affected Party only needs to prove that condition (c) of Article 1.1 is satisfied:

- (a) war (whether declared or not), hostilities, invasion, act of foreign enemies, extensive military mobilization;
- (b) civil war, riot, rebellion and revolution, military or usurped power, insurrection, act of terrorism, sabotage or piracy;
- (c) currency and trade restriction, embargo, sanction;
- (d) act of authority, whether lawful or unlawful, compliance with any law or governmental order, expropriation, seizure of works, requisition, nationalization;
- (e) plague, epidemic, quarantine or other health emergency affecting the general public, natural disaster or extreme natural event;
- (f) explosion, fire, destruction of equipment, prolonged break-down of transport, telecommunication, information system or energy;
- (g) general labour disturbance, such as boycott, strike and lock-out, go-slow, occupation of factories and premises.

1.4 Notification

The Affected Party shall give notice of the event without delay to the other party.

1.5 Consequences of Force Majeure

A party successfully invoking Force Majeure is relieved from its duty to perform its obligations under this Agreement and from any liability in damages or from any other contractual remedy for breach of contract, from the time at which the impediment causes inability to perform, provided that the notice thereof is given

without delay. If notice thereof is not given without delay, the relief is effective from the time at which notice thereof reaches the other party. The other party may suspend the performance of its obligations, if applicable, from the date of the notice.

1.6 Temporary Impediment

Where the effect of the impediment or event invoked is temporary, the consequences set out in Article 1.5 above shall apply only as long as the impediment invoked prevents performance by the Affected Party of its contractual obligations. The Affected Party must notify the other party as soon as the impediment ceases to impede performance of its contractual obligations.

1.7 Duty to Mitigate

The Affected Party is under an obligation to take all reasonable measures to limit the effect of the event invoked upon performance of the Agreement.

1.8 Agreement Termination

Where the duration of the impediment invoked has the effect of substantially depriving the parties of which they were reasonably entitled to expect under the Agreement, either party has the right to terminate the Agreement by notification within a reasonable period to the other party. Unless otherwise agreed, the parties expressly agree that the Agreement may be terminated by either party if the duration of the impediment exceeds one hundred and twenty (120) days.

1.9 Unjust Enrichment

When Article 1.8 applies, and where either party in the performance of the Agreement derived a benefit before the termination of the Agreement, the party deriving such a benefit shall pay to the other party a sum of money equivalent to the value of such benefit.

9.0 INDEMNIFICATION & LIABILITY

9.1 Indemnification of Client

The vendor/contractor agrees to indemnify and save harmless the DDSB from all actions, suits, claims and demands, and costs and damages arising by reason of injury or death to any person or any property resulting from the services or work performed herein.

9.2 Intellectual Property Indemnity

The vendor/contractor shall defend, indemnify and hold DDSB harmless against all third-party claims, suits, proceedings, costs, damages, losses and expenses (including reasonable legal fees and settlement fees), and judgments incurred, claimed or sustained by DDSB arising out of or related to any allegation that any portion of the goods/services (including software and updates, error corrections, or upgrades thereto) violates any patent, copyright, trade secret, trade-mark, or other third-party intellectual property right. If a claim is filed in a court or other administrative proceeding seeking to enjoin the use of the goods/services, the vendor/contractor shall either:

- (i) at the vendor's/contractor's cost, procure for DDSB the right to continue to use the relevant portion of the goods/services;
- (ii) replace, at the vendor's/contractor's cost, the relevant portion of the goods/services with a substitute product that functions substantially in accordance with the applicable specifications of that portion of the goods/services; or
- (iii) at the vendor's/contractor's cost, modify the goods/services so that it does not infringe or misappropriate, provided that the goods/services, as modified, continues to perform substantially in accordance with the applicable specifications.

The vendor/contractor will have the right to control the defense, select counsel, and direct the course of resolution, including settlement of any infringement claim (but only if the settlement does not include an admission of liability by DDSB, does not involve more than the payment of money, and grants DDSB a full and unconditional release from all liability with respect to the claim). In addition to the defense provided by the vendor/contractor, DDSB may elect to retain its own counsel, but the vendor/contractor will not be responsible for any fees or expenses of such counsel.

This indemnity shall survive the expiration or sooner termination of the contract.

9.3 Insurance (Fire)

The successful bidder shall be responsible for fire insurance on their own facilities and equipment.

9.4 Insurance (General Liability)

The vendor/contractor shall provide and maintain at their own expense, a policy of general liability insurance issued by an insurance company incorporated or licensed to conduct insurance business in the Province of Ontario during the entire contract period.

General liability insurance shall be in the name of the vendor/contractor, naming the DDSB and Durham Energy Specialist Limited as additional insured, with limits of not less than five million (5,000,000.00) dollars inclusive per occurrence for bodily injury, death, and damage to property including loss of use thereof.

In the case of any Roof Replacement or New Roofing projects, General Liability Insurance shall be in the name of the vendor/contractor, naming the DDSB as additional insured, with limits of not less than ten million (10,000,000) dollars inclusive per occurrence for bodily injury, death and damage to property including loss of use thereof.

The vendor/contractor shall provide the DDSB (Purchasing Department) with proof of insurance within 10 days of issuance of the written notification of intent to award the contract.

10.0 RIGHTS AND RESPONSIBILITIES

10.1 Environmental

In an effort to reduce environmental waste, the DDSB promotes and supports goods and services that are environmentally friendly and contain the maximum level of post-consumer waste and/or recyclable content, without significantly affecting the intended use of the goods or services. Where possible, packaging shall be manufactured from recycled materials.

10.2 Government or Regulatory Actions

Where any governmental or regulatory authority having jurisdiction (AHJ) requires the DDSB or the vendor/contractor to recall or cease using any goods/services, the DDSB or the vendor/contractor, as the case may be, shall promptly notify the other of such decision or requirement providing all relevant particulars.

In the case of any recall, seizure or requirement to cease using any of the goods/services by any governmental or regulatory authority having jurisdiction, the vendor/contractor, without limiting the DDSB's rights or remedies, shall be provided the opportunity to provide corrective action satisfactory to the DDSB, as follows:

- replace or repair the good/services and deliver replacement or repaired good/services to the DDSB, which is satisfactory to the DDSB; and
- honour all applicable good/services warranties

In any event, the vendor/contractor shall defend, indemnify and hold the DDSB and its officers, directors, agents, principals, elected officials or employees harmless from and against all damages, liabilities, and costs including legal costs on a substantial indemnity basis, arising from or related to such recall, seizure or order to cease using, to the extent that such loss was caused by the vendor/contractor.

The responsibility of the vendor/contractor under this provision shall also apply in the case where any Canadian governmental or regulatory authority issues an order to seize the goods/services (for example, where the vendor/contractor failed to exercise the required corrective action and/or the license of the goods/services was revoked).

For clarity, the responsibility of the vendor/contractor to replace or repair the goods/services does not apply where the DDSB decides, in its sole discretion, to cease using the goods/services due to health or safety concerns and those concerns have not led to the request by the Canadian governmental or regulatory authority that the vendor/contractor take appropriate action to correct or to cease using the goods/services.

10.3 Lobbying

Lobbying is inappropriate. Engaging in this kind of behaviour may result in your bid being disqualified.

10.4 No Publicity or Promotion

No vendor, including a preferred Vendor/Contractor, shall make any public announcement or distribute any literature regarding this RFP or otherwise promote itself in connection with this RFP or any arrangement entered into under this RFP without the prior written approval of the DDSB.

In the event that a Vendor/Contractor, including a preferred Vendor/Contractor, makes a public statement either in the media or otherwise in breach of this requirement, in addition to any other legal remedy it may have in law, in equity or within the context of this RFP, DDSB shall be entitled to take all reasonable steps as may be deemed necessary by DDSB, including disclosing any information about a Proposal, to provide accurate information and/or to rectify any false impression which may have been created.

10.5 Subcontractors

The vendor/contractor agrees to preserve and protect the rights of the parties under the contract with respect to work to be performed under subcontract and to:

- Enter into contracts or written agreements with their subcontractors requiring them to perform their work in accordance with and subject to the terms and conditions of the contract documents.
- Be fully responsible to the DDSB for acts and omissions of their subcontractors and of persons directly or indirectly employed by them as for acts and omissions of persons directly employed by him.
- The vendor/contractor MUST submit a list of any sub-contractor who will be carrying out any part of this contract indicating the work each subcontractor will be responsible to perform.
- The DDSB may for reasonable cause, object to the use of a proposed subcontractor and require the vendor/contractor to employ one of the other subcontract bidders. In the event that the DDSB requires such a change, the contract price shall be adjusted by the difference in cost and mark-up occasioned by such a change.
- Nothing contained in the contract documents shall create a contractual relationship between a subcontractor and the DDSB.

10.6 Term of Contract

This contract is for the period herein stipulated, subject to both satisfactory performance and pricing. Pricing is to remain firm as specified and subsequent years pricing will be subject to negotiation acceptable to the DDSB.

The DDSB reserves the right to extend the contract subject to negotiations acceptable to the DDSB.

This contract shall come into force on the effective date and shall expire, unless terminated earlier in accordance with the provisions of the contract, on the occurrence of any of the following:

- Installation of the goods/services has been completed to the satisfaction of the DDSB, as applicable;
- All other bidder obligations under the contract have been met to the satisfaction of the DDSB;
- The DDSB has made all of the payments required under the contract.

If required, either party can ask for confirmation that the contract has expired. The term of the contract is subject to any and all rights of either party to terminate the contract pursuant to the terms and conditions, or otherwise available to either party at law or in equity.

10.7 Termination of Contract

The DDSB shall be entitled to terminate the contract, without liability, cost or penalty in accordance with the following:

- On written notice to the vendor/contractor, if any proceeding in bankruptcy, receivership, liquidation or insolvency is commenced against the vendor/contractor or its property;
- On written notice to the vendor/contractor, if the vendor/contractor makes an assignment for the benefit of its creditors, becomes insolvent, commits an act of bankruptcy, ceases to conduct its business or affairs, files a notice of intention or a proposal or seeks any arrangement or compromise with its creditors under any statute or otherwise;
- On written notice to the vendor/contractor, following the occurrence of any material change in the DDSB requirements which results from regulatory or funding changes or recommendations issues by any government or regulatory body;
- At any time, without cause, by giving the vendor/contractor at least thirty (30) days written notice;
- On thirty (30) days written notice to the vendor/contractor in the event of a breach of the representation regarding conflict of interest;
- As per any provision of the contract that provides for early termination.

If the DDSB terminates the contract for any of these reasons, it is entitled to:

- Take possession of the work in progress and materials on site and utilize the construction equipment then on site and complete the work by whatever method the DDSB may consider expedient but without undue delay or expense.
- Withhold any further payments to the vendor/contractor until the work is complete.

- Recover from the vendor/contractor all losses, damages and expense incurred by the DDSB due to the vendor/contractor's default (this may be deducted from any monies due or becoming due to the vendor/contractor).
- The vendor/contractor's obligations under the contract as to quality, correction and general guarantee of the work performance up to the time of termination shall continue to be in force after such termination.

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

10.8 Suspension and/or Stoppage of Work

The DDSB may, without invalidating the contract, suspend performance by the vendor/contractor from time to time for any or all work for such reasonable period of time as the DDSB may determine.

The resumption and completion of work after the suspension shall be governed by the schedule established by the DDSB.

The DDSB designated representative has the authority to stop the progress of any work whenever in their opinion, such stoppage may be necessary.

11.0 WORK COMPLIANCE

11.1 Electrical Safety

All electrical/electronic components supplied by the vendor must be CSA / ULC and/or Ontario Hydro/Ontario Electrical Safety Authority approved. Appropriate labels must be affixed to the equipment.

Appropriate label, symbol or seal shall be affixed to all electrical equipment supplied or used in the performance of the contract. If such label, symbol or seal is absent, the equipment will be returned to the vendor/contractor at their expense. The DDSB will not forward payment until this condition is met.

11.2 Electronic Commerce Act

Electronic forms of correspondence for business requirements will be considered a legal medium as prescribed in the Ontario "Electronic Commerce Act, 2000, S.O. 2000.

11.3 Accessibility for Ontarians With Disabilities Act (A.O.D.A.)

DDSB is committed to the highest possible standards for accessibility. The vendor/contractor must be capable to recommend and deliver, as appropriate for each deliverable, accessible and inclusive goods and/or 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 429-7 made under the Accessibility for Ontarians with Disabilities Act, 2005 (Accessibility Standards for Customer Service), the DDSB has established regulations, policies, practices and procedures governing the provision of its goods and services to persons with disabilities. DDSB Regulation #1305 is available for review on the Boards website under Policies and Procedures at: DDSB Policies, Regulations & Procedures.

Vendor/contractors are required to comply with the Board'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 vendor/contractor.

11.4 Canadian Standards Association (C.S.A.)

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.

12.0 LIST OF PREQUALIFIED BIDDERS

12.1 General Contractors – Category C:

Company Name	Location
Deciantis Construction Limited	Richmond Hill, ON
Gateman Milloy Inc	Kitchener, ON
Gerr Construction Limited	Bowmanville, ON
Golden Gate contracting	Oakville, ON
J.J. McGuire General Contractors Inc.	Oshawa, ON
J.V.S. Construction Limited	Whitby, ON
Morosons Construction Limited	Toronto, ON
Newgen Construction Corporation	Mississauga, ON
Pre-Eng Contracting Ltd.	Concord, ON
Remo General Contracting Ltd.	Brampton, ON
RJB Construction (1989) Ltd	Newmarket, ON
Rutherford Contracting Ltd.	Aurora, ON
Silver Birch Contracting Ltd.	Schomberg, On
Torcom Construction Inc	North York, ON
TRP Construction General Contractors	Burlington, ON

Henry Street High School
Project Name: Ventilation Upgrades
Site Address: 600 Henry Street, Whitby, ON L1N 5C7

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Issued For: Bid
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LIST OF PREQUALIFIED BIDDERS

12.2 Mechanical Contractors:

Company Name	Location
Adamson and Dobbin Ltd.	Peterborough, ON
Black Creek Mechanical Ltd.	Toronto, ON
CEC Mechanical	King City, ON
Mapleridge Mechanical Contracting Inc	Pickering, ON
Masen Mechanical Inc.	Woodbridge, ON
MSB Mechanical Ltd	Aurora, ON
Mutual Mechanical Ltd.	Oshawa, ON
Pipe All Plumbing & Heating Ltd.	Woodbridge, ON
Stellar Mechanical	Toronto, ON
Summit Mechanical	Peterborough, ON
Unified Mechanical Inc.	Courtice, ON
W. Mitchell & Son Mechanical Contractors Ltd.	Pickering, ON

Henry Street High School
Project Name: Ventilation Upgrades
Site Address: 600 Henry Street, Whitby, ON L1N 5C7

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Issued For: Bid
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LIST OF PREQUALIFIED BIDDERS

12.3 Electrical Contractors

Company Name	Location
Small Projects List:	
CEC Services Limited (Aurora)	King City, ON
Cremers Brothers Electric Limited	Peterborough, ON
Electro Light Inc	Oshawa, ON
Ferguson Electric Company Ltd	Cobourg, ON
Gremar Electric Ltd.	Vaughan, ON
Multiservice Electric Ltd.	Claremont, ON
RCN Electric	Mississauga, ON
Smith and Long	Markham, ON
Sojat Electric Limited	Richmond Hill, ON
Space Age Electric	Oshawa, ON
Surefoot Mechanical.Inc	Whitby, ON
Trilogy Electric Ltd.	Whitby, ON

Henry Street High School
Project Name: Ventilation Upgrades
Site Address: 600 Henry Street, Whitby, ON L1N 5C7

T22-13
Issued For: Bid
Date: January 14, 2022

13.0 APPENDIX XX

COVID-19 Protocol

1. The DDSB recognizes the importance of immunization as a key element to help keep school settings safe.
2. The purpose of this document is to outline the DDSB's expectations and processes with respect to COVID-19 vaccination in order to protect the DDSB's staff and students. Reference in this document to vaccination or to a vaccine is in reference to a COVID-19 vaccination authorized for use in Canada.
3. Pursuant to the requirements of the Province, by September 7, 2021, all DDSB employees, Trustees, and student transportation drivers as well as all individuals attending on school premises frequently and having direct contact with staff or students including students on educational placement, volunteers, those who provide professional services to children at school and visitors, including third-party contractors, are required to attest if they are fully vaccinated against COVID-19, with proof to follow (the "Attestation").
4. The DDSB Attestation form for employees is now live and can be found on employee self serve.
5. Any third-parties with employees, students or volunteers covered by this Protocol shall provide the DDSB with a certificate confirming that they have received completed Attestations from all their employees, students or volunteers, as the case may be.
6. The Attestation allows individuals to note if they have a valid medical exemption. For those that have a medical reason for not being vaccinated, documentation from either a physician or a nurse practitioner is required (note: a nurse practitioner is a registered nurse who holds an extended certificate of registration under the Nursing Act, 1991). The documentation from the physician/nurse practitioner must specify whether the reason is permanent or time-limited. If time-limited, the documentation should indicate how long the medical reason is expected to last. If an individual is unable to receive their vaccine for a medical reason but that reason is valid for a limited time, the DDSB will follow-up to ensure the individual re-submits the Attestation.
7. Individuals who are not fully vaccinated or who prefer not to disclose their vaccination status are to indicate this on the Attestation form. All such individuals still must complete the form. Submission of a completed Attestation is mandatory. Further, all such individuals must:
 - a. Undergo regular COVID-19 Antigen Testing ("COVID-19 Test") and provide proof of a negative result as required by Ministry of Education in order to gain access to any DDSB building (testing will be at no cost to DDSB employees); and

- b. Complete a mandatory education program as prescribed by the Ministry of Education.
8. If an individual covered by this protocol is unable to be vaccinated due to a protected ground as defined by the Ontario Human Rights Code (the “Code”) and is otherwise in full compliance with this Protocol, the DDSB will consider accommodations in accordance with the Code to the point of undue hardship. Any duty to accommodate must be balanced against the Board’s obligations to protect the health and safety of employees and students. Due to the serious health threat COVID-19 presents to the public, any requests for accommodation must be submitted in writing to hrbp@ddsb.ca and must provide sufficient supporting material.
9. Depending on individual circumstances possible accommodations may include additional measures related to risk mitigation such as masking, physical distancing or may include remote arrangements, work-from-home arrangements, leave of absence and/or restructured duties and responsibilities. In all cases, COVID-19 testing will be required if attending at any DDSB premises.
10. Personal information and personal health information are collected in compliance with the Municipal Freedom of Information and Protection of Privacy Act, under the authority of the Education Act, RSO 1990, c. E-2, as amended, Section 169.1(1), and the Ministry's COVID-19: Immunization Disclosure Policy & Testing Requirements. The information collected through this confidential disclosure will advance safety in schools and promote the province's vaccination policy to support the health and well-being of students, families, and communities. Questions regarding the collection of this data should be directed to your supervisor or the Human Resources Superintendent Heather Mundy.

Henry Street High School
Project Name: Ventilation Upgrades
Site Address: 600 Henry Street, Whitby, ON L1N 5C7

T22-13
Issued For: Bid
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14.0 APPENDIX YY

Certificate of Compliance: DDSB COVID-19 Immunization Disclosure Protocol

As announced on August 17, 2021, an immunization disclosure protocol is required for all publicly-funding school board staff and other individuals frequently in these setting who may have direct contact with students and/or staff for the 2021 -2022 school year.

The following individuals are included if they attend school premises frequently and have direct contact with staff and/or students:

- Students on educational placement, including professional services students on a placement/work-integrated learning visit
- Volunteers
- Those who provide professional services to children at school
- Visitors, including third party contractors

Individuals subject to this protocol must provide proof of one of the following three things:

1. Full vaccination against COVID-19 (“Fully-vaccinated against COVID-19” means having received all of the doses required for a COVID-19 vaccine(s) approved by the World Health Organization and having received the final vaccine does at least 14 days ago.
2. A medical reason for not being vaccinated against COVID-19
3. Completion of a COVID-19 vaccination educational program prescribed by the Ministry of Education

*Those who are not fully vaccinated will be required to complete COVID-19 rapid antigen testing twice per week as prescribed by the Ministry of Education.

I affirm that all of our staff/employees/students that are frequently attending DDSB school premises and in direct contact with staff and/or students have met the requirements set out by the DDSB protocol. Please send this signed letter to Michelle.Chassels@ddsbs.ca

Name of Organization/Company/Business:

Contact Email:

Signing Officer Name:

Signing Officer Signature:

Date:



Henry Street High School
Project Name: Ventilation Upgrades
Site Address: 600 Henry Street, Whitby, ON L1N 5C7

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15.0 SPECIFICATIONS

INDEX TO SPECIFICATIONS

Section No.	Section Title
00160	List of Prequalified Bidders
00400	Supplementary Bid Form

PART I – GENERAL

- 1.1 This is an invited Tender. General (Prime) Contract bidders submitting a bid require prequalification and acceptance by the Owner prior to obtaining Bid Documents. Refer to Part 2 below.
- 1.2 Any mechanical and electrical subcontract bidders submitting a bid to the general (prime) contractors require prequalification and acceptance by the Owner prior to obtaining Bid Documents. Refer to Parts 3 and 4 below.
- 1.3 Other Subcontract Bidders: Refer to Parts 5 and 6 below for designated Subcontract work.

PART 2 – GENERAL (PRIME) CONTRACT BIDDERS

- 2.1 The following General contract bidders have been prequalified and accepted to bid:
 - .1 Deciantis Construction Limited
Richmond Hill, ON
Phone: 905-884-5131
Email: john@deciantisconstruction.ca
 - .2 Gateman Milloy Inc.
Kitchener, ON
Phone: 519-748-6500
Email: phersics@gatemanmilloy.com
 - .3 Gerr Construction Limited
Bowmanville, ON
Phone: 905-697-2290
Email: ngerrits@gerrcon.com
 - .4 Golden Gate Contracting
Oakville, ON
Phone: 905-844-1122
Email: lubna@ggcontracting.ca
 - .5 JJ McGuire General Contractors Inc.
Oshawa, ON
Phone: 905-436-2554
Email: bids@jjmcquire.com
 - .6 JVS Construction Limited
Whitby, ON
Phone: 905-430-8943
Email: admin@jvslimited.ca

- .7 Morosons Construction Limited
Toronto, ON
Phone: 416-233-4171
Email: info@morogroup.ca

- .8 Newgen Construction Corporation
Mississauga, ON
Phone: 905-602-4830
Email: hugo@newgen.cc

- .9 Pre-Eng Contracting Ltd.
Concord, ON
Phone: 905-738-6866
Email: info@pre-eng.com

- .10 Remo General Contracting Ltd.
Brampton, ON
Phone: 905-792-0700
Email: info@remogc.ca

- .11 RJB Construction (1989) Ltd.
Newmarket, ON
Phone: 905-895-8144
Email: info@rjbconstruction.ca

- .12 Rutherford Contracting Ltd.
Aurora, ON
Phone: 905-726-4888
Email: tenders@ruthcon.ca

- .13 Silver Birch Contracting Ltd.
Schomberg, ON
Phone: 905-952-3856
Email: estimating@birchcon.ca

- .14 Torcom Construction Inc.
North York, ON
Phone: 416-226-9337
Email: vache@torcomconstruction.com

- .15 TRP Construction General Contractors
Burlington, ON
Phone: 905-336-1041
Email: info@trpconstruction.ca

PART 3 – MECHANICAL SUBCONTRACT BIDDERS

- 3.1 The following Mechanical subcontract bidders have been prequalified and accepted to bid:

- .1 Adamson & Dobbin
P.O. Box 1326, 407 Pido Road
Peterborough, ON K9J 7H5
Contact: David Dobbin
Phone: 705-745-5751
Fax: 705-742-4524
Email: steve@adamsonanddobbin.com

- .2 Black Creek Mechanical Ltd.
104 Florence Crescent
Toronto, ON M6N 4E5
Contact: James Findlay
Phone: 1-416-604-7558
Fax: 1-416-604-7008
Email: estimating@blackcreekmechanical.ca

- .3 CEC Mechanical
16188 Bathurst Street
King City, ON L7B 1K5
Contact: David Beswick
Phone: 905-713-3711
Fax: 905-713-0736
Email: dbrown@beswickgroup.com

- .4 Mapleridge Mechanical
939 Dillingham Road
Pickering, ON L1X 2P7
Contact: Rob Allingham
Phone: 905-831-0524
Fax: 905-831-1628
Email: james@mrmmech.com

- .5 Masen Mechanical Inc.
155 Regina Road, Unit 1
Woodbridge, ON L4L 8L9
Contact: Anthony Peluso
Phone: 905-264-1667
Fax: 905-264-1664
Email: anthony@masenmechanical.ca

- .6 MSB Mechanical Ltd.
212 Earl Stewart Drive, Unit 4
Aurora, ON L4G 6V7
Contact: Mathew Black
Phone: 905-726-3997
Fax: 905-726-9126
Email: tenders@msbmechanical.com

- .7 Mutual Mechanical
869 Nelson Street
Oshawa, ON L1H 5N7
Contact: Boris Varga
Phone: 905-579-6089
Fax: 905-579-5732
Email: admin@mutualmechanical.net

- .8 Pipe All Plumbing & Heating Ltd.
141 Strada Drive
Woodbridge, ON L4L 5V9
Contact: Frank Caschera
Phone: 905-851-1927
Fax: 905-851-2002
Email: office@pipeall.ca

- .9 Stellar Mechanical
15 Penn Drive
Toronto, ON M9L 2A6
Contact: Tony DiGiuseppe
Phone: 416-748-8088
Fax: 416-748-8288
Email: tony@stellarmechnical.ca

- .10 Summit Mechanical
Contact: Bart Barnes
749 the Kingsway
Peterborough, ON K9J 6W7
Phone: 705-740-0202
Fax: 705-743-7606
Email: jamey@summitmechanical.ca

- .11 Unified Mechanical
55 Avondale Drive
Courtice, ON L1E 2Z1
Contact: Drew Rankin
Phone: 905-433-0045
Fax: 289-240-3342
Email: unifiedmechanical@live.ca

- .12 W.Mitchell & Son
12-1730 McPherson Court
Pickering, ON L1W 3E6
Contact: Collin Mitchell
Phone: 905-831-7691
Fax: 905-831-4673
Email: collin@wmitchellandson.com
estimating@wmitchellandson.com

PART 4 – ELECTRICAL SUBCONTRACT BIDDERS

4.1 The following Electrical subcontract bidders have been prequalified and accepted to bid:

- .1 CEC Services Limited (Aurora)
16188 Bathurst Street
King City, ON L7B 1K5
Contact: Kevin Beswick
Phone: 905-713-3711
Fax: 905-713-0736
Email: estimating@beswickgroup.com
- .2 Cremers Brothers Electric Ltd.
2005 Bensfort Road
Peterborough, ON K9J 6X7
Contact: Ed Cremers
Phone: 705-742-3489
Fax: 705-742-4411
Email: jamie@cbe.on.ca
- .3 Electrolight
1401 Patton Street
Oshawa, ON L1G 7V6
Contact: Jerry Fitzgerald
Phone: 905-424-2321
Fax: 905-576-4928
Email: electrolightinc@bell.net
- .4 Ferguson Electric Company Ltd.
140 Veronica Street
Cobourg, ON K9A 0E3
Contact: Wayne Ferguson
Phone: 905-372-1212
Fax: 905-372-8114
Email: andrew@fergusonelectric.net
chris@fergusonelectric.net
- .5 Greinar Electric Ltd.
7500 Hwy 27, Unit 10
Vaughan, ON L4H 0J2
Contact: Gennaro DiGregorio
Phone: 416-647-1442
Fax: 905-652-8259
Email: gennaro@greinar.ca
- .6 Multiservice Electric Ltd.
PO Box 5062
Claremont, ON L1Y 1A4
Contact: Robert Smith
Phone: 905-649-5157
Fax: 905-649-6444
Email: rsmith@multiserviceelectric.com

-
- .7 RCN Electric
1060 Britannia Road East, Unit 9
Mississauga, ON L4W 4T1
Contact: Claudio Marinaccio
Phone: 905-670-2217
Email: rcnelec@bellnet.ca
- .8 Smith and Long
115 Idema Road
Markham, ON L3R 1A9
Contact: Robert Riopelle
Phone: 416-391-0443
Fax: 416-391-0621
Email: jscott@smithandlong.com
- .9 Sojat Electric Limited
16 Sims Crescent, Unit 12
Richmond Hill, ON L4B 2P1
Contact: Andy Sojat
Phone: 905-731-8212
Fax: 905-731-8081
Email: sojatelectric@yahoo.ca
- .10 Space Age Electric Ltd.
219 Bloor Street East
Oshawa, ON L1H 3M3
Contact: Leonard Lembo
Phone: 905-436-6744
Fax: 905-432-3751
Email: spaceage@rogers.com
- .11 Star Electric Services Inc.
8 Automatic Road, Unit 2A
Brampton, ON L6S 5N3
Contact: Ranjit Grewal
Phone: 905-799-3883
Fax: 905-799-8334
Email: info@starelectrical.ca
- .12 Surefoot Electric
23-2020 Wentworth Street
Whitby, ON L1N 9A8
Contact: Joe Sayles
Phone: 905-579-2690
Fax: 905-743-0429
Email: joe@surefootelectric.com

- .13 Trilogy Electric Ltd.
822 Centre Street North
Whitby, ON L1N 4V1
Contact: Tommaso Aloia
Phone: 905-666-4100
Fax: 905-666-4535
Email: tom@trilogyelectric.com

PART 5 – OTHER SUBCONTRACT BIDDERS

5.1 Acceptable Roofing Subcontract Bidders:

- .1 Atlantic Roofers (existing roof under warranty)

5.2 Acceptable Sheet Metal Subcontract Bidders:

- | | | |
|-----|-----------------------------|--------------|
| .1 | Adamson & Dobbin Ltd. | 705-745-5751 |
| .2 | Black Creek Mechanical Ltd. | 416-604-7558 |
| .3 | Briar Group Air Systems | 416-740-0221 |
| .4 | DM Enterprises Limited | 905-375-4436 |
| .5 | Mapleridge Mechanical | 905-831-0524 |
| .6 | MSB Mechanical Ltd. | 905-726-3997 |
| .7 | Tam-Kal | 905-888-9200 |
| .8 | Crozier Environmental Inc. | 905-983-9199 |
| .9 | Noddle Sheet Metal | 705-742-5203 |
| .10 | Dunford Liscio Mechanical | 905-793-7577 |
| .11 | Heritage Sheet Metal | 705-277-3056 |
| .12 | Lakeland Multitrade | 905-372-7413 |
| .13 | G&G Sheet Metal | 905-888-7728 |
| .14 | WHS Sheet Metal | 416-301-8615 |
| .15 | Townsend Sheet Metal | 905-952-2060 |

5.3 Building Automation Controls:

- .1 DDSB to supply all parts.
- .2 The successful General prime contractor shall carry the successful installing controls contractor as a sub-trade under the allotted cash allowance. Refer to Cash Allowance Specification (including overhead and profit being part of base price, and not cash allowance, except for overruns). Upon the contract being awarded, DDSB shall select a pre-qualified installing controls contractors based on the scope of work outlined on the drawings.

END OF SECTION

PART 1 - GENERAL

1.1 Instructions to Bidders

- .1 Supplementary Bid Form must be submitted to Durham Energy Specialist Limited (info@durhamenergy.com) and the Durham District School Board (kelly.jennings@ddsb.ca) within twenty-four (24) hours after tender closing. Contractors shall identify all sub-contractors they intend to use and must complete all information requested. Contractor shall sign, date and seal the last page and initial and date all other pages.
- .2 Should the Supplementary Bid Form not be submitted then the Contractor shall use Base Bid Manufacturers as listed.
- .3 The Stipulated Bid Sum shall be for the base bid manufacturer or supplier equipment only, unless otherwise indicated. Where a choice of this equipment is given, this Contractor shall indicate the supplier or manufacturer they intend to use. Where no choice is indicated, the base bid supplier or equipment shall be used.
- .4 Equipment or materials manufactured by firms named in the following listing only shall be deemed equal to the equipment or material specified provided the equipment or material will have capacity, performance, rating, construction, physical dimensions, accessories and features which, in the opinion of the Consultant, are equal to those of the specified equipment or material. The Contractor shall not indicate equipment, materials or suppliers which are not listed.
- .5 Where modification to the work of other trades are not required as a result or part of the alternative offered, include the cost of said modifications in the work.

1.2 Price Breakdowns

The total of all amounts below shall equal total stipulated sum.

.1	General Trades Work	\$ _____
.2	Mechanical Work	\$ _____
.3	Electrical Work	\$ _____
.4	Cash Allowance (Cutting, Patching, etc.)	\$ <u>7,500</u>
.5	Cash Allowance (Controls)	\$ <u>30,000</u>
.6	Cash Allowance (P.A. & Data)	\$ <u>5,000</u>
.7	Cash Allowance (Abatement)	\$ <u>2,500</u>

Contractor Name: _____ Contractor Initial: _____ Date: _____

1.3 Sub-Contractors

The Contractor shall state below the name of the Sub-Contractors they intend to use, which shall not be changed without the consent of the Consultant.

Selective Demolition	_____
Masonry	_____
Structural Steel	_____
Roofing	_____
Rough Carpentry	_____
Finish Carpentry	_____
Architectural Woodwork	_____
Firestopping & Smoke Seals	_____
Acoustic Ceilings	_____
Gypsum Board	_____
Terrazzo	_____
Painting	_____
Mechanical	_____
Mechanical (Sheet Metal)	_____
Electrical	_____
Controls	_____(Cash Allowance)_____

1.4 Equipment List

The Contractor shall state below the name of the equipment they intend to use, which shall not be changed without consent of the Consultant.

Doors & Frames	_____
Rooftop Units	_____

SUBMITTED BY:

I / We certify that I / We have the authority to bind the company:

Name of Signing Officer(s)

SIGNATURE

Name of Signing Officer(s)

SIGNATURE

Telephone Number of Signing Officers

NAME OF COMPANY

ADDRESS OF COMPANY

HST REGISTRATION NUMBER

CORPORATE SEAL

Contractor Name: _____ Contractor Initial: _____ Date: _____

INDEX TO SPECIFICATIONS

Section No.	Section Title
01010	General Requirements
01021	Cash Allowances
01310	Project Management and Coordination
01320	Construction Schedule
01351	Health and Safety
01520	Construction Facilities
01561	Environmental Protection
01720	Roofing
01730	General Trades Work
01740	Cleaning
01760	Warranty Work

PART I – GENERAL

1.1 General Requirements

- .1 The requirements of this section shall apply to all sections in Division 1.
- .2 All material, labour, equipment, and services required under this section shall be the full responsibility of the Contractor including any material, labour, equipment, and services provided by their subcontractors.

1.2 Definitions

- .1 “Supply” shall mean supply only.
- .2 “Install” shall mean install and connect.
- .3 “Provide” shall mean supply, install, and connect.
- .4 “Drawings and Specifications” shall mean Contract Documents.
- .5 “Authorities” or “Authorities having jurisdiction” shall mean all agencies that enforce the applicable laws, ordinances, rules, regulations, or codes of the Place of Work.
- .6 “Work” shall mean all equipment, materials, labour, and permits to provide a complete and operational mechanical system as detailed in the drawings and specifications.
- .7 “Owner” or “DDSB” shall mean Durham District School Board.

1.3 Related Work

- .1 Division 15 – Mechanical
- .2 Division 16 – Electrical

1.4 Intent

- .1 The drawings and specifications are not a detailed set of installation instructions. Drawings and specifications are complementary to one another and that which is shown on one is as binding as that which is shown on both.
- .2 The Consultant shall be immediately informed of any discrepancies between drawings and specifications leaving in doubt the true intent of the work.
- .3 Supply all labour, equipment, and materials necessary to install a complete and operational mechanical system described herein and shown on the drawings.

- .4 It is the intent of these drawings and specifications to provide for an installation complete and in operating condition. The responsibility for supplying and installing all material necessary to accomplish this, except where specifically noted that such work or materials is not included, shall be part of this section.
- .5 Assess and be familiar with existing site conditions prior to pricing and construction and allow for same in tender price.
- .6 All work must be done by qualified, certified and experienced persons in such line of work.
- .7 All work shall be in accordance with standard industry practice accepted and recognized by the Consultant and the Trade.
- .8 This Contractor shall coordinate with and cooperate with all other trades prior to installation. Where work interferes with other trades due to failure to coordinate or cooperate, the work shall be removed and relocated as approved by the Consultant at no extra cost to the Owner.
- .9 The Consultant shall have the right to reject any work that does not conform to the Contract Documents and accepted standards of practice including but not limited to performance, quietness of operation and finish.

1.5 Codes, Bylaws, Standards, and Regulations

- .1 The work shall comply with the latest editions and revisions of applicable codes, bylaws, standards, and regulations including but not limited to:
 - .1 Ontario Building Code
 - .2 Canadian Standards Association
 - .3 Local Building Bylaws
 - .4 Ontario Occupational Health and Safety Act
- .2 Provide work in accordance with the requirements of all applicable government codes, local by-laws, underwriter's regulations base building standards, contract documents, and all authorities having jurisdiction.
- .3 Where discrepancies occur between contract drawings and specifications and above codes and standards referred to herein, the Contractor is to notify the Consultant in writing and obtain clarification prior to proceeding with the work.
- .4 Contractors shall not reduce the requirements on the contract drawings and specifications by applying any codes and standards referred to herein.

1.6 Permits and Fees

- .1 The Consultants will apply for the Building Permit on behalf of DDSB. The Contractor shall arrange for all building inspections.

- .2 The Contractor shall apply for, obtain, and pay for all other required permits, fees, connections, inspections, licenses, certificates or charges necessary including all taxes.
- .3 Coordinate all required inspections and give necessary notice to all authorities.
- .4 Upon completion of project, provide inspection certificates confirming acceptance by all authorities having jurisdiction for all applicable disciplines.

1.7 Shop Drawings

- .1 Within two (2) weeks of award, the Contractor shall submit shop drawings of all equipment for the project.
- .2 Prior to ordering of products or delivery of any products to job site, submit shop drawings electronically in PDF format to the Consultant for review and comments. Submit sufficiently in advance of construction to allow ample time for review. Size of shop drawings shall be 8.5x11. 11x17 will be acceptable where appropriate for content and scale.
- .3 Submittals shall contain but not be limited to construction information, product data and dimensional layout.
- .4 Clearly mark each sheet of printed submittal material, using arrow, underlining or circling, to show particular sizes, dimensions, model numbers, ratings and options actually being proposed. Cross out non-applicable material.
- .5 **Prior to submission to the Consultant, the Contractor shall review all shop drawings. By this review the Contractor represents that they have determined and verified all field measurements, field construction criteria, materials, catalogue numbers and similar data or will do so and that he has checked and coordinated each shop drawing with the requirements of the Work and of the Contract Documents.**
- .6 **The Contractor's review of each shop drawing shall be indicated by their approval stamp, date and signature on the front of each page. Drawings will not be considered if not previously checked by the Contractor.**
- .7 Review comments from the Consultant. If shop drawings are modified, confirm changes before proceeding. If shop drawings are not approved, revise and resubmit changes for approval within one (1) week.
- .8 Review of the shop drawings by the Consultant does not relieve the Contractor or his Supplier of the responsibility to provide the correct and complete equipment, material or installation.
- .9 Keep one complete set of shop drawings at the job site during construction.

1.8 Warranty

- .1 Provide a one (1) year full parts and labour warranty for the new system from date of substantial completion.
- .2 Submit warranty letter on Company letterhead signed by Company representative stating warranty terms including warranty period from date of substantial completion.

PART 2 - PRODUCTS

2.1 Materials

- .1 All material used shall be new, free from defects, of quality specified, and installed in accordance with manufacturer's instructions.
- .2 The same manufacturer shall be used for types of equipment used in similar applications.
- .3 It is the responsibility of the Contractor to store and protect materials supplied by this scope.
- .4 Materials shall be stored in original containers.
- .5 Remove all redundant materials from site and dispose of in an environmentally friendly manner.

2.2 Selected Products and Equivalentents

- .1 Selected products are specified and/or shown on the drawings, and identified by manufacturer's name, type and catalogue number.
- .2 Equivalent products may be considered if sufficient information is submitted at least ten (10) working days prior to tender close to the Consultant to enable the Consultant to determine acceptability of such products.
- .3 Where a manufacturer of materials, equipment or products is not specified, they shall meet the requirements and be of quality as specified herein.

2.3 Quality of Product

- .1 All products provided shall be listed where applicable.
- .2 All products provided shall be new including those not specified and shall be of a quality best suited to the purpose required and their use subject to approval by the Consultant.

2.4 Product Finishes

- .1 Shop drawings shall indicate finishes. Use standard finish unless otherwise specified.
- .2 Apply primer on all items which are to be finished on the job.
- .3 Repair dents and touch up all damaged finishes with matching lacquer, or, if required by the Consultant, completely repaint or replace damaged surface at no extra cost to the Contract.

PART 3 - EXECUTION

3.1 Site Examination

- .1 Examine the site of work and become familiar with all features and characteristics affecting this work before submitting tender.
- .2 No additional compensation will be given for extra work due to existing conditions which such examination should have disclosed.
- .3 Report to the Consultant any unsatisfactory conditions which may adversely affect the proper completion of this work.

3.2 Coordination with Other Divisions

- .1 Examine the drawings and all divisions of the specifications. Before commencing any work, obtain a ruling from the Consultant if any conflict exists, otherwise no additional compensation will be made for any necessary adjustments.
- .2 Lay out the work and equipment with due regard to architectural, structural and electrical features.
- .3 Examine previously constructed work and notify the Consultant of any conditions which prejudice the proper completion of this work. Commencement of this work without such notification shall constitute acceptance of other work.

3.3 Workplace Safety

- .1 The workplace must be kept safe at all times.
- .2 Conform to all ministries of labour, and health and safety regulations at all times.
- .3 Use ladders and proper techniques as approved by the ministry of labour to perform all work.
- .4 Cover all holes/openings and provide barriers around hazards, etc. to ensure occupants and workers are not at risk.

- .5 Where work does not conform to such regulations, stop work immediately and report the situation to the Owner's representative or Consultant or rectify the situation immediately.
 - .6 Report any hazards or concerns to the Owner's representative immediately.
 - .7 Conform to Owner's safety requirements and construction regulations.
- 3.4 Welding, Grinding, Noisy Work, Odours
- .1 No welding, grinding, other noisy work or work generating odours shall be done during regular operating/school hours.
 - .2 All above work shall be done after hours or on weekends outside of regular hours.
 - .3 Submit hot work permit prior to any welding. Coordinate any specific requirements in conformance with Client standards.
- 3.5 Cutting, Coring and Patching
- .1 All cutting, coring and patching as it relates to work under this division is the responsibility of this Contractor in a manner acceptable by the Consultant and Owner. Coordinate any cutting or coring with the Owner prior to construction.
 - .2 Structural members shall not be cut.
 - .3 Use fire rated materials at all fire separations.
 - .4 Patching shall match existing surroundings and shall be approved by the Consultant and Owner. Patching shall leave a completely smooth finish.
- 3.6 Finishing and Painting
- .1 All final finishing and painting as it relates to the contract work is the responsibility of this Contractor in a manner acceptable by the Consultant and the Owner.
 - .2 Protect and clean all surroundings from sanding residue.
 - .3 Painting shall include two (2) coats of colour approved by the Consultant or the Owner.
 - .4 Match existing finishes unless otherwise noted.
- 3.7 Mobilization, Demolition and Security
- .1 Supply and erect all signs, barricades and such other protection as may be required to protect the public during construction.

- .2 Provide security protection for Contractor's office, plant and stored materials.
- .3 Move onto site and set up storage facilities and temporary hoarding as required.
- .4 Move off site and remove storage facilities and all temporary facilities and leave the site clean and tidy.

3.8 Damage to Existing Services and Structures

- .1 Obtain the necessary drawings and perform any necessary sub-surface, wall and floor investigations in order to determine the exact number and location of all existing services, structures, underground pipes, cables, and other similar items.
- .2 The location for existing structures and services shown on the Contract Drawings do not relieve the Contractor of this responsibility.
- .3 Take the necessary steps to ensure that no damage is caused to existing structures, buildings, foundations, roads, sidewalks, property, utility services, and other similar items during the progress of the Work.
- .4 If any damage is caused, repair and make good such damage at no additional cost within a reasonable time and to the complete satisfaction of the Consultant and Owner.

3.9 Occupying the Site

- .1 Use only those areas designated by the Owner for the access, except in so far as is necessary for the execution of the Works, and in so doing, do not unnecessarily obstruct the normal traffic of, to, from or about the Site; and do not unreasonably allow any vehicles or materials to stand in front of, or near to, any buildings on the Site or any access thereto, or any access into any private properties.
- .2 Confine operations within areas designated for construction, storage and access as shown on the Contract Drawings and/or as directed by the Consultant/Owner.
- .3 Limit access to and from the site as instructed by the Consultant.
- .4 Maintain safe access to any existing facilities for the operations staff at all times.

3.10 Contractor Use of Premise

- .1 Arrange with the Owner and Consultant for storage areas and access to the Works.
- .2 Make arrangements with property owners if additional areas are required. Obtain written agreements and submit copies to the Consultant.
- .3 Confine operations within working limits for construction, storage and access.

- .4 Carry out the construction of the Works in such a manner that a minimum of inconvenience is caused to the Owners and occupants of properties adjacent to the Works.
- .5 Store materials separately on the Site at locations agreed upon with the Consultant, suitably protected to prevent their deterioration or the intrusion of foreign matter. In the opinion of the Consultant, remove any material which has deteriorated or been damaged immediately from the Site at no additional cost to the Owner.
- .6 During construction, liaise with the Consultant and the Owner to schedule work to minimize impacts on building operations.

3.11 Equipment and System Protection

- .1 Protect equipment and materials from damage in storage and on site before, during, and after installation until final acceptance.
- .2 Protect equipment and system openings from dust and debris with appropriate covers that will withstand through the construction.
- .3 Where equipment and system components become dirty or damaged, clean and repair to new condition to the satisfaction of the Consultant and Owner at no expense to the Owner.

3.12 Protective Coatings and Painting

- .1 Prime and touch up finished paintwork or coatings that have been damaged.
- .2 Where damage is beyond minor repair, restore finishes to new condition.

3.13 Owner Occupancy

- .1 The Owner and its operators will occupy premises during entire construction period for execution of normal operations.
- .2 Cooperate with the Owner in scheduling operations to minimize conflict and to facilitate the Owner usage.
- .3 Maintain free access and parking for the Owner's staff.

3.14 Field Review and Deficiencies

- .1 The Contractor shall notify the Consultant when the job is ready for field review at various stages including rough-in stages.
- .2 During the course of construction, the Consultants will monitor construction and provide written reports of work progress, discussions and deficiencies.

- .3 The Contractor shall correct all deficiencies within the work period prior to the next review.
- .4 The Contractor shall not conceal any work until inspected. Where work was concealed, the Contractor shall remove and replace tiles, coverings or other obstructions to allow proper inspection at the Contractor's expense.
- .5 Upon completion of the project the Consultant will do a final review. Upon receiving the final inspection report, the Contractor must correct and sign back the inspection report indicated all deficiencies are completed. A re-inspection will only be done once the Consultant receives this in writing. Where the Consultant performs the re-inspection and the work is not complete, the Contractor is responsible for reimbursing the Consultant for the field review. The fee for additional reviews will be at the Consultant's hourly rates plus mileage and applicable taxes to be paid directly to the Consultant prior to performing the next field review.

END OF SECTION

PART I – GENERAL

1.1 Requirements Included

.1 Cash Allowances

1.2 Cash Allowances

- .1 Include in the Contract Price, cash allowances stated herein.
- .2 Cash Allowances shall be carried by the Prime Contractor, not by individual subcontractors. The Contractor shall include in the Stipulated Contract Sum, all Cash Allowances called for in this section of the Specifications.
- .3 Conform to the General Requirements, Section 01010.
- .4 Cash allowances cover the net cost to the Contractor of services, products, construction machinery and equipment, freight, unloading, handling, storage, installation and other authorized expenses incurred in performing the work stipulated under the Cash Allowance.
- .5 The Contract Price, and not the Cash Allowances, shall include the Contractor's overhead and profit in connection with such Cash Allowances.
- .6 Where authorized expenditures under Cash Allowances exceed the aggregate sum of all of the Cash Allowances the Contractor shall be entitled to compensation for the overrun plus an amount for overhead and profit as specified in the Contract Documents.
- .7 Progress payments on account of work authorized under cash allowances shall be included in the Contractor's monthly certificate for payment. Pricing back-up shall be included by the contractor for the cash allowance work.
- .8 Unexpected amounts of Cash Allowances may be reallocated to other specified Cash Allowances at the sole discretion of the Owner and/or Consultant.
- .9 No refund of mark-up will be expected from the Contractor if actual expenditure against specified purpose Cash Allowances is less than the aggregate total of such allowances.

1.3 Cash Allowances

- .1 The Prime Contractor shall carry the following cash allowances:
 - .1 Unforeseen Changes on Site Including, but Not Limited to,
Additional Cutting and Patching not indicated on drawings..... \$ 7,500
 - .2 Controls (Installing Contractor)..... \$30,000
 - .3 P.A./Communications..... \$ 5,000
 - .4 Door Wraps..... \$ 2,500

END OF SECTION

PART I – GENERAL

1.1 Section Includes

- .1 Coordination of work between the Contractor and the Owner under administration of the Consultant.
- .2 Pre-construction, construction progress and special meetings.
- .3 On-site documents.

1.2 Start-up Meeting

- .1 Within two (2) weeks after award of Contract, the Contractor shall arrange a pre-construction meeting to discuss and resolve administrative procedures and responsibilities.
- .2 Representatives of the Owner, the Consultant and the Contractor shall be in attendance. The Contractor representatives shall include, at a minimum, the Mechanical (Prime) Contractor.
- .3 The Agenda for the meeting is to include the following:
 - .1 Appointment of official representative for participants in Work.
 - .2 Typical day and time for weekly meetings.
 - .3 Schedule and sequence of work.
 - .4 Schedule of submission of shop drawings.
 - .5 Requirements for storage areas.
 - .6 Delivery schedule of specified equipment.
 - .7 Site security.
 - .8 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, and administrative requirements.
 - .9 Owner supplied Products.
 - .10 As-built drawings.
 - .11 Operation and maintenance information.
 - .12 Take-over procedures, acceptance, and warranties.
 - .13 Monthly progress claims, administrative procedures and holdbacks.

1.3 Construction Progress Meetings

- .1 The Contractor will schedule and administer bi-weekly meetings throughout progress of the Works as required. Bi-weekly meetings will be scheduled for a typical day and time for each week and shall be determined at the pre-construction meeting to suit all parties.
- .2 Attend all meetings and have project manager and representatives from major subcontractors attend. All sub-contractors shall attend all meetings unless otherwise pre-approved by the Consultant. The Contractor shall provide written

request at least 72 hours before each meeting to obtain approval for absence of any sub-contractor.

- .3 Provide any schedule updates.
- .4 The Agenda for the meeting is to include the following:
 - .1 Review and approval of minutes from previous meeting.
 - .2 Review of Work progress since previous meeting.
 - .3 Field observations, problems, conflicts.
 - .4 Problems that impede construction schedule.
 - .5 Review of delivery schedules.
 - .6 Corrective measures and procedures to regain projected schedule.
 - .7 Revision to construction schedule.
 - .8 Progress schedule, during succeeding work period.
 - .9 Review of submittal schedules.
 - .10 Review proposed changes for affect on construction schedule and on completion date.
 - .11 Review of marked up record drawings and other business.
- .5 The Contractor shall record minutes and include significant proceedings and decisions, as well as identifying “action by” and “due date”.
- .6 The Contractor shall distribute electronic file of minutes via email within four (4) working days after each meeting and transmit to meeting participants, affected parties not in attendance, and the Owner.
- .7 Site meeting frequency shall be twice weekly if performance and schedule are not to the satisfaction of the Consultant or the Owner, at no additional cost to the Contract.

1.4 On-Site Documents

- .1 Maintain at job site, one copy of each of the following:
 - .1 Contract drawings
 - .2 Specifications
 - .3 Addenda
 - .4 Reviewed shop drawings
 - .5 Contract Change Orders
 - .6 Other modifications to Contract
 - .7 Marked up Record Drawings
 - .8 Field test reports
 - .9 Copy of approved Work schedule
 - .10 Manufacturers’ installation and application instructions

1.5 Construction Coordination

- .1 Comply with Owner’s allocation of mobilization areas, storage, access and parking facilities.

.2 During construction coordinate use of site and facilities with the Consultant and Owner.

.3 Comply with instructions of the Consultant and Owner for use of site facilities.

1.6 Schedules Management

.1 Submit to the Consultant within two (2) weeks of award of the Contract, the preliminary construction progress schedule, based on the tender and all required schedules, in accordance with Section 01320.

.2 After review by the Consultant, revise and resubmit all schedules to comply with revised project schedule.

.3 Identify and track all critical items on all schedules and advise the Consultant of any changes to the schedules.

.4 Actively manage and coordinate the work to avoid delays against reviewed schedules.

.5 Revise schedules, reorganize and replace construction to minimize the impact of any identified delays.

1.7 Coordination of Construction

.1 This is a lump sum contract to be completed in its entirety by the Contractor using the Contractor's own forces and the forces of individual subcontractors and subtrades.

.2 All of the specifications and drawings are interpreted as one contract. Be wholly responsible for coordination of all work by own forces, subtrades or subcontractors to complete the work.

.3 No Section or Division of these specifications shall be construed or interpreted as being the responsibility of any subtrade, subcontractor or supplier.

.4 Examine the work of all trades and ensure that conditions are satisfactory for the completion of any subsequent work.

.5 Notify the Consultant immediately of any adverse conditions which may affect subsequent work and do not proceed with any subsequent work until such conditions are rectified.

1.8 Submittals

.1 Make all necessary submittals to the Consultant for review and approval.

.2 Submit all requests for payment to the Consultant.

.3 Submit requests for interpretation of Contract Documents and obtain instructions from the Consultant.

- .4 Submit requests for Contract Change Orders to the Consultant.
- .5 Deliver all closeout submittals to the Consultant.
- .6 Allow five (5) days for Consultant to respond to Request for Interpretation.

1.9 Closeout Procedures

- .1 Notify the Consultant in writing when the works are considered ready for Substantial Completion.
- .2 Accompany the Consultant on a preliminary field review of the work to identify and confirm items for completion or correction.
- .3 Allow five (5) working days from the date of notification to the first day of joint preliminary field review.
- .4 Comply with the Consultant's written instructions for completion or correction of items prior to issuance of Certificate of Substantial Completion.
- .5 Complete all outstanding items of work or deficiencies identified in the Certificate of Substantial Completion in a timely manner.

END OF SECTION

PART I – GENERAL

1.1 Description

- .1 This section specifies requirements and procedures for preparing and updating construction schedules and reports for planning, coordinating, executing, and monitoring the progress of the work.

1.2 Related Work

- .1 All Divisions and Sections are related to this Section.

1.3 Schedules

- .1 The Contractor shall perform and complete all work as set forth on the drawings and in the specifications by the completion date specified in the tender and contract documents.
- .2 Prepare construction schedule and submit to Consultant for review and approval. Modify and implement schedules and sequences as modified and approved by the Consultant at no extra cost to the Contract.
- .3 The construction schedule shall be provided at or before the pre-construction meeting as specified under Section 01310.

1.4 Welding, Grinding, Noisy Work, Odours

- .1 No welding, grinding, other noisy work or work generating odours shall be done during regular operating/school hours.
- .2 All above work shall be done during summer break or after hours or on weekends outside of regular school hours.

1.5 Progress of the Work

- .1 The work shall be started on the date indicated in the written order for commencement of the works and shall be executed with such progress as may be required to prevent delay to the general completion of such parts of the project, and with such forces, material and equipment, as to assure completion of the work in the time established in the Form of Tender. Additionally, the Contractor shall, at all times, schedule and direct his work so that it provides an orderly progression of the work to completion within the specified time for completion.
- .2 The Contractor agrees that whenever it becomes apparent from the current regular schedule update that delays to the approved schedule have resulted and these delays are through no fault of the Owner or Owner's representatives, and hence, that the Contract completion date will not be met, or when so directed by

the Owner, he will take whatever action is necessary to achieve the specified milestone and contract completion dates.

- .3 With each schedule update, the Contractor shall submit for review a written statement of the steps he intends to take, to address, to remove or arrest any delay to the schedule. If the Contractor fails to submit a written statement of the steps he intends to take or fails to take such steps as required by the Contract, the Owner may direct the level of effort in manpower (trades), equipment and work schedule overtime to remove or arrest the delay to the critical path in the accepted schedule, and the Contractor shall promptly provide such level of effort at no additional cost to the Owner. In addition, should schedule delays persist, the Contractor's bonding agent may be asked to attend meetings to update the schedule.
- .4 Failure of the Contractor to comply with the requirements of this provision shall subject him to, at the Owner's Sole discretion, a withholding, in partial or in total of payments otherwise due to the Contractor for work performed under this Contract. The Contractor agrees that any withholding of money is not a penalty for noncompliance, but is an assurance for the Owner that funds will be available to implement these requirements should the Contractor fail to do so, since failure of the Contractor to comply with these requirements shall mean that the Contractor failed to execute the work with such diligence as to ensure its completion within the time for completion.

PART 2 – CONSTRUCTION SCHEDULE

2.1 Requirements

- .1 The schedule shall show the order and interdependence of activities and the sequence in which the work is to be accomplished as planned by the Contractor.
- .2 The scheduled activities shall be developed into four major groups:
 - .1 Construction Administration

Each of the following procurement items should be tied logically to the correct construction activity in the overall construction schedule:

 - .1 Permits and Approvals
 - .2 Submittal Items
 - .3 Approval of Submittal Items
 - .4 Fabrication and Delivery of Submittal Items
 - .2 Construction Activities
 - .1 Construction activities are the physical work activities that describe how the job will be constructed.

- .3 Shutdowns and Tie-ins
 - .1 Work by Contractor
 - .4 Testing, Start-up, Training and Closeouts
 - .1 Activities for this group shall include all work required to satisfy the appropriate specification sections and meet the requirements of substantial performance and contract completion.
 - .3 Failure to include in the schedule any element of work required for the performance of this Contract shall not excuse the Contractor from completing all the work required within the applicable completion time, notwithstanding the Owner's network review.
 - .4 A schedule which shows the completion of any milestone or substantial performance prior to the contractual completion dates stipulated may be accepted by the Consultant but shall in no event form the basis of a claim for delay against the Owner by the Contractor.
 - .5 Schedule of Values
 - .1 Each activity on the construction schedule shall be allocated a dollar value. Each activity's assigned cost shall consist of labour, equipment, and materials costs. The sum of all activity costs shall be equal to the total contract price. In submitting cost data the Contractor certifies that they are not unbalanced and that the values assigned to each activity represents the Contractor's estimate of the actual costs of performing that activity. The listing of cost loaded activities will become the schedule of values and will serve as a basis for progress payments to the contractor.
 - .2 The accepted schedule of values shall represent a fair, reasonable and equitable dollar cost allocation for each activity on the Contractor's construction schedule. These values shall be represented in all progress draws.
 - .3 If it is determined that the cost data do not meet the requirements for a balanced bid breakdown, the Contractor will present documentation substantiating any cost allocation on the cost data. Cost allocations shall be considered unbalanced if an activity on the construction schedule has been assigned a disproportionate allocation of cost.
- 2.2 Schedule Updates
- .1 The Schedule may be reviewed at each construction meeting. The Contractor shall update their schedule as requested by the Owner or Consultant.

PART 3 – CONTRACT COMPLETION TIME

3.1 Causes for Extension of Time

- .1 In the event the Contractor requests an extension of any contract completion date, he shall furnish justification and supporting evidence. The Consultant will, after receipt of such justification and supporting evidence, make findings of fact and will advise the Contractor in writing thereof. If the Consultant finds that the Contractor is entitled to an extension of the Contract completion date under the provisions of the contract, the Consultant's determination as to the total number of day's extension shall be based upon the current accepted and updated schedule and on all data relevant to the extension. Such data shall be included in the next updating of the schedule. The Contractor acknowledges and agrees that actual delays in activities which, according to the schedule, do not affect any contract completion date shown by the critical path in the network do not have any effect on the contract completion date or dates and therefore will not be the basis for a change in Contract completion time.

END OF SECTION

PART 1 - GENERAL

1.1 Construction Safety Measures

- .1 Contractor shall implement all required health and safety requirements of the Health and Safety Acts.
- .2 Meet the requirements of the following:
 1. Occupational Health and Safety Act, Regulations for construction projects, O. Reg. 213/91 (as am. By O. Reg. 631/94), Part II General Construction
 2. Occupational Health and Safety Act, Industrial Establishments Regulation, R.R.O. 1990, Reg. 851 (as amended by O. Reg. 516/92; 630/94; 230/95; and 450/97), Part I Safety Regulations.
 3. Revised Statutes of Ontario 1980, Chapter 321, Revised Regulation of Ontario 1980, Regulation 691 as amended by O. Reg. 156/84 and O. Reg. 645/86, and Ontario Regulation 714/82
 4. Canada Labour Code, Canada Occupational Safety and Health Regulations, SOR/86-304 (as amended by SOR/87-623; 88-44; 88-68; 88-632; 89-479; 89-515; 90-180; 91-448; 92-544; 94-33; 94-263; 95-286; 95-533; 96-294; 96-400; and 96-525), Part XI – Confined Spaces
 5. Workers Safety & Insurance Board (WSIB) and municipal statutes and authorities.
- .3 In event of conflict between any provisions of above authorities, the most stringent provision governs.
- .4 Where applicable, the Contractor shall be designated “Constructor” as defined by Ontario Act.

1.2 Overloading

- .1 Ensure no part of work is subjected to a load which will endanger its safety or will cause permanent deformation.

1.3 Special Protection and Precautions

- .1 Comply with the requirements of the Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials and regarding labelling and the provision of material safety data sheets (MSDS) acceptable to Labour Canada.
- .2 Comply with the requirements of the current CAN/CGA B-105-M-93 when working in and around hazardous locations/confined spaces.
- .3 Conform to Ministry of Labour requirements for work in hazardous locations. Establish and implement written procedures to assure compliance.
- .4 Smoking is not permitted anywhere on the site or on the property.

END OF SECTION

PART 1 – GENERAL

1.1 Section Includes:

- .1 Construction aids
- .2 Parking

1.2 Installation and Removal

- .1 Provide construction facilities in order to execute work expeditiously.
- .2 Remove all such work from site after use.
- .3 Make all necessary applications, obtain permits and pay for all fees.

1.3 Scaffolding and Supports

- .1 Provide and maintain scaffolding, ladders and platforms required to complete the work.

1.4 Fire Protection

- .1 Provide and maintain temporary fire protection equipment during performance of the Works required by governing codes, regulations and bylaws.
- .2 Burning rubbish and construction waste materials is not permitted on site.
- .3 Confine work and operations of employees as required by Contract Documents. Do not unreasonably encumber premises with products.
- .4 Do not load or permit the loading of any part of the Works with a weight or force that will endanger the Works.

1.5 Construction Parking

- .1 Parking will be permitted in areas as approved by the Owner, provided it does not disrupt regular facility operations and performance.
- .2 Provide and maintain adequate access to project site.
- .3 Any damages resulting from Contractor's negligence will be the responsibility of the Contractor.

1.6 Equipment, Tools and Materials Storage

- .1 Provide and maintain, in a clean and orderly condition, lockable sheds/boxes for storage of tools, equipment and materials.

- .2 Locate materials on site in a manner to cause least interference with work activities and normal operation of the existing facility.

1.7 Washroom Facilities

- .1 Utilize washroom facilities on site where approved by the Owner.
- .2 Leave washrooms in a clean sanitary condition.

END OF SECTION

PART 1 – GENERAL

1.1 Description

- .1 This section specifies requirements for environmental controls including control of noise, dust, surface water and erosion, various pollution control methods and handling of Designated Substances as well as compliance with the Occupational Health and Safety Act and Site Safety.

1.2 General

- .1 Establish and maintain site procedures such that noise levels from construction areas are minimized.
- .2 Control noise level in accordance with local by-laws and Ministry of the Environment (MOE) Standards.
- .3 Prevent dust nuisance resulting from construction operations at all locations on the site and roads used by Contractor's activities.
- .4 Protect existing services, land, water courses.

1.3 Measures

- .1 Noise Controls:
 - .1 Use vehicles and equipment with efficient muffling devices.
 - .2 Provide and use devices that will minimize noise levels in construction areas.
- .2 Dust Controls:
 - .1 Use water, brine or calcium chloride to control dust.
 - .2 Minimize use of calcium chloride and brine, particularly in close proximity to water courses, aquifers or agricultural lands.
 - .3 Transport dusty materials in covered haulage vehicles.
- .3 Mud Control:
 - .1 Keep sites and public roadways, clean and free from mud, at all times.

1.4 Refuelling Areas

- .1 Review all proposed construction areas to plan access routes and fuelling areas.
- .2 Do not refuel or maintain equipment adjacent to or in watercourse or over water supply aquifers unless non-spill facilities are used.
- .3 Do not fuel equipment within 30 metres of any watercourse unless otherwise non-spill facilities are used.

1.5 Cleaning Equipment

- .1 Do not clean equipment in streams, lakes, ditches, swales, etc.
- .2 Clean construction equipment prior to entering roadways.
- .3 Do not clean equipment in locations where debris can gain access to sewers, watercourses or aquifers.

1.6 Spills

- .1 Submit procedures for interception, rapid clean-up and disposal of any spillage that may occur, for the Engineer's review, prior to commencing work.
- .2 Be prepared at all times to intercept, clean-up and dispose of any spillage that may occur whether on land or water.
- .3 Keep all materials required for clean up of spillages readily accessible on site.
- .4 Report immediately any spills causing damage to the environment to the MOE Spills Centre.

1.7 Sensitive Areas

- .1 Avoid encroachment on unique natural areas and establish boundary protection and signage to avoid such encroachment.

1.8 Management and Disposal of Excess Materials

- .1 The requirements of OPSS 180 shall apply except for the following revision/ amendments:
 - .1 Subsection 180.07.02, Conditions on management by Reuse, shall be amended by the addition of the following:
 - .1 "Recycled hot mix asphalt or excess bituminous pavement shall not be used as trench backfill or bedding."
 - .2 Subsection 180.07.04, Conditions on Management by Open Burning, shall be deleted. No open burning will be permitted.

1.9 Removal and Disposal of Hazardous Materials

- .1 Hazardous materials shall be removed from the site and handled in accordance with MOE Regulations current at the time of construction.
- .2 Comply with the governing Ministry of Labour Regulations respecting protection of works, remedial handling and disposition of the Designated Substances encountered.

- .3 Prior to commencement of work on or about any Designated Substance, provide written notification to the MOE of the location(s) proposed for disposal of Designated Substances. Provide a copy of said notification to the Engineer a minimum of 10 working days in advance of starting work on or about any Designated Substance.
- .4 In the event that the MOE has concerns with any proposed disposal location, further notification shall be provided until the MOE's concerns have been addressed.
- .5 Do not empty fuel, lubricants, paint materials, solvents or other chemicals into sewers or watercourses.

1.10 Compliance with the Occupational Health and Safety Act

- .1 It is specifically drawn to the attention of the Contractor that the Occupational Health and Safety Act provides, in addition to other items that:
 - .1 A Constructor shall ensure, on a project undertaken by the Contractor that:
 - .1 The measures and procedures prescribed by this Act and regulations are carried out on the project;
 - .2 Every employer and every worker performing work on the project complies with this Act and the regulations, and;
 - .3 The health and safety of workers on the project is protected;
 - .2 This Contract is deemed to be an individual project for the purposes of the Occupational Health and Safety Act and the regulations made thereunder and the Contractor to whom the Contract is awarded unequivocally acknowledges that he is the Constructor as defined in the said Act on this project and shall carry out all of the obligations and shall bear all of the responsibilities of the Constructor as set out in the said Act and Regulations;
 - .3 If the Owner is designated as the "Constructor" as a result of the Contractor's actions, all the increases in costs shall be borne by the Contractor;
 - .4 All Occupational Health and Safety Act Regulations for construction projects are to be strictly adhered to.

END OF SECTION

PART 1 - GENERAL

1.1 Work Included

- .1 Provide all labour, materials and equipment for all required cutting and patching at penetration of existing roofing system as required to install new roof penetrations.
- .2 This contractor shall coordinate with other trades. They shall obtain positive assurance that all pipes, vents and equipment, which pass through the roof have been completely installed. They shall protect walls, etc. from damage due to their work with particular attention to brickwork.
- .3 Flashing around the perimeter of the new flues and other roof penetrations.
- .4 Tapered insulation to establish positive crickets and crossfalls to suit field conditions.

1.2 Inspection

- .1 Inspect all surfaces on which roofing work is to be placed and report to the Contractor immediately any defects which would prevent satisfactory execution or permanency of the work. Do not proceed until all such unsatisfactory work has been corrected.
- .2 Failure to examine or report, will be taken as an acceptance that preparatory work is satisfactory.

1.3 Warranty

- .1 Any roofing work shall offer full warranty or maintain the existing warranty where applicable. The warranty shall be for Labour, Material and Workmanship.

1.4 Qualifications

- .1 Roofing shall be done by mechanics skilled in this trade in strict accordance with the manufacturer's printed instructions with a minimum 5 years documented experience.
- .2 All work shall be carried out in complete accordance with acknowledged good roofing practice.

1.5 Delivery, Storage and Handling

- .1 Materials shall be delivered to the job site in such a way as to avoid damage. They shall be stored on site in protected locations and isolated from damage or deterioration by impact or weather conditions.

- .2 Lap seal and adhesives shall be stored at temperatures between 16 degrees C. (60 degrees F) and 27 degrees C (80 degrees F) to facilitate handling and ensure shelf life. Where material has been exposed to lower temperatures it shall be placed in a warm room and brought up to application temperature.
- .3 Insulation shall be delivered in protective packages and stored under dry conditions at all times. If insulation is stored outdoors, it shall be stacked on pallets at least 10 cm above the ground and shall be covered with tarpaulin or similar opaque waterproof covering.
- .4 Stir adhesives thoroughly before use and cover the container immediately after use to avoid evaporation of the solvent.
- .5 Adhesives and sealants may contain petroleum distillates and may be flammable. Do not inhale fumes or use near open flame.
- .6 Do not use sharp or heavy objects to contact with sheet during or after installation other than those required for filling.

1.6 Project Conditions

- .1 No installation work shall be performed during rainy inclement weather and on frost or wet covered surfaces.
- .2 Cold temperature does not necessarily restrict the application of the roofing although very low temperature and winter conditions may call for special techniques. Consult the manufacturer's representatives for their recommendations.

1.7 Sequencing Scheduling

- .1 Work shall be so scheduled as to provide a watertight seal at the end of each working day on the area worked upon during the day.
- .2 Apply roofing as soon as possible after completion of the roof deck to minimize exposure to the elements and to meet the construction schedule.

1.8 Roofing Contractors

- .1 Only qualified roofing contractors shall be used. Refer to acceptable products specified under Part 2.
- .2 Acceptable Contractors:
 - .1 Atlantic roofers (type Bur Soprema hot applied) – under warranty

PART 2 - PRODUCT

- 2.1 All new roofing materials shall be compatible with and match existing roof.
- 2.2 Acceptable Roofing Products
 - .1 Type Bur Soprema hot applied shall be used to maintain manufacturer's warranty.

PART 3 - EXECUTION

- 3.1 Preparatory Work
 - .1 The surface to which the roofing system is to be installed must be smooth, clean, dry and free from protrusions and sharp edges. Debris, oil and grease must be removed. The application is responsible to see that these conditions are met.
 - .2 Gypsum board installed over steel deck shall be supported on all flutes at end of board and be free of gaps and voids.
- 3.2 Vent Stack Flashing
 - .1 Thaler stack jack flashings complete with T.8 Bitumen Protection Cup 460mm (18") height.
- 3.3 Adjustments and Clean-up
 - .1 Installations of details noted as deficient during Final Inspection shall be repaired and corrected by the applicator at his expense, made ready for re-inspection.
 - .2 Remove all surplus materials, cuttings, etc. off site and leave all of the work clean and complete in all respects.
- 3.4 Inspections and Approval
 - .1 Formal final inspection of the completed work shall be made jointly by the manufacturer's representative, the Roofing Contractor, the Roofing Inspector selected by the Owner and the Consultant.
 - .2 Warranties shall take effect upon correction of any deficiencies noted during final inspection.
 - .3 Arrangements shall be made for the manufacturer's representative to carry out inspections of the work when in progress. The representative shall report to the Consultant on an appropriate form, his findings related to these inspections.

3.5 Clean Up

- .1 Clean to the consultant's approval, soiled surfaces, spatters, and damage caused by work of this section.
- .2 Check area drains to ensure cleanliness and proper function, and remove debris, equipment and excess material from the site.

END OF SECTION

PART 1 – GENERAL

1.1 General Requirements

- .1 Provide all material, labour, equipment, and services to complete all general trades work as outlined on the drawings and specified herein.

1.2 Shop Drawings

- .1 Submit shop drawings for doors (including frames and hardware) and floor sealing for review by the Engineer and include in Maintenance Manuals.

1.3 Warranty

- .1 Provide a one (1) year full parts and labour warranty for all work from date of substantial completion.

PART 2 - PRODUCTS

2.1 General

- .1 Refer to drawings for scope and specifications where not included herein.
- .2 Include for all cutting, coring, and patching. Use fire rated materials for all fire rated assemblies or requirements.
- .3 All new work shall be level, plumb and done in a good workmanlike manner acceptable by the Consultant and Owner.
- .4 Provide all materials for new general trades scope, lintels and other finishes for a complete scope of work as outlined on the drawings.
- .5 Provide new shafts and other enclosures for a complete scope of work to ensure all new and reworked services are concealed unless otherwise noted.
- .6 Provide all finishing and painting to match existing surroundings and to the acceptance of the Consultant and Owner.
- .7 Coordinate paint colours with Owner.

2.2 Equipment Bases

- .1 Provide new 4" (100mm) high concrete housekeeping pads for new floor mounted equipment where noted on drawings. Refer to Section 15090.
- .2 Paint sides and top 12" (30mm) edge of concrete pads with two (2) coats of yellow paint.

2.3 Acoustic Tile Ceilings – Non-Rated

- .1 Non-rated ceilings shall conform to CAN/CGSB-92.1 and installation to comply with applicable requirements of ASTM C636.
- .2 Acoustical Panels – Non-Fire Rated – Except Washrooms
 - .1 To CAN/CGSB-92.1.
 - .2 Type: Mineral composition acoustical units, sag resistant.
 - .3 Pattern: Non-directional fissured.
 - .4 Flame spread rating of 25 or less.
 - .5 Smoke developed class of 50 or less.
 - .6 Noise reduction coefficient (NRC) designation of 0.55 minimum.
 - .7 Ceiling attenuation class (CAC) designation of 30 minimum.
 - .8 Light reflectance range of 0.80 and above.
 - .9 Edge type: Square.
 - .10 Colour: White.
 - .11 Size: 16 mm minimum thickness, 610mm by 1220mm.
 - .12 Shape: Flat.
 - .13 Acceptable Products:
 - .1 Armstrong World Industries Canada Ltd.: Fine Fissured 1729
 - .2 Certainteed Ceilings: Vantage 10, VAN-197
 - .3 CGC Interiors: Radar Climaplus 2410
- .3 Acoustical Panels – Non-Fire Rated – Washrooms
 - .1 Type: Gypsum core acoustical units with sealed edges, vinyl face and back.
 - .2 Pattern: Fine-textured.
 - .3 Flame spread rating of 25 or less.
 - .4 Smoke developed class of 50 or less.
 - .5 Noise reduction coefficient (NRC) designation of 0.10 minimum.
 - .6 Ceiling attenuation class (CAC) designation of 40 minimum.
 - .7 Light reflectance range of 0.77 and above.
 - .8 Edge type: Square.
 - .9 Colour: White.
 - .10 Size: 13mm minimum thickness, 610mm by 1220mm.
 - .11 Shape: Flat.
 - .12 Minimum weight: 9.77kg/m².
 - .13 Acceptable Products:
 - .1 Certainteed Ceilings: Protectone Vinylrock X, 1140-CRF-1.
 - .2 CGC Interiors: Sheetrock brand lay-in ceiling tile Climaplus 3270
- .4 Suspension System – Non-Fire Rated – Except Washrooms
 - .1 Intermediate duty system to ASTM-C635.

- .2 Basic materials for suspension system: commercial quality cold rolled steel zinc coated.
- .3 Exposed tee-bar grid components: white colour. Components die cut. Main tee, 43mm high, with double web, rectangular bulb and 25mm rolled cap on exposed face. Cross tee, 43mm high, with rectangular bulb; web extended to form positive interlock with main tee webs; lower flange extended and offset to provide flush intersection; wall moulding, 22mm wide by 22mm high, finished to match main tees and cross tees.
- .4 Two directional exposed tee-bar grid, double web.
- .5 Acceptable Products:
 - .1 Armstrong World Industries Canada Ltd.: Prelude ML exposed tee system.
 - .2 Bailey Metal Products Limited: Lance-Lock System 900 (BEH).
 - .3 Certainteed Ceilings: Classic Hook System.
 - .4 CGC Interiors: Donn DX exposed grid suspension system.
 - .5 Chicago Metallic Corporation: series 1200 suspension system.
- .5 Suspension System – Non-Fire Rated – Washrooms
 - .1 Intermediate duty system to ASTM-C635.
 - .2 Basic materials for suspension system: commercial quality cold rolled steel zinc coated.
 - .3 Exposed tee-bar grid components: white colour. Components die cut. Main tee, 43mm high, with double web, rectangular bulb and 25mm rolled cap on exposed face. Cross tee, 43mm high, with rectangular bulb; web extended to form positive interlock with main tee webs; lower flange extended and offset to provide flush intersection; wall moulding, 22mm wide by 22mm high, finished to match main tees and cross tees.
 - .4 Two directional exposed tee-bar grid, double web.
 - .5 Hot dipped galvanized, painted steel tee with painted aluminum cap.
 - .6 Acceptable Products:
 - .1 Armstrong World Industries Canada Ltd.: Prelude XL for exterior applications.
 - .2 Bailey Metal Products Limited: Lance-Lock System 700.
 - .3 Certainteed Ceilings: Classic Aluminum Cap Hook System.
 - .4 CGC Interiors: Donn ZXLA Suspension System.
 - .5 Chicago Metallic Corporation: Series 1830 HDG Suspension System.
- .6 Accessories
 - .1 Hanger Wire: galvanized soft annealed steel wire, 3.6mm minimum diameter.
 - .2 Hanger inserts: Purpose made.
 - .3 Carrying Channels: 1.2mm cold rolled galvanized steel channel, 38mm deep with 19mm flanges.

- .4 Hanger Anchoring Devices: Philips Red Head by Philips Drill Company of Canada Limited.
 - .1 T32, self-drilling for use in concrete deck.
 - .2 WS-3822 wedge anchor with tie wire insert for use in composite concrete and steel deck.
- .5 Suspension System Accessories: splices, bull nose corner caps, hold down clips, wire ties, retainers and typical flush wall moulding, to complement suspension system components, as recommended by system manufacturer.
- .7 Isolation Hangers (if required):
 - .1 Welded steel housing with anti-rust paint, and colour-coded stable elastomer springs.
 - .2 Spring static deflection shall be no less than 6mm and shall provide 50% overload capacity. Brackets shall be designed to carry 500% overload without failure.
 - .3 Hanger assembly shall be equipped with bottom eye bolt.
 - .4 Manufacturer/Product: BVA Systems Ltd.: Model HD Hangers.

PART 3 - EXECUTION

3.1 General

- .1 Provide all finishing and painting work to match existing.
- .2 All general trades work including final finishing and painting as it relates to the contract work is the responsibility of the Contractor in a manner acceptable to the Consultant and Owner.
- .3 All new or reworked services shall be concealed unless otherwise noted.
- .4 Install lintels at new wall openings as per structural drawings.
- .5 Protect and clean all surroundings from sanding residue.
- .6 Painting shall include two (2) coats of colour approved by the Consultant or the Owner.

3.2 Equipment Bases

- .1 Provide new concrete housekeeping pads for new floor mounted equipment where noted on drawings. Refer to Section 15090.
- .2 Paint sides and 12" (300mm) top edge of housekeeping pads with two (2) coats of yellow paint.

3.3 Acoustic Tile Ceilings

- .1 Install new acoustic tile ceilings as indicated on drawings. Ceilings shall be rated or non-rated as noted.
- .2 Install in accordance with ASTM-C636. Install rated ceilings in conformance with ULC listings.
- .3 Install suspension system to manufacturer's instructions.
- .4 Do not erect ceiling suspension system until work above ceiling has been inspected by the consultant.
- .5 Do not secure hangers to fluted steel floor. Secure hangers to overhead structure using attachment methods as required for particular structure and acceptable to the consultant. Where structural spacing exceeds ceiling hanger spacing, provide double carrying channels nested and placed perpendicular to and on top of bottom flange of steel beams or on top of the lower chords of the open web steel joists, and secured to each joist with three loops of 1.2mm galvanized soft steel wire.
- .6 Where obstructions interfere with the placement of ceiling hangers, provide double carrying channels nested and hung from the structure above on both sides of the obstruction.
- .7 Install hangers on main tees spaced at maximum 1200mm centres and within 150mm from ends of main tees and tee splices.
- .8 Lay out with border units not less than 50% of standard unit width and according to reflected ceiling plans.
- .9 Ensure suspension system is coordinated with location of related components.
- .10 Install typical wall moulding to provide correct ceiling height. Existing moulding shall not be reused.
- .11 Completed suspension system shall support super-imposed loads, such as lighting fixtures, diffusers, grilles, speakers and other ceiling mounted fixtures.
- .12 Support at light fixtures and diffusers with additional ceiling suspension hangers within 150mm of each corner and at maximum 600mm around perimeter of fixture. Install an additional hanger immediately above each fastener for ceiling mounted curtain tracks.
- .13 Interlock cross member to main runner to provide rigid assembly. Ensure all main tee splices and cross tee end clips are fully engaged.
- .14 Frame at openings for light fixtures, air diffusers, speakers and at changes in ceiling heights.

- .15 Finished ceiling system shall be square with adjoining walls and level within 6mm in 3000mm. Install acoustical units parallel to building lines with edge unit not less than 50% of unit width. Refer to reflected ceiling plan.
- .16 Scribe acoustic units accurately and neatly to fit adjacent work. Butt joints tight, terminate edges with moulding.
- .17 Co-ordinate ceiling work to accommodate components of other sections, to be built into acoustical ceiling components, such as light fixtures, diffusers, speakers and sprinkler heads.
- .18 Neatly cut acoustical units to fit tightly around all building elements that penetrate ceiling.
- .19 Cleaning
 - .1 Clean with non-solvent based commercial cleaners.
 - .2 Touch up minor scratches, abrasions, voids and other defects in painted surfaces as acceptable. Replace damaged sections when touch-up is not acceptable to the consultant.
 - .3 Replace components which are visibly damaged, marred or not cleanable.
 - .4 Remove all excess material and debris when work of this section is completed.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

- .1 Progressive cleaning
- .2 Final cleaning

1.2 Project Cleanliness

- .1 Maintain the Works in tidy condition, free from accumulation of waste products and debris.
- .2 Remove waste materials from site at regularly scheduled times or dispose of as directed by the Consultant or Owner. Do not burn waste materials on site.
- .3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .4 Provide on-site drum containers for collection of waste materials and debris.
- .5 Provide and use clearly marked separate bins for recycling.
- .6 Remove waste material and debris from site and deposit in waste container at end of each working day.
- .7 Dispose of waste materials and debris off site.
- .8 Clean interior areas prior to the start of finish work and maintain areas free of dust and other contaminants during finishing operations.
- .9 Store volatile waste in covered metal containers and remove from premises at the end of each working day.
- .10 Provide adequate ventilation while using volatile or noxious substances. The use of building ventilation systems is not permitted for this purpose.
- .11 Use only cleaning materials recommended by the manufacturer of the surface to be cleaned, and as recommended by the cleaning material manufacturer.
- .12 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces and will not contaminate building systems or electrical or control panels.

1.3 Final Cleaning

- .1 Prior to Substantial Completion, remove surplus products, tools, construction machinery and equipment not required for performance of remaining work.

- .2 Remove waste products and debris other than that caused by others, and leave the Works clean and suitable for occupancy.
- .3 Remove waste products and debris other than that caused by Owner Staff.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Remove stains, spots, marks and dirt from walls, and floors created during construction.
- .6 Clean lighting reflectors, lenses, and other lighting surfaces.
- .7 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .8 Clean equipment and fixtures to a sanitary condition and clean or replace filters of mechanical equipment.
- .9 Remove debris and surplus materials from all areas.

END OF SECTION

PART 1 - GENERAL

1.1 General

- .1 Provide all warranties outlined in the Contract Documents from the time of Substantial Completion of the Works or components of the works.
- .2 Perform warranty work required during progress of the work and during the Warranty Period.
- .3 Extend warranties on any component of the work that is required to be placed in operation prior to Substantial Performance for the purpose of complying with the sequence of construction.

1.2 Submittals

- .1 Inform the Owner in writing of the arrangements made for carrying out warranty work during the Warranty Period.
- .2 Provide a telephone number and address for receipt of notices relating to matters requiring action by the Contractor during the Warranty Period.

1.3 Work During Warranty Period

- .1 Perform all warranty work required upon receipt of verbal or written notices from the Owner.

1.4 Repair by Owner

- .1 The Owner will, without giving notice to the Contractor, repair shrinkages or defects that are dangerous in nature, that constitute an extreme emergency or that affect the operation of the Works. The Contractor will be notified of less serious conditions prior to work being performed.
- .2 The Owner will notify the Contractor of emergency work performed by the Owner.
- .3 The cost of labour, equipment and material to perform emergency work will be charged to the Contractor.

END OF SECTION

INDEX TO SPECIFICATIONS

Section No.	Section Title
15010	General Mechanical Requirements
15020	Mechanical Identification
15042	Testing
15043	Balancing
15045	Documentation and Manuals
15060	Pipe and Pipe Fittings
15090	Hangers, Supports, Sleeves and Seals
15095	Water Treatment
15100	Valves
15122	Gauges, Thermometers and Wells
15181	Hot Water Specialties
15250	Insulation – Piping
15258	Insulation – Ductwork
15760	Heating Coils
15771	Packaged Rooftop Units
15810	Ductwork
15811	Fabric Duct
15820	Duct Accessories
15850	Air Outlets
15900	Controls

PART 1 – GENERAL

1.1 General Requirements

- .1 The requirements of this section shall apply to all sections in Division 15.
- .2 Conform to Division 1 General Conditions.
- .3 All material, labour, equipment, and services required under this section shall be the full responsibility of the Mechanical Contractor including any material, labour, equipment, and services provided by their subcontractors.
- .4 Complete and submit the Mechanical Supplementary Bid Form including list of equipment and materials to be used on this project and forming part of the tender documents.

1.2 Pre-Qualified Mechanical Contractors

- .1 Refer to front end documents and Division 0 for pre-qualified mechanical contractor list. Only those pre-qualified contractors shall bid on this project.

1.3 Acceptable Sheet Metal Subcontract Bidders:

- .1 Refer to Division 0 for acceptable sheet metal subcontractors.

1.4 Definitions

- .1 “Supply” shall mean supply only.
- .2 “Install” shall mean install and connect.
- .3 “Provide” shall mean supply, install, and connect.
- .4 “Drawings and Specifications” shall mean Contract Documents.
- .5 “Authorities” or “Authorities having jurisdiction” shall mean all agencies that enforce the applicable laws, ordinances, rules, regulations, or codes of the Place of Work.
- .6 “Work” shall mean all equipment, materials, labour, and permits to provide a complete and operational mechanical system as detailed in the drawings and specifications.
- .7 “Owner” or “DDSB” shall mean Durham District School Board.

1.5 Related Work

- .1 Division 1 – General
- .2 Division 16 – Electrical

- .3 Division 15 specifications form a part of the Contract Documents and shall be read, interpreted, and coordinated with all other Divisions.

1.6 Intent

- .1 The drawings and specifications are not a detailed set of installation instructions. Drawings and specifications are complementary to one another and that which is shown on one is as binding as that which is shown on both.
- .2 The Consultant shall be immediately informed of any discrepancies between drawings and specifications leaving in doubt the true intent of the work.
- .3 Supply all labour, equipment, and materials necessary to install a complete and operational mechanical system described herein and shown on the drawings.
- .4 It is the intent of these drawings and specifications to provide for a mechanical installation complete and in operating condition. The responsibility for supplying and installing all material necessary to accomplish this, except where specifically noted that such work or materials is not included, shall be part of this section.
- .5 Assess and be familiar with existing site conditions prior to pricing and construction and allow for same in tender price.
- .6 All work must be done by qualified, certified and experienced persons in such line of work. Trade certificates must be available on demand.
- .7 All work shall be in accordance with standard industry practice accepted and recognized by the Consultant and the Trade.
- .8 This Contractor shall coordinate with and cooperate with all other trades prior to installation. Where work interferes with other trades due to failure to coordinate or cooperate, the work shall be removed and relocated as approved by the Consultant at no extra cost to the Owner.
- .9 The Consultant shall have the right to reject any work that does not conform to the Contract Documents and accepted standards of practice including but not limited to performance, quietness of operation and finish.

1.7 Codes, Bylaws, Standards, and Regulations

- .1 The mechanical system shall comply with the latest editions and revisions of applicable codes, bylaws, standards, and regulations including but not limited to:
 - .1 Ontario Building Code
 - .2 ASHRAE
 - .3 SMACNA
 - .4 NFPA
 - .5 Canadian Standards Association
 - .6 Canadian Gas Association
 - .7 Local Building Bylaws

- .8 Ontario Occupational Health and Safety Act
 - .2 Provide work in accordance with the requirements of all applicable government codes, local by-laws, underwriter's regulations base building standards, contract documents, and all authorities having jurisdiction.
 - .3 Where discrepancies occur between contract drawings and specifications and above codes and standards referred to herein, the Contractor is to notify the Consultant in writing and obtain clarification prior to proceeding with the work.
 - .4 Contractors shall not reduce the requirements on the contract drawings and specifications by applying any codes and standards referred to herein.
- 1.8 Permits and Fees
- .1 The Consultant will apply for building permit on Owner's behalf.
 - .2 The Contractor shall apply for, obtain, and pay for all other required permits, fees, connections, inspections, licenses, certificates or charges necessary including all taxes.
 - .2 Coordinate all required inspections and give necessary notice to all authorities.
 - .3 Upon completion of project, provide inspection certificates confirming acceptance by all authorities having jurisdiction for all applicable disciplines.
- 1.9 Contract Breakdown
- .1 After the tenders close, submit a breakdown of the price into scope and trades to the satisfaction of the Consultant based on the sections of the specifications.
 - .2 Breakdown shall include but not be limited to:
 - .1 Mobilization and shop drawing submission (maximum \$3,000)
 - .2 Demolition
 - .3 Rooftop Units
 - .4 Reheat Coils
 - .5 Hydronic Piping & Specialties
 - .6 Ductwork / Sheet Metal & Duct Accessories
 - .7 Insulation
 - .8 Water Treatment
 - .9 Testing, Startup & Training
 - .10 Balancing
 - .11 Electrical – subtrade shall provide detailed breakdown (Refer to 16010)
 - .12 General Trades – subtrade shall provide detailed breakdown
 - .13 Structural Steel
 - .14 Roofing
 - .15 Close-out Submittals – Manuals & Record Drawings (minimum \$2,500 mechanical)
 - .16 Cash Allowance – must provide detailed subtrade breakdown

- .3 Progress claims shall be based on the breakdown. Submit in table format showing contract amount, work complete to date as percentage, previous draw, amount this draw and balance for each line item.

1.10 Shop Drawings

- .1 Within two (2) weeks of award, the Contractor shall submit shop drawings of all equipment for the project.
- .2 Prior to ordering of products or delivery of any products to job site, submit shop drawings electronically in PDF format to the Consultant for review and comments. Submit sufficiently in advance of construction to allow ample time for review. Size of shop drawings shall be 8.5x11". 11x17" will be acceptable where appropriate for content and scale.
- .3 Submittals shall contain but not be limited to:
 - .1 Construction information
 - .2 Product data
 - .3 Performance data including performance curves
 - .4 Acoustical sound power data
 - .5 Dimensional layout and clearances
 - .6 Mounting arrangements
 - .7 Certification of compliance to applicable codes
 - .8 Operating and Maintenance information
 - .9 Wiring, single line and schematic diagrams (where applicable)
- .4 Clearly mark each sheet of printed submittal material, using arrow, underlining or circling, to show particular sizes, dimensions, wiring diagrams, operating clearances, control diagrams, project identification, types, model numbers, ratings, capacities and options actually being proposed. Cross out non-applicable material.
- .5 **Prior to submission to the Consultant, the Mechanical Contractor shall review all shop drawings. By this review the Mechanical Contractor represents that they have determined and verified all field measurements, field construction criteria, materials, catalogue numbers and similar data or will do so and that they have checked and coordinated each shop drawing with the requirements of the Work and of the Contract Documents.**
- .6 **The Mechanical Contractor's review of each shop drawing shall be indicated by his approval stamp, date and signature on the front of each page. Drawings will not be considered if not previously checked by the Mechanical Contractor.**
- .7 Review comments from the Consultant. If shop drawings are modified, confirm changes before proceeding. If shop drawings are not approved, revise and resubmit changes for approval within one (1) week.

- .8 Review of the shop drawings by the Consultant does not relieve the Contractor or his Supplier of the responsibility to provide the correct and complete equipment, material or installation.
 - .9 Keep one complete set of shop drawings at the job site during construction.
 - .10 Include stamped reviewed shop drawings in the Maintenance Manuals.
- 1.11 Product Delivery Schedule
- .1 Within two (2) weeks from shop drawing review, a schedule must be submitted by the Contractor showing projected delivery dates of all products to meet required construction schedule.
- 1.12 Construction Meetings
- .1 The Mechanical Contractor shall attend all site meetings unless otherwise pre-approved.
 - .2 Sub-trades shall attend site meetings as requested or as required.
- 1.13 As-built Drawings
- .1 Refer to Section 15045.
 - .2 Maintain accurate, neat, and clean As-built drawings on an **on-going basis** during construction to be reviewed periodically by the Consultant during construction.
 - .3 As-built drawing mark-ups shall be made available at every site meeting or inspection.
 - .4 As-built drawings shall include but not be limited to final location of any access doors on same for future service requirements.
 - .5 Upon completion of the work, submit to the Consultant for review, one (1) complete set of clear, legible, certified as-built drawings.
- 1.14 Reports
- .1 Provide the following reports upon completion of work by certified Contractors for review and approval by the Consultant:
 - .1 Equipment Start-Up Reports
 - .2 Piping Pressure Test Reports
 - .3 TSSA Certification
 - .4 HVAC Systems Cleaning Report (where applicable)
 - .5 Balance Report
 - .6 Chemical Treatment Test Report
 - .7 Other equipment startup reports and test sheets certified by the manufacturer or a qualified technician

- .8 Demonstration Reports/Logs
 - .2 All reports shall be dated and signed by the Technician who performed the start-up and/or tests.
- 1.15 Maintenance Manuals
- .1 Refer to Section 15045.
 - .2 Provide the Owner with two (2) **indexed**, hard cover maintenance manuals to local air balance industry standards plus one (1) electronic copy on labeled memory stick. Manuals shall contain and be tabbed in the following order:
 - .1 Table of Contents
 - .2 Contractor's, Manufacturer's and Supplier's Contact Information
 - .3 Warranty Letter
 - .4 Valve schedule
 - .5 Colour coding charts for access areas
 - .6 Reports as specified herein and as applicable
 - .7 Shop drawings (stamped reviewed by Consultant)
 - .8 Equipment maintenance instructions and manuals
 - .9 Controls as-built drawings
 - .10 As-built drawings
 - .3 Submit one (1) complete copy to the Consultant for review and approval. Revise based on any comments and resubmit all copies and electronic copy to Consultant.
- 1.16 Testing and Startup
- .1 Refer to Sections 15042 under this Division.
 - .2 Test and startup all equipment and work.
 - .3 Fully coordinate all testing and startups with all trades, the Consultant, and authorities having jurisdiction.
 - .4 Provide adequate notice to all parties.
- 1.17 Demonstration
- .1 Demonstrate to the Owner on proper operation of the system.
 - .2 The Contractor shall arrange for all necessary personnel and equipment specialists to be in attendance for purposes of demonstration.
 - .3 Provide instruction by a manufacturer's representatives as required too fully demonstrate the systems.

- .4 Demonstration shall include but not be limited to:
 - .1 Demonstration in the normal, abnormal and emergency operation of all systems provided under this Division.
 - .2 Review of all necessary maintenance procedures, including winterization, of all systems provided under this Division.
 - .3 Provision of a documented maintenance program covering all systems provided or modified under this contract.
 - .4 Review of all close-out documentation including complete maintenance manuals and record drawings.
- .5 Prepare a Demonstration Agenda and Log for signature by all Participants. Submit to Consultant and include in Manuals.

1.18 Substantial Completion and Performance

- .1 Substantial completion and performance shall be determined and awarded by the Consultant.
- .2 Complete the following to the satisfaction of the Consultant prior to request for substantial completion:
 - .1 Fire Dampers and Fire Stopping
 - .2 System Testing and Startups including report
 - .3 Balancing including report
 - .4 Draft copy of maintenance manual
 - .5 As-built Drawings
- .3 Complete the following to the satisfaction of the Consultant prior to request for substantial performance:
 - .1 Final Maintenance Manuals
 - .2 Final Record Drawings
 - .3 Demonstration and Training

1.19 Warranty

- .1 Provide a one (1) year full parts and labour warranty for the new system from date of substantial completion. A draft copy of the maintenance manual shall be submitted before substantial completion is awarded.
- .2 Submit warranty letter on Company letterhead signed by Company representative stating warranty terms including warranty period from date of substantial completion.

PART 2 - PRODUCTS

2.1 Materials

- .1 All material used shall be new, free from defects, of quality specified, and installed in accordance with manufacturer's instructions.
- .2 Major equipment shall have nameplates on the exterior of the equipment in a visible location containing manufacturer's name, model number, serial number, performance data, and electrical characteristics.
- .3 The same manufacturer shall be used for types of equipment used in similar applications.
- .4 It is the responsibility of the Contractor to store and protect materials supplied by this scope.
- .5 Materials shall be stored in original containers.
- .6 Submit to the Consultant and the Owner, current MSDS Sheets for any products being used on the job site where they exist.
- .7 Remove and dispose of all redundant materials and garbage from site.
- .8 Supply anchor bolts and templates for installation by other Divisions.

2.2 Selected Products and Equivalentents

- .1 Sections within Division 15 list "Acceptable Manufacturers" which must meet characteristics of the specified equipment and products for each section.
- .2 Base specified products are specified and/or shown on the drawings, and identified by manufacturer's name, type and catalogue number.
- .3 Any alternate manufacturers from base specified products and equipment must equal or exceed the quality, finish and performance of those base specified and/or shown, and not exceed the space requirements allotted on the drawings. Include costs for any associated work to accommodate such substitutions, including the Consultant's time and revisions to the work of other divisions (i.e. electrical changes).
- .4 If item or material specified is unobtainable, state in Tender proposed substitute and amount added or deducted for its use. Extra monies will not be paid for substitutions after the Contract has been awarded.
- .5 If item of size indicated is unobtainable, supply next larger size without additional charge.

2.3 Quality of Product

- .1 All products provided shall be listed and/or approved by relevant authorities and shall be new.
- .2 If products specified are not listed and/or approved, obtain approval of provincial regulatory authority. Pay all applicable charges levied and make all modifications required for approval.
- .3 All products provided shall be new including those not specified and shall be of a quality best suited to the purpose required and their use subject to approval by the Consultant.

2.4 Product Finishes

- .1 Shop drawings shall indicate finishes. Use standard finish unless otherwise specified.
- .2 Repair dents and touch up all damaged finishes with matching finish, or if required by the Consultant or Owner, completely repaint or replace damaged surface at no extra cost to the Contract.

2.5 Access Doors/Panels

- .1 Provide access doors/panels as required for access, adjustment, operation, service, and maintenance.
- .2 Access doors/panels shall be Acudor, Ecuador or equivalent with concealed hinges and screwdriver locking device.
- .3 Acceptable Manufacturers:
 - .1 Acudor
 - .2 Zurn
 - .3 Nailor Industries
 - .4 Le Hage

2.6 Belt Drives

- .1 Fit reinforced belts in sheave matched to drive. Multiple belts to be matched sets.
- .2 Use cast iron or steel sheaves secured to shafts with removable keys unless otherwise specified.
- .3 For motors under 7.5kW (10hp): standard adjustable pitch drive sheaves, having plus or minus 10% range. Use mid-position of range for specified r/min.
- .4 For motors 7.5kW (10hp) and over: sheave with split tapered bushing and keyway having fixed pitch unless specifically required for item concerned.

Provide sheave of correct size to suit balancing.

- .5 Minimum drive rating: 1.5 times nameplate rating on motor. Keep overhung loads within manufacturer's design requirements on prime mover shafts.
- .6 Motor slide rail adjustment plates to allow for centre line adjustment.
- .7 Provide sheave changes as required for final air balancing.

2.7 Drive Guards

- .1 Provide guards for unprotected drives.
- .2 Guards for belt drives:
 - .1 Expanded metal screen welded to steel frame.
 - .2 Minimum 1.2 mm (18 gauge) thick sheet metal tops and bottoms.
 - .3 40mm (1-1/2") diameter holes on both shaft centres for insertion of tachometer.
 - .4 Removable for servicing.
- .3 Provide means to permit lubrication and use of test instruments with guards in place.
- .4 Install belt guards to allow movement of motors for adjusting belt tension.
- .5 Guard for flexible coupling:
 - .1 "U" shaped, minimum 106 mm (16 gauge) thick galvanized mild steel.
 - .2 Securely fasten in place.
 - .3 Removable for servicing.
- .6 Unprotected fan inlets or outlets:
 - .1 Wire or expanded metal screen, galvanized, 20 mm (3/4") mesh.
 - .2 Net free area of guard: not less than 80% of fan openings.
 - .3 Securely fasten in place.
 - .4 Removable for servicing.

2.8 Equipment Supports

- .1 Equipment supports supplied by equipment manufacturer: specified elsewhere in Division 15.
- .2 Equipment supports not supplied by equipment manufacturer: fabricate from structural grade steel. Submit structural calculations with shop drawings.
- .3 Install base mounted equipment on chamfered edge housekeeping pads, minimum of 100 mm (4") high and 150 mm (6") larger than equipment dimensions all around. All pads shall be painted yellow on sides and top. Refer

to Section 15090.

2.9 Sleeves

- .1 Pipe sleeves: at points where pipes pass through masonry, concrete or fire rated assemblies and as indicated.
- .2 Schedule 40 steel pipe.
- .3 Sleeves with annular fin continuously welded at midpoint:
 - .1 Through foundation walls.
 - .2 Where sleeve extends above finished floor.
 - .3 Through fire rated walls and floors.
- .4 Sizes: minimum 6mm (1/4") clearance all around, between sleeve and un-insulated pipe or between sleeve and insulation.
- .5 Terminate sleeves flush with surface of concrete and masonry walls, concrete floors on grade and 25mm (1") above other floors.
- .6 Fill voids around pipes:
 - .1 Caulk between sleeve and pipe in foundation walls and below grade floors with water proof fire retardant non-hardening mastic.
 - .2 Where sleeves pass through walls or floors, provide space for firestopping. Where pipes/ducts pass through fire rated walls, floors and partitions, maintain fire rating integrity.
 - .3 Ensure no contact between copper tube or pipe and ferrous sleeve.
 - .4 Fill future-use sleeves with lime plaster or other easily removable filler.
 - .5 Coat exposed exterior surfaces of ferrous sleeves with heavy application of zinc rich paint to CGSB 1-GP-181M+Amdt-Mar-78.
- .7 Provide minimum 20 gauge duct sleeves where ducts pass through masonry concrete or fire rated assemblies. Maintain minimum 25mm (1") clearance all around or to the requirements of the authority having jurisdiction. Seal at all as indicated.

2.10 Fire Stopping

- .1 This Contractor shall work with all other Contractors on the project in providing one common method of fire stopping all penetrations made in the fire rated assemblies.
- .2 Approved fire stopping and smoke seal material in all fire separations and fire ratings within annular space between pipes, ducts, insulation and adjacent fire separation and/or fire rating.
- .3 Do not use cementitious or rigid seals around penetrations for pipe, ductwork, or other mechanical items.

- .4 Insulated pipes and ducts; ensure integrity of insulation and vapour barrier at fire separation.
- .5 Provide materials and systems capable of maintaining effective barrier against flame, smoke and gases. Ensure continuity and integrity of fire separation.
- .6 Comply with the requirements of CAN4-S115-M35, and do not exceed opening sized for which they have been tested.
- .7 Systems to have an F or FT rating (as applicable) not less than the fire protection rating required for closures in a fire separation. Provide “fire wrap” blanket around services penetrating fire walls. Extent of blanket must correspond to ULC recommendations.
- .8 The fire stopping materials are not to shrink, slump or sag and to be free of asbestos, halogens and volatile solvents.
- .9 Firestopping materials are to consist of a component sealant applied with a conventional caulking gun and trowel.
- .10 Fire stop materials are to be capable of receiving finish materials in those areas which are exposed and scheduled to receive finishes. Exposed surfaces are to be acceptable to consultant prior to application of finish.
- .11 Firestopping shall be inspected and approved by the Consultant and local authority prior to concealment of enclosure.
- .12 Install material and components in accordance with ULC certification, manufacturer’s instructions and local authority.
- .13 Submit product literature and insulation material on fire stopping in shop drawing and product data manual. Maintain copies of these on site for viewing by installers and Consultant.
- .14 Manufacturer of product shall provide certification of installation. Submit letter to the Consultant.
- .15 Acceptable Manufacturers:
 - .1 Fryesleeve Industries Inc.
 - .2 General Electric Pensil Firestop Systems
 - .3 International Protective Coatings Corp.
 - .4 Rectorseal Corporation (Metacaulk)
 - .5 Proset Systems
 - .6 3M
 - .7 AD Systems
 - .8 Hilti
- .16 Ensure firestop manufacturer representative performs on-site inspections and certifies installation. Submit inspection reports/certification at time of substantial

completion.

2.11 Escutcheons

- .1 Provide on pipes and ductwork passing through walls, partitions, floors and ceilings in finished areas.
- .2 Chrome or nickel plated brass or Type 302 stainless steel, one piece type with set screws.
- .3 Outside diameter to cover opening or sleeve.
- .4 Inside diameter to fit around finished pipe.

2.12 Spare Parts

- .1 Provide spare parts as specified under this Division.
- .2 Provide list of equipment in maintenance manuals indicating corresponding spare parts required. List of spare parts to be signed off by receiving personnel.

2.13 Special Tools

- .1 Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Maintenance Materials Special Tools and Spare Parts.

PART 3 - EXECUTION

3.1 Site Examination

- .1 Examine the site of work and become familiar with all features and characteristics affecting this work before submitting tender.
- .2 No additional compensation will be given for extra work due to existing conditions which such examination should have disclosed.
- .3 Report to the Consultant any unsatisfactory conditions which may adversely affect the proper completion of this work.

3.2 Interference and Coordination Drawings

- .1 Examine the drawings and all divisions of the specifications.
- .2 Prepare interference and equipment layout drawings to ensure all components will be properly accommodated within the spaces provided.
- .3 Lay out the work and equipment with due regard to architectural, structural and electrical features, and service requirements.

- .4 Submit interference drawings to the Consultant.
- .5 Before commencing any work, obtain a ruling from the Consultant if any conflict exists, otherwise no additional compensation will be made for any necessary adjustments.

3.3 Separation of Services

- .1 Contact between dissimilar metals, such as copper and aluminum, in damp or wet locations is not permitted.
- .2 All pipes, ductwork and wiring shall be supported from permanent building structure. Use of other services for support is not permitted.

3.4 Workplace Safety

- .1 The workplace must be kept safe at all times.
- .2 Conform to all ministries of labour, and health and safety regulations at all times.
- .3 Use ladders and proper techniques as approved by the ministry of labour to perform all work.
- .4 Cover all holes/openings and provide barriers around hazards, etc. to ensure occupants and workers are not at risk.
- .5 Where work does not conform to such regulations, stop work immediately and report the situation to the Owner's representative or Consultant or rectify the situation immediately.
- .6 Report any hazards or concerns to the Owner's representative immediately.
- .7 Conform to Owner's safety requirements and construction regulations.

3.5 Temporary Requirements

- .1 All temporary requirements to complete mechanical work during construction shall be the responsibility of the Mechanical Contractor except temporary power or water.

3.6 Location of Equipment

- .1 Approximate distances and dimensions may be obtained by scaling off the drawings. Figured dimensions shall govern over scaled dimensions.
- .2 Equipment locations shown on the drawings are approximate. Locations may be revised to suit construction and equipment arrangements provided design intent is not jeopardized and there is no additional cost to the Owner.

3.7 Mounting Heights

- .1 Mounting height of equipment is from finished floor to equipment unless otherwise specified or indicated. Coordinate with block coursing if applicable.
- .2 Where mounting heights are not indicated on the drawings, obtain verification from the Consultant before proceeding.

3.8 Excavating and Backfilling

- .1 Provide all saw cutting, excavating and backfilling for new underground services. All backfilling shall be new clean granular 'A' fill brought in specifically for the purpose of backfilling to the underside of floor slab. All backfilling shall be compacted at intervals not more than 150mm (6") layer to the satisfaction of the Consultant.
- .2 Provide excavating and backfilling outside the building with granular 'A' brought in specifically for backfilling to a minimum of 450mm (18") over the pipe.
- .3 Bottoms of trenches shall be excavated so that the pipe will be supported on a 150mm (6") compacted bed of clean granular 'A' fill. Provide all necessary pumping to maintain excavation free of water.
- .4 Should water be encountered during excavation, the Mechanical Contractor shall provide all labour and material, including all equipment required for dewatering the excavation. After the water has been removed, this Contractor shall install a 300mm (12") base of compacted 50mm (2") clear stone covered with filter cloth before installing backfill as detailed and/or as specified.
- .5 Be responsible for all weather protection required to install piping and/or equipment to the satisfaction of the Consultant.
- .6 Be responsible for providing all clear stone or granular 'A' material suitable for application to replace existing soil not suitable for backfilling above the 450mm (18") bedding material.
- .7 It is the responsibility of the Contractor to review the soils report. Additional work requested due to failure of soil conditions due to Contractor not reviewing report will not be entertained.
- .8 Allow for restoration of concrete and floor finishes.

3.9 Welding, Grinding, Noisy Work, Odours

- .1 No welding, grinding, other noisy work or work generating odours shall be done during regular operating/school hours.
- .2 All above work shall be done after hours or on weekends outside of regular hours.

- .3 Submit hot work permit prior to any welding.

3.10 Cutting, Coring, Patching and Restoration

- .1 Allow for all cutting, coring, patching, restoration and finishing. Surface finishes shall exactly match existing finishes of same materials.
- .2 Each Section of this Division shall bear expense of cutting, patching and repairing to install their work and/or replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.

3.11 Painting

- .1 Apply at least one (1) coat of corrosion resistant primer paint to ferrous supports and site fabricated work.
- .2 Paint all new concrete pads for mechanical equipment with 2 coats of yellow paint on all sides and top 12" (300mm) edge.
- .3 Prime and touch up marred finished paintwork to match original.
- .4 Restore to new condition, or replace equipment at discretion of Consultant, finishes which have been damaged too extensively to be merely primed, painted and touched up.

3.12 Concealment

- .1 All equipment, components, piping, and conduit shall be concealed in ceiling spaces, bulkheads or walls in finished areas.
- .2 Exposed equipment, components, piping, and conduit installed in unfinished areas, shall be installed as high as possible. Run piping and conduit parallel to building lines, tight to roof deck, floor above and down columns or corners.

3.13 Clearances and Accessibility

- .1 Install all work for easy access for adjustment, operation, service, and maintenance.
- .2 Maintain clearances for all equipment as per local codes and manufacturer's instructions.
- .3 Access panels shall be Acudor, Ecuador or equivalent with concealed hinges and screwdriver locking device.
- .4 Provide access panels of adequate size as required to access equipment and components in concealed areas. Do not install access doors in specialty walls or ceilings.
- .5 Provide fire rated access doors where installed in fire separations to match rating

of separation.

- .6 Install all services in exposed areas so that a minimum head clearance of 2200mm (88") is maintained.

3.14 Equipment and System Protection

- .1 Protect equipment and materials from damage in storage and on site before, during, and after installation until final acceptance.
- .2 Protect equipment and system openings from dust and debris with appropriate covers that will withstand through the construction.
- .3 Where equipment and system components become dirty or damaged, clean and repair to new condition to the satisfaction of the Consultant and the Owner at no expense to the Owner.

3.15 Supports

- .1 Provide all miscellaneous metals and materials as required for support, hanging, anchoring, and guiding of all equipment, ductwork, piping, and all other work in Division 15.
- .2 All supports must be securely mounted to structures.
- .3 Refer to Section 15090.

3.16 Fire Stopping

- .1 Refer to Part 2 herein.

3.17 Cleaning

- .1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units prior to turn over to Owner.
- .2 In preparation for final acceptance, clean and refurbish all equipment and leave in operating condition including replacement of all filters in all air and piping systems.

3.18 Owner Supplied Equipment

- .1 Arrange for delivery and installation of Owner supplied equipment where specified in this Division.
- .2 Connect to equipment supplied by the Owner and make operable.

3.19 Identification and Labeling

- .1 All equipment, valves, panels and devices shall be labeled under this Division.

.2 Refer to Section 15020.

3.20 TSSA Inspection

.1 Prior to final completion of the project, this Contractor shall make application, arrange, and pay for a TSSA Inspection of all piping systems and equipment installations, including, but not limited to refrigeration, fuel piping, heating plant, and associated equipment installed under the contract.

.2 Provide a copy of the TSSA Report in the maintenance manuals for each system.

3.21 Field Review and Deficiencies

.1 The Contractor shall notify the Consultant when the job is ready for field review at various stages including rough-in stages.

.2 During the course of construction, the Consultants will monitor construction and provide written reports of work progress, discussions and deficiencies.

.3 The Contractor shall correct all deficiencies within the work period prior to the next review.

.4 The Contractor shall not conceal any work until inspected. Where work was concealed, the Contractor shall remove and replace tiles, coverings or other obstructions to allow proper inspection at the Contractor's expense.

.5 Upon completion of the project the Consultant will do a final review. Upon receiving the final inspection report, the Contractor must correct and sign back the inspection report indicated all deficiencies are completed. A re-inspection will only be done once the Consultant receives this in writing. Where the Consultant performs the re-inspection and the work is not complete, the Contractor is responsible for reimbursing the Consultant for the field review. The fee for additional reviews will be at the Consultant's hourly rates plus mileage and applicable taxes to be paid directly to the Consultant prior to performing the next field review.

END OF SECTION

PART 1 – GENERAL

1.1 References

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.60-M89, Interior Alkyd Gloss Enamel.
 - .2 CAN/CGSB-24.3-92, Identification of Piping Systems.
- .2 Canadian Standards Association (CSA)
 - .1 Natural Gas Installation Code CSA B149.1-00
- .3 National Fire Protection Association
 - .1 NFPA 13 (current edition), Standard for the Installation of Sprinkler Systems
 - .2 NPFA 14 (current edition), Standard for the installation of Standpipe and Hose Systems

1.2 Product Data

- .1 Submit product data in accordance with Division 1, General Requirements.
- .2 Product data to include paint colour chips, all other products specified in this section.

1.3 Product Literature

- .1 Submit product literature in accordance with Division 1: General Requirements.
- .2 Product literature to include nameplates, labels, tags, lists of proposed legends.

PART 2 - PRODUCTS

2.1 Manufacturer's Equipment Nameplates

- .1 Metal or plastic lamacoid nameplate mechanically fastened to each piece of equipment by manufacturer.
- .2 Lettering and numbers to be raised or recessed.
- .3 Information to include, as appropriate:
 - .1 Equipment: Manufacturer's name, model, size, serial number, capacity.
 - .2 Motor: voltage, Hz, phase, power factor, duty, frame size.

2.2 System Nameplates

.1 Colours:

- .1 Hazardous: red letters, white background
- .2 Elsewhere: black letters, white background (except where required otherwise by applicable codes).

.2 Construction:

- .1 3mm (1/8") thick laminated plastic, matte finish, with square corners, letters accurately aligned and machine engraved into core.

.3 Sizes:

- .1 Conform to the following table:

Size	Dimensions mm (")	No. of Lines mm (")	Height of Letters mm (")
1	10 x 50 (3/8" x 2")	1 (3/64")	3 (1/8")
2	15 x 75 (1/2" x 3")	1 (3/64")	6 (1/4")
3	15 x 75 (1/2" x 3")	2 (5/64")	3 (1/8")
4	20 x 100 (3/4" x 4")	1 (3/64")	10 (3/8")
5	20 x 100 (3/4" x 4")	2 (6/64")	6 (1/4")
6	20 x 200 (3/4" x 8")	1 (3/64")	10 (3/8")
7	25 x 125 (1" x 5")	1 (3/64")	15 (1/2")
8	25 x 125 (1" x 5")	2 (5/64")	10 (3/8")
9	32 x 200 (1-1/4" x 8")	1 (3/64")	20 (3/4")

- .2 Use maximum of 25 letters/numbers per line.

.4 Locations:

- .1 Terminal cabinets, control panels: Use size #5.
- .2 Equipment in Mechanical Rooms: Use size #9.
- .3 Rooftop equipment: Use size #9.
- .4 Equipment above ceiling: use size #1 riveted to ceiling suspension system.

2.3 Piping Systems Governed by Code

.1 Natural Gas:

- .1 Natural gas: To CSA B149.1-00 and authority having jurisdiction and as indicated elsewhere.
- .2 Paint indoor gas piping with **2 coats** of yellow paint.
- .3 Paint outdoor gas piping with **2 coats** of weatherproof paint to match building colour where visible from meter and with yellow where not visible

from meter (i.e. roof).

- .4 See colour legend specified herein.

2.4 Identification of Piping Systems

- .1 Identify contents by background colour marking, description and direction of flow by arrows. To CAN/CGSB 24.3 except where specified otherwise.

- .2 Materials

- .1 Label piping with pipe markers equal to SMS (Smillie McAdams Summerlin Ltd.) "Coil-Mark".
- .2 Pipe markers shall be semi-rigid plastic vinyl, with surface printing using premium quality ultraviolet inks.
- .3 For outside diameters up to 150mm (6"), markers shall be coiled and wrap completely around the pipe with two rows of wording in alternating directions. For outside diameters larger than 150mm (6"), markers shall be saddle style with four rows of wording and installed using 864mm (34") long nylon cable ties provided with the marker.

- .3 Legend:

- .1 Block capitals to sizes and colours listed in CAN/CGSB-24.3.

- .4 Arrows showing direction of flow:

- .1 Outside diameter of pipe insulation less than 75 mm (3"): 100 mm (4") long x 50 mm (2") high.
- .2 Outside diameter of pipe or insulation 75 mm (3") and greater: 150 mm (6") long x 50 mm (2") high.
- .3 Use double-headed arrows where flow is reversible.

- .5 Extent of background colour marking:

- .1 To full circumference of pipe or insulation.
- .2 Length to accommodate pictogram, full length of legend and arrows.

- .6 Colours and Legends:

- .1 Where not listed, obtain direction from Consultant.
- .2 Colours for legends, arrows:

<u>Background colour</u>	<u>Legend</u>	<u>Arrows</u>
Yellow	White	Black
Green	White	Black
Red	White	Black

2.5 Identification of Duct Systems

- .1 Label all duct systems with air type and air flow direction.
- .2 Black spray painted stencils are acceptable.

2.6 Concrete Pads for Mechanical Equipment

- .1 Paint all sides and top 12" (300mm) edge of all concrete pads for mechanical equipment with two (2) coats of yellow paint. Paint colour to match Benjamin Moore Safety Yellow #343.

2.7 Valves, Controllers

- .1 Brass tags with 15mm (1/2") stamped identification data filled with black paint.
- .2 Include flow diagrams for each system, of approved size, showing charts and schedules with identification of each tagged item, valve type, service, function, normal position, location of tagged item.
- .3 Provide coloured adhesive label indication on ceiling grid to locate valves/equipment above. Label description to match device. Size, colour and description to be pre-approved by Consultant.

2.8 Controls Components Identification

- .1 Identify all systems, equipment, components, controls, sensors with system nameplates specified in this section.
- .2 Inscriptions to include function and (where appropriate) fail-safe position.
- .3 Provide yellow adhesive label indication on ceiling grid to locate control devices above. Label description to match device. Size and description to be pre-approved by Consultant.

2.9 Mechanical Ceiling Components Identification

- .1 Identify all other mechanical components in ceiling space (i.e. TMV) with system nameplates specified in this section.
- .2 Inscriptions to include description (i.e. TMV access).
- .3 Provide lamacoid nameplate or adhesive label indication on ceiling grid to locate component above. Label description to match device. Size and description to be pre-approved by Consultant.

2.10 Language

- .1 Identification to be in English.

PART 3 - EXECUTION

3.1 Timing

- .1 Provide all identification in ceilings prior to the installation of ceiling tiles for Consultant review. Where identification in ceilings is not complete prior to ceiling tiles being installed it is the Contractor's responsibility to remove any tiles as directed by the Consultant for their review.

3.2 Installation

- .1 Perform work in accordance with CAN/CGSB-24.3 except as specified otherwise.
- .2 Provide ULC and/or CSA registration plates as required by respective agency.

3.3 Nameplates

- .1 Install on all equipment unless otherwise noted.
- .2 Equipment labels not required on:
 - .1 Force flow heaters, Wallfin or Convector
 - .2 Expansion tanks
 - .3 Air Separators and other system accessories
- .3 Locations:
 - .1 In conspicuous location to facilitate easy reading and identification from operating floor.
- .4 Standoffs:
 - .1 Provide for nameplates on hot and/or insulated surfaces.
- .5 Protection:
 - .1 Do not paint, insulate or cover in any way.

3.4 Location of Identification on Piping and Duct Systems

- .1 On long straight runs in ceiling spaces and in open areas in boiler rooms, equipment rooms, galleries, tunnels not more than 3m (10') intervals and more frequently if required to ensure that at least one is visible from any one viewpoint in operating areas and walking aisles.
- .2 Adjacent to each change in direction.
- .3 At least once in each small room through which piping or ductwork passes.

- .4 On both sides of visual obstruction or where run is difficult to follow.
- .5 On both sides of separations such as walls, floors, partitions.
- .6 Where system is installed in pipe chases, ceiling spaces, galleries, other confined spaces, at entry and exit points, and at each access opening.
- .7 At beginning and end points of each run and at each piece of equipment in run.
- .8 At point immediately upstream of major manually operated or automatically controlled valves, dampers, etc. Where this is not possible, place identification as close as possible, preferably on upstream side.
- .9 Identification to be easily and accurately readable from usual operating areas and from access points.
 - .1 Position of identification to be approximately at right angles to most convenient line of sight, considering operating positions, lighting conditions, risk of physical damage or injury and reduced visibility over time due to dust and dirt.

3.5 Valves, Controllers

- .1 Valves and operating controllers, except at plumbing fixtures, radiation, or where in plain sight of equipment they serve: Secure tags with non-ferrous chains or close "S" hooks.
- .2 Install one copy of flow diagrams, valve schedules mounted in frame behind non-glare glass where directed by Consultant. Provide one copy (reduced in size if required) in each operating and maintenance manual.
- .3 Number valves in each system consecutively.

3.6 Mechanical Ceiling Components Identification

- .1 Provide lamacoid nameplate or adhesive label indication on ceiling grid to locate component above. Label description to match device.

END OF SECTION

PART 1 - GENERAL

1.1 Quality Assurance

- .1 Test equipment and material where specified and as required by authorities having jurisdiction to demonstrate its proper and safe operation.
- .2 Test procedures shall be in accordance with applicable portions of:
 - .1 Canadian Gas Association (CGA)
 - .2 Ontario Building Code
 - .3 National Fire Protection Association (NFPA)
 - .4 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
 - .5 Sheet Metal and Air Conditioning National Association (SMACNA)
 - .6 American Society of Mechanical Engineers
 - .7 Ontario Ministry of Health
 - .8 Local codes and ordinances
 - .9 Other recognized test codes
- .3 Provide additional tests and re-testing as required and requested by the Consultant or Owner.

1.2 Submittals

- .1 Obtain certificates of approval and acceptance from authorities having jurisdiction and include in Operating and Maintenance Manuals.
- .2 On completion of mechanical installation, provide certification of tests with detailed data as required. Itemize tests as to time performed and personnel responsible. Include a copy of field data in Operating and Maintenance Manuals.

1.3 Liability

- .1 During tests, assume responsibility for damages in the event of injury to personnel, building or equipment and bear costs for liability, repairs and restoration.

PART 2 – PRODUCTS

- 2.1 All equipment and products necessary to perform tests shall be covered under this Division at no cost to the Owner.

PART 3 - EXECUTION

3.1 Pressure Tests

- .1 Piping, fixtures or equipment shall not be concealed or covered until reviewed and accepted by the Consultant.
- .2 Provide equipment, materials and labour for tests. Use test instruments from approved laboratory or manufacturer and furnish certificate showing degree of accuracy.
- .3 Test equipment and material where specified required by authorities having jurisdiction to demonstrate its proper and safe operation.
- .4 Provide four (4) days notice to the Consultant before tests.
- .5 Carry out hydraulic tests for eight (8) hours and maintain pressure. Where leakage occurs, repair and retest.
- .6 Domestic and Make-Up Water Piping: Test to 1½ times maximum working pressure or 1034 kPa (150 psi) water pressure measured at system low point.
- .7 Drainage Systems: Test by filling with water to produce water pressure of 35 kPa (5 psi) minimum and 83 kPa (12 psi) maximum. Check for proper grade and obstruction by ball test, or other approved means.
- .8 Natural Gas Piping: Conduct a 1 hour test of all gas piping systems up to 11" pressure and a 24 hour chart test at 50 psi of all gas piping systems over 11" pressure. The Contractor shall perform a soap test and electronic test. Arrange and pay for a gas inspection by the local Gas/TSSA Inspector.
- .9 Hydronic Water Piping: Test to 1-1/2 times maximum working pressure or minimum 1034 kPa (150 psi).
- .10 Duct Pressure Tests: Refer to Section 15810.

3.2 Equipment Tests

- .1 Perform testing of all equipment as per manufacturer's recommendations and requirements under full operational ranges and submit reports.
- .2 Use the services of a qualified Technician and submit report.

3.3 Test Reports

- .1 Submit all test reports to Consultant as specified herein within one (1) week of each test completion.
- .2 Include a copy of all test reports in the manuals.

.3 Refer to Section 15010 and 15045.

END OF SECTION

PART 1 - GENERAL

1.1 Work Included

- .1 Review location of all balancing valves on drawings for air and water systems prior to construction and submit recommendations for additional balancing dampers or balancing valves to perform complete system balancing.
- .2 Balance and adjust all new and upgraded air and water systems and equipment and submit reports. Provide additional scope associated with existing equipment where indicated on drawings.
- .3 Allow for a minimum of one (1) return visit for any adjustments and/or to work with the Contractor to investigate any issues.

1.2 Scope of Work

- .1 Review design drawings and general function of each system including associated equipment, control sequences and operation cycles. Confirm listing of flow and terminal measurements to be performed.
- .2 Confirm balancing valve and damper locations are adequate for system balancing. Recommend additional locations to Contractor and Consultant if required to complete system balancing.
- .3 Outline procedures for taking test measurements to establish compliance with requirements. Specify type of instrument to be used, method of instrument application and correct factors.
- .4 Balance and adjust entire air and hydronic water systems upon completion of the work. Use approved report format as approved by the Consultant to record all results. Submit sample to Consultant for approval prior to balancing.
- .5 Contact Consultant during or immediately following balancing procedures to discuss any concerns or issues prior to issuing any reports.
- .6 Submit one (1) copy of the Balance Report to the Consultant for review.
- .7 Make adjustments as directed by the Consultant. Include for a minimum of one (1) return visit for any adjustments and/or to work with the Contractor to investigate any issues.
- .8 Revise report and resubmit to the Consultant for review.
- .9 Upon acceptance of the report, include one (1) final accepted copy in maintenance manuals.

1.3 Balance Reports

- .1 Use a format acceptable to the Consultant for Reports.

- .2 Submit one (1) copy of the report to the Consultant for review within one (1) week from balance completion and prior to inclusion into Maintenance Manuals. Include any comments or concerns from system balancing on report.
 - .3 Reports shall include equipment data, design data and balance results in metric and imperial units.
 - .4 Report shall include but not be limited to:
 - .1 Balancing Company
 - .2 Balancing Agent who performed the work
 - .3 Date the balancing was performed
 - .4 Date of report
 - .5 Tools and apparatus used for testing including calibration information
 - .6 System description
 - .7 Equipment manufacturer, model, serial, arrangement, size, performance (flow, pressure drop), fan size (if applicable), motor size, voltage and amperage
 - .8 Design and actual air flows (supply air, return air, outside air, relief air)
 - .9 Design and actual water flows
 - .10 Setting of balancing valves
 - .11 Design and actual pressure drops (air and water)
 - .12 Electrical characteristics
 - .13 Design and actual motor FLA, RPM
 - .14 Comments or concerns on findings
- 1.4 Acceptable Balancing Agencies
- .1 Quality Air
Contact: Darek Niezgoda
Phone: (905) 492-3111
Email: darek@qualityairdistribution.com
 - .2 Flowset Balancing
Contact: Chris Pither
Phone: (416) 410-9793 or (647) 321-5114
Email: chrisp@flowset.com
 - .3 Design Test and Balance
Contact: Surrinder Singh
Phone: (905) 886-6513
Email: mail@designtest.ca
 - .4 Technical Aire
Contact: Linval Ocharoo
Phone:(416) 564-4807
Email: lcharoo@technicalaire.com

PART 2 - PRODUCTS

2.1 Equipment

- .1 All equipment and products necessary to perform tests shall be provided and covered by the Balancing Agent.

2.2 Maintenance Manual Materials

- .1 Provide copies of the reports to the Contractor for inclusion in the manuals.

PART 3 – EXECUTION

3.1 General

- .1 Coordinate with system installers to confirm location of all balancing dampers and balancing valves. Balance dampers and valves required in addition to those shown on the drawing must be coordinated prior to installation.
- .2 Balance to maximum measured flow deviation from specified values of 10% at terminal device and 5% at equipment.
- .3 Mark settings on valves, splitters, dampers and other adjustment devices.
- .4 Include any required site investigation and system balancing based on any system deficiencies as noted herein.
- .5 Contact Consultant during or immediately following balancing procedures to discuss any concerns or issues prior to issuing any reports.
- .6 At final inspection, recheck and prove random selections of data recorded in report at discretion and direction of the Consultant.

3.2 Air System Procedure

- .1 Adjust air handling and distribution systems to provide required or design supply and return air quantities.
- .2 Make air quantity measurements in ducts by pitot tube traverse of entire cross-sectional area of duct.
- .3 Measure air quantities at air inlet and outlet.
- .4 Use volume control devices to regulate air quantities only to extent that adjustments do not create objectionable air motion or sound levels. Affect volume control by duct internal devices, such as dampers and splitters.
- .5 Vary total system air quantities by adjustment of fan speeds. Vary branch air quantities by damper regulation.

- .6 Provide system schematic with required and actual air quantities at each outlet or inlet.
- .7 Provide plugs in any holes created in ductwork for readings.

3.3 Water System Procedure – Hydronic Systems

- .1 Adjust water systems to provide required or design quantities.
- .2 Use calibrated venturi tubes, orifices, or other metered fittings and pressure gauges to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.
- .3 Adjust systems to provide specified pressure drops and flow through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.
- .4 Effect system balance with automatic control valves fully open to heat transfer elements.
- .5 Effect adjustment of water distribution systems by means of balancing cocks, valves and fittings. Do not use service or shutoff valves for balancing unless indexed for balance point.
- .6 Where pump capacity available is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.

3.4 Reports

- .1 Submit written reports for all balancing in a format pre-approved by the Consultant as per Scope of Work above.
- .2 Submit one (1) copy of the Balance Report to the Consultant for review.
- .3 Make adjustments as directed by the Consultant. Include for a minimum of one (1) return site visit as noted herein.
- .4 Revise report and resubmit to the Consultant for review.
- .5 Fan Test Reports
 - .1 Report air flow; air pressure at inlet and discharge; fan speed; motor current; motor voltage; manufacturer; model; fan wheel size.
 - .2 For fans with power greater than 250 watts, plot design and actual pressure and flow on manufacturer's or drafted fan performance curve.

- .6 Pump Test Reports
 - .1 Report designed water flow; water pressure at inlet and discharge; pump speed; motor current; motor voltage; manufacturer; model; impeller size.
 - .2 For pumps with power greater than 250 watts, plot design and actual pressure and flow on manufacturer's or drafted pump performance curve.
- .7 Upon acceptance of the report, provide copies of final report for maintenance manuals.

END OF SECTION

PART 1 - GENERAL

1.1 Work Included

- .1 Operating and Maintenance Manuals
- .2 Assembly of equipment details sheets and shop drawings including Owner supplied equipment
- .3 Assembly of equipment and systems operating and maintenance instructions
- .4 Assembly of equipment start up and tests reports
- .5 Assembly of Balancing Report
- .6 Assembly of final inspection certificates
- .7 As-built Drawings

1.2 Related Work

- .1 Division 1
- .2 General Mechanical Requirements – Section 15010

PART 2 - PRODUCTS

2.1 Operation and Maintenance Materials

- .1 Provide electronic submission of complete manual in PDF format to Consultant for review. Preliminary manuals will not be accepted. Electronic submission shall include numbered Table of Contents and all required sections. Sections/subfolder and file names shall be numbered in order to match table of contents, and named to match what they represent (i.e. subfolder name “3. Reports”; file name “Balance Report”). Only PDF documents will be accepted.
- .2 Resubmit updates to electronic manual based on Consultant’s review comments until fully accepted.
- .3 Once the electronic manual has been fully approved, the Contractor shall print and provide one (1) hard copy of the complete manual PLUS one electronic copy on USB to the Client. The Contractor shall coordinate with Client and arrange for delivery to requested location. The hard copy manual shall be in 8½” x 11”, 3 ring type catalogue binder, labeled front and spine with contents to match electronic manual including Table of Contents, plastic tab dividers to match subfolder names, and contents to match file names. The USB shall contain the complete manual in electronic PDF format as approved by Consultant, and be labeled with permanent affixed label.

- .2 Manufacturer's data section is to be indexed and ordered to match the sections of the specifications.
- .3 Assemble or develop complete and correct documentation for the operation and maintenance information for equipment and systems provided.
- .4 Assemble or develop copies of all Consultant-reviewed shop drawings and certified material required to complete the documentation. This generally includes but is not limited to the following:
 - .1 Table of Contents
 - .2 Contractors and Subcontractors Information
 - .3 Manufacturer's and Supplier's Information
 - .4 Warranty Letter
 - .5 Reports:
 - .1 Equipment Start-Up Reports
 - .2 Piping Pressure Test Reports
 - .3 TSSA Certification
 - .4 HVAC Systems Cleaning Report (where applicable)
 - .5 Balance Report
 - .6 Water Treatment Report
 - .7 Electrical Reports (ESA, Fire Alarm, etc)
 - .8 Other equipment startup reports and test sheets certified by the manufacturer or a qualified technician
 - .9 Demonstration Reports/Logs
 - .7 Shop drawings (stamped reviewed by Consultant)
 - .8 Maintenance instructions, requirements and schedule
 - .9 Controls as-built drawings
 - .10 Training Log
 - .11 Valve schedule (where applicable)
 - .12 Colour coding charts for access areas (where applicable)
 - .13 As-built drawings

2.2 As-built Drawings

- .1 As-built drawings shall be kept up-to-date on an ongoing basis during construction for periodic review by the Consultant. As-built drawings shall always be kept in the same location on site known to the Consultant.
- .2 Contractors shall certify that final As-built drawings to be correct by notation and signature on the drawings.
- .3 As-built drawings shall precisely identify the configuration, size and location of all systems and equipment installed under this Division, including but not limited to:
 - .1 Heating and Cooling: shut off valves, balancing valves, piping, access doors.

- .2 Controls: controllers, panels, devices, relay cabinets, sensors, thermostats, valve operators, wiring and conduit runs complete with legend.
 - .3 Miscellaneous: actual room names and numbers, schematic diagrams, riser diagrams.
 - .4 As-built drawings shall be submitted to the Consultant.
- 2.3 Balance Reports
- .1 Refer to Section 15043 – Balancing.
 - .2 Include a copy of Balance Report in Operating and Maintenance Manuals.
- 2.4 Test and Start-Up Reports
- .1 Refer to section 15042 – Testing, and Section 15010 – General Mechanical Requirements.
 - .2 Include a copy of all test and start-up reports in Operating and Maintenance Manuals.
 - .3 Obtain final copies of any 3rd Party test reports for inclusion in Operating and Maintenance Manuals.
- 2.5 Demonstration Reports
- .1 Refer to Section 15010 – General Mechanical Requirements
 - .2 Include a copy of all Training literature in the Operating and Maintenance Manuals.
 - .3 Include a copy of the signed and dated Demonstration Log.

PART 3 - EXECUTION

- 3.1 General
- .1 Substantial Completion will not be granted until a draft hard copy of the complete manual has been submitted by the Contractor and reviewed and accepted by the Consultant.
 - .2 Submit a draft copy of the manual to the Consultant for review prior to final submission of all copies.
 - .3 Provide two (2) final hard copies and one (1) electronic copy in PDF format to the Consultant for final acceptance.

3.2 As-built Drawings

- .1 Upon completion of the work, submit to the Consultant for review, one (1) complete set of clear, legible, red-lined certified As-built Drawings. The Contractor shall certify and sign the completed As-built Drawings.
- .2 Substantial completion will not be granted until the As-built Drawings have been submitted to the Consultant.

END OF SECTION

PART 1 - GENERAL

1.1 Welding

- .1 Materials, fabrication, erection, test, examination, inspection, operation and maintenance shall conform to ASME B31.1 and other local and provincial Regulations.
- .2 Welders shall be certified in the Province of Ontario and fully qualified for the type of work outlined on the drawings.

1.2 Quality Assurance

- .1 Gas piping shall meet the requirements of the latest CSA Gas Installation Code.
- .2 Domestic water piping shall meet the requirements of the Ontario Building Code and Municipal Codes.
- .3 Pipe fittings shall conform to the following standards:
 - .1 ANSI B36.10, ASTM-197-47 (Materials)
 - .2 ANSI B16.3 (Malleable Iron Fittings, Threaded)
 - .3 ANSI B16.9 (Wrought Carbon Steel Fittings, Butt Weld)
 - .4 ANSI B16.5 (Forged Carbon Steel Flanges, Threaded, Weld Neck or Slip-on)
 - .5 ANSI B18.2.1 (Carbon Steel Bolts, Hex Head, Course Thread)
 - .6 ANSI B18.2.2 (Carbon Steel Nuts, Heavy Hex, Course Thread)
 - .7 ANSI B16.20 (Gaskets)
 - .8 ANSI B16.39 (Unions)
 - .9 CSA B242 [M1980(R1998)] (Groove and Shoulder Type Mechanical Pipe Couplings)
- .4 All grooved components (couplings, fittings, valves, gaskets, bolts, nuts) shall be of one manufacturer. Acceptable manufacturers: Victaulic.

1.3 Reference Standards and Codes

- .1 Ontario Building Code
- .2 ASTM
- .3 CSA
- .4 CGA
- .5 ANSI
- .6 NFPA
- .7 ULC

- .8 Local Codes and Requirements

PART 2 – PRODUCTS

2.1 Domestic Water

- .1 Domestic water pipe shall be Type “L” hard drawn copper tubing, conforming to ASTM B88.
- .2 Fittings shall be wrought copper, solder joint, pressure type.
- .3 Solder to threaded adapters shall be provided at screwed valves or equipment.
- .4 Unions shall be all bronze construction with ground joint and either solder joint or screwed ends as required. Provide dielectric unions or couplings at all connections between copper tubing and ferrous piping.
- .5 Solder: Potable water systems shall be lead free.

2.2 Hydronic Piping

- .1 Piping up to including 2”: Piping shall be Black Steel Schedule 40 with malleable steel threaded screwed fittings.
- .2 Piping 2.5” and over: Piping shall be Black Steel Schedule 40 with welded fittings. Victaulic is not acceptable.
- .3 Brass adapters shall be provided at all connections between copper tubing and ferrous piping.
- .4 Provide expansion loops in piping systems as indicated on drawings, where required and specified herein.

2.3 Expansion Loops

- .1 Provide expansion loops equal to Flex Hose Tri-Flex Loop Model TFL4 (+/-4" axial), which provides a flexible pipe loop that will absorb and compensate multi-plane movements simultaneously as well as reduce piping stress.
- .2 Construction to be 3 equal length sections of annular corrugated stainless steel close-pitch hose with stainless steel overbraid that will absorb or compensate for pipe movements in all 6 degrees of freedom (3 coordinate axes, plus rotation about those axes) simultaneously.
- .3 The corrugated metal hose, braids, and a stainless steel ring-ferrule/band (material gauge not less than .048") must be integrally seal-welded using a 100% circumferential, full penetration TIG welds. End fittings shall be selected per application. Fittings must be attached using a 100% circumferential TIG weld.

- .4 Braided stainless steel Tri-Flex Loops must be suitable for operating temperatures up to 850 degrees F (455 degrees C).
 - .5 Expansion Loops shall be designed for pressure testing to 1.5 times their maximum rated working pressure and a minimum 4:1 (burst to working) safety factor.
 - .6 Each braided expansion loop shall be individually leak tested by the manufacturer using air-under-water or hydrostatic pressure.
 - .7 Expansion Loops shall be prepared for shipment using a cut-to-length metal shipping bar, tacked securely between the elbows of the two parallel legs, to maintain the manufactured length during shipping. Shipping bar must be removed prior to system start-up.
 - .8 The hanger assembly kit shall be used to support and hang the expansion loop.
 - .9 The ULC Listed Seismic Wire/Cable assemblies conform to the requirements of the ASCE (American Society of Civil Engineers) guidelines for structural applications of wire rope, in that the cable is pre-stretched and the permanent end fittings maintain the break strength of the cable with a safety factor of two.
 - .10 The pre-manufactured flexible loop shall be installed as per manufacturer's printed installation instructions. Other manufactured loops that require pipe alignment guides shall use "Spider" type with outer housing ring. Units shall be fabricated from carbon steel. Pipe hangers and/or roller supports shall not be considered acceptable for use as guides.
 - .11 Expansion loops must have a 5-year full product replacement warranty.
- 2.4 Condensate Piping
- .1 Black Steel Schedule 40 with malleable steel threaded screwed fittings or
 - .2 Type K or L hard copper complete with cast brass or wrought copper drainage fittings with solder joints or
 - .3 IPEX XFR.
- 2.5 Equipment Drains
- .1 Galvanized steel schedule 40 with galvanized threaded fittings or
 - .2 Type K or L hard copper complete with cast brass or wrought copper drainage fittings with solder joints or
- 2.6 Aboveground Drainage, Venting and Storm
- .1 Pipe up to and including 50mm (2") for services **except Urinals** shall be:

- .1 Copper DWV pipe complete with cast brass or wrought copper drainage fittings with solder joints, use 50/50 solder and matching flux for copper drain, waste, and vent piping or
 - .2 Cast iron MJ pipe with MJ fittings and stainless steel clamps. Clamps shall be two-band type.
- .2 Pipe up to and including 50mm (2") **for Urinals** shall be:
- .1 PVC DWV for any piping underground or concealed in walls.
 - .2 PVC XFR for any piping in pipe chases, ceilings spaces or other open areas.
 - .3 NOTE: PVC DWV or XFR is not acceptable in any other applications.
- .3 Pipe 75mm (3") and up shall be:
- .1 PVC DWV 40 System 15 complete with PVC drainage fittings with solvent weld joints (in concealed areas only, not acceptable in ceilings spaces) or
 - .2 Cast iron MJ pipe with MJ fittings and stainless steel clamps. Clamps shall be two-band type.

2.7 Connections

- .1 Unions
 - .1 Use extra heavy duty pattern unions with ground joints, brass seats and threads to ANSI B1.20.1 for connections 50mm (2") and under.
 - .2 Rated for minimum 150 psi.
- .2 Flanges
 - .1 Use standard weight type flanges to ANSI B16.1 with neoprene gaskets for connections 63mm (2½") and over.
 - .2 Rated for minimum 125 psi.
- .3 Adapters
 - .1 Brass adapters shall be provided at all connections between copper tubing and ferrous piping.

2.8 Strainers

- .1 Sizes 50mm (2") and under: Screwed brass or iron body, Y pattern with 0.8mm stainless steel perforated screen.
- .2 Sizes 63mm to 100mm (2½" to 4)": Flanged iron body, Y pattern with 1.2mm stainless steel screen.
- .3 Screen free area shall be minimum three times area of inlet pipe. Provide valved drain and hose connection off strainer bottom.

- .4 Grooved end strainers: where grooved end piping systems are allowed shall be rated for 300 PSI (2065 kPa) Y-Type Strainer shall consist of ductile iron body, Type 304 stainless steel cylindrical removable baskets with 1/16" (1,6mm) diameter perforations and 41% open area 2"-3" strainer sizes or 1/8" (3,2mm) diameter perforations and 40% open area 4"-12" strainer sizes. Acceptable material: Victaulic Style 732.

2.9 Natural Gas Piping

- .1 Sizes 50mm (2") and under: ASTM A53 Schedule 40 seamless wrought steel with standard threaded malleable fittings to ANSI B16.3.
- .2 Sizes over 50mm (2"): ASTM A53 Schedule 40 seamless wrought steel with wrought steel butt welding fittings to ANSI B16.9.
- .3 Welding materials and labour shall conform to ASME codes and authorities having jurisdiction.
- .4 Provide regulators as required and vent as per code.
- .5 Gas vents shall not be within 3m (10') to any natural or mechanical fresh air intakes.
- .6 Gas Regulators
 - .1 Gas regulators shall be complete with internal relief. Where installed indoors, vent to outdoors.
 - .2 Size using an inlet pressure of 2lb, an outlet pressure of 7" w.c. and a capacity to suit equipment served.
 - .3 Acceptable Manufacturers: Sensus as supplied by Ontor, Maxitrol, Fisher.

2.10 Firestop Sealants and Collars

- .1 Provide firestop sealants around all pipe penetrations through rated separations.
- .2 Provide firestop collars for all combustible pipe penetrations through rated separations (where combustible piping is approved).
- .3 Intumescent insert: Flexible, elastomeric strip, two stage expansion, designed to firestop penetrations in fire-rated walls and floors and floor/ceiling assemblies.
- .4 Provide a minimum of 15 times free expansion.
- .5 Sealants shall not contain water soluble expansion ingredients.

PART 3 - EXECUTION

3.1 General

- .1 Apply for permit before beginning any work. Have drawings approved for construction by authorities having jurisdiction or local agencies prior to beginning work.
- .2 Review all inverts and elevations before beginning any installation.
- .3 Have entire installation inspected, at various stages where required, to ensure approval at completion of project.
- .4 Provide clearance for proper installation of insulation and for access to components including but not limited to valves, air vents, drains and unions.
- .5 Maintain proper grades on piping for proper drainage and provide valves at all low points.
- .6 All sanitary lines shall be sloped 1:50.
- .7 All gas piping installations shall comply with CGA code CAN 1-B149, gas safety branch bulletins, local codes and NFPA 96. Provide a CGA approved ball valve where new equipment is to be connected.
- .8 Install gas piping in open or ventilated spaces. Pitch lines and provide drip legs for condensation collection points. Where gas piping is run in a concealed space, provide ventilation grilles as required.
- .9 All exposed piping to run parallel to walls and in a neat and orderly fashion to maintain headroom. Group piping where possible.
- .10 Do not run combustible or nonapproved pipe through fire separations or return air ceiling plenums. Use approved materials and methods only.
- .11 Provide drain valves and air vents at low and high points respectively where required.
- .12 Make connections to equipment with unions or flanges. Provide dielectric unions or couplings at all connections between copper tubing and ferrous piping or non-conducting type connections for jointing dissimilar metals.
- .13 Install piping to allow for expansion and contraction and to eliminate stress on equipment, piping, or connections.
- .14 Provide isolation valves or shutoff valves at all equipment.
- .15 Provide cleanouts as indicated on drawings and as required by code. Floor cleanouts are not approved in finished floor areas unless otherwise noted. Ensure adequate clearance to all cleanouts.

.16 Provide sleeves for piping passing through floor slab. Caulk around piping and fill entire space between piping and floor slab with approved fire retardant material to maintain required fire rating where necessary.

.17 Provide fire stop sealant at all pipe penetrations through fire separations.

3.2 Natural Gas Piping

.1 All gas piping installations shall comply with CGA code CAN 1-B149, gas safety branch bulletins, local codes and NFPA 96. Provide a CGA approved ball valve where new equipment is to be connected.

.2 Coordinate replacement of existing gas meter with new gas meter with Enbridge (if required).

.3 Install gas piping in open or ventilated spaces. Pitch lines and provide drip legs for condensation collection points. Where gas piping is run in a concealed space, provide ventilation grilles as required.

.4 Provide dog house for all gas piping through roof. Refer to details on drawing.

.5 Provide union, valve and drip leg at final connection to all equipment. Drip leg shall be minimum 50mm (2") above any floor or roof level.

.6 Refer to Section 15090 for piping supports and roof block supports.

.7 Gas Regulators

.1 Provide regulators as noted on drawings and as required, sized in accordance with loads and equipment as required. Where installed indoors, vent to the outdoors.

.2 Gas pressure regulating valve relief pipe is to be extended upward and remote from the gas vent and the fresh air intake, in compliance with current codes. Provide support and bracing as required.

.8 Testing and Inspections

.1 The Contractor shall perform a soap test and electronic test.

.2 Arrange and pay for a gas inspection by the local Gas/TSSA Inspector.

3.3 Steel Pipe Connection

.1 Screw joint steel piping up to and including 38mm (1½"). Screw or weld 50 mm (2") piping. Weld piping 63mm (2½") and larger, including branch connections. Grooved piping is not acceptable.

.2 Make screwed joints with standard NPT configuration. Use approved nontoxic joint compound or teflon tape.

- .3 Use full sized tees or main sized saddle type branch connections for directly connecting branch lines to mains in steel piping. Do not project branch pipes inside the main pipe.
- .4 Make reductions in large water pipes with eccentric reducing fittings installed to provide drainage and venting.

3.4 Grades, Routes and Installations

- .1 Route piping in orderly manner and maintain proper grades. Install to conserve headroom and interfere as little as possible with use of space.
- .2 Run exposed piping parallel to walls. Group piping wherever practical at common elevations.
- .3 Install concealed pipes close to the building structure to keep furrings to a minimum.
- .4 On closed systems, equip low points with 19mm ($\frac{3}{4}$ ") drain valves and hose connection.
- .5 At high points, provide collecting chambers and high capacity float operated automatic air vents.

3.5 Expansion Loops

- .1 Provide expansion loops in piping systems as indicated on drawings and specified herein.
- .2 The hanger assembly kit shall be used to support and hang the expansion loops.
- .3 The pre-manufactured flexible loop shall be installed as manufacturer's installation instructions. Other manufactured loops that require pipe alignment guides shall use "Spider" type with outer housing ring. Units shall be fabricated from carbon steel. Pipe hangers and/or roller supports shall not be considered acceptable for use as guides.

3.6 Flashing

- .1 Where mechanical equipment passes through weather or waterproofed walls and roofs, all roofing including flashing shall be provided under this Division.
- .2 Flash floor drains over finished areas by extending flashing 250mm (10") clear on sides. Fasten flashing to drain clamp device. Use lead sheet or approved nonmetallic waterproofing membrane.

3.7 Sleeves

- .1 Where piping passes through floor, ceiling or wall, close off space between pipe and sleeve with noncombustible insulation or approved non combustible

insulation, fire rated as required to match the rating of the penetrated surface.
Provide tight fitting metal caps on both sides.

- .2 Install chrome plated escutcheons where piping passes through finished surfaces.
- .3 Size large enough to allow for movement due to expansion and to provide for continuous insulation.

3.8 Identification

- .1 Paint all gas piping with two (2) coats of paint.
- .2 Identify all piping with type of service and arrows in direction of flow every 3m (10') and on either side of walls and floors. Labels shall be permanent and pre-approved by the Consultant. Label on exterior of insulation. Match existing labeling where applicable.
- .3 Refer to Section 15010.

3.9 Testing

- .1 Test drains for tightness and grade as noted or required by code.
- .2 Refer to testing procedures in Section 15042.

3.10 Cleaning and Treatment

- .1 Flush, clean and treat heating piping systems before and after testing.
- .2 Refer to Water Treatment Section 15095.

END OF SECTION

PART 1 - GENERAL

1.1 Quality Assurance

- .1 Domestic water pipe supports shall meet the requirements of Ontario Building Code.
- .2 Natural gas pipe supports shall meet the requirements of CGA B149.1, Gas Installation Code.
- .3 Hydronic water pipe supports shall meet the requirements of ANSI B31.
- .4 Duct hangers shall follow the recommendations of the SMACNA Duct Manuals.

1.2 General Requirements

- .1 Provide hangers and supports to secure equipment in place, prevent vibration, maintain grade and provide for expansion and contraction.
- .2 Install supports of strength and rigidity to suit loading without unduly stressing building. Locate adjacent to equipment to prevent undue stresses in piping and equipment.
- .3 Select hangers and supports for the service and in accordance with the manufacturer's recommended maximum loading. Hangers shall have a safety factor of 5 to 1.
- .4 Obtain approval prior to drilling for inserts and supports for piping systems.
- .5 Obtain approval prior to using percussive type fastenings.
- .6 Use of other piping or equipment for hanger supports is not permitted.
- .7 Use of perforated band iron, wire or chain as hangers is not permitted.

1.3 Firestop Sealants and Collars

- .1 Standard method of fire tests of firestop system CAN4-S115-M85.
- .2 UL Classified and/or FM Systems Approved and tested to the requirements of ASTM E814 (UL1479).
- .3 Seals, assemblies and materials for penetration of fire rated surfaces shall be listed by FM and certified by UL or ULC for the service application.

1.4 Submittals

- .1 Firestop materials: Submit service limitations, installation instructions, UL certification and FM listing.

- .2 Fire rated penetration seals: Submit dimensional data, service limitations, installation instructions, UL certification and FM listing.

PART 2 - PRODUCTS

2.1 Inserts

- .1 Inserts shall be malleable iron case or galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods and lugs for attaching to forms.
- .2 Size inserts to suit threaded hanger rods.

2.2 Suspended Mechanical Equipment:

- .1 Suspend mechanical equipment from structure with adjustable length steel rods, threaded both ends or continuous threaded, complete with lock nuts on both ends. Provide spreader beams to distribute weight.
- .2 Construct supports of structural steel members or steel pipe and fittings. Brace and fasten with flanges bolted to structure.
- .3 Provide anchors, bolts and accessories required for mounting and anchoring equipment.

2.3 Pipe Hangers and Supports

- .1 Pipe hangers shall wrap around outside of insulation for all sizes. Exception will apply for hot water piping only in limited ceiling clearance applications. Piping shall be provided with insulation flashing of heavy gauge metal to prevent crushing and hanger sized for exterior of insulation.
- .2 Hangers:
 - .1 Pipe Sizes 13mm (1/2") to 38mm (1 1/2"): Adjustable wrought steel ring, or plated strap.
 - .2 Pipe Sizes 50mm (2") and over: Adjustable wrought steel clevis.
 - .3 Hanger Rods: Provide steel hanger rods, threaded both ends or continuous threaded, complete with lock nuts on both ends.
 - .4 Saddles shall wrap around the outside of the insulation for all piping and be sized accordingly.
 - .5 In limited ceiling clearance applications for pipe sizes up to and including 38mm (1 1/2"), split ring standoff hangers or adjustable band hangers shall be acceptable. Obtain pre-approval from Consultant prior installation on site.
- .3 Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods, cast iron roll and stand for hot pipe sizes 150mm (6 ") and over.

- .4 Wall Support:
 - .1 Pipe Sizes to 75mm (3"): Cast iron hook, or fabricated bracket of 1"x1"x1/4" angle bar.
 - .2 Pipe Sizes 100mm (4") and over: Welded steel bracket and wrought steel clamp.
- .5 Vertical Support:
 - .1 Steel riser clamp.
- .6 Floor Support:
 - .1 Fabricated stand and pipe clamp or saddle.

2.4 Natural Gas Piping Roof Supports

- .1 Gas pipe support systems shall be continuous block channel supports equal to "DURA-BLOK" DB-Series or DB6-Series as supplied by Cooper B-Line, Inc.
- .2 Alternate products must meet or exceed the same physical and performance characteristics as per the following:
 - .1 Density: 0.52 oz/cu in ASTM C642
 - .2 Durometer Hardness: 67.2A ± 1 ASTM D2240
 - .3 Tensile Strength: 231 psi minimum ASTM D412
 - .4 Compression Deformation: 5% at 70psi and 72°F ASTM D395
 - .5 Brittleness at Low Temp: -50°F ASTM D746
 - .6 Freeze and thaw when exposed to deicing chemicals: No loss after 50 cycles ASTM C672
 - .7 Coefficient of Thermal Expansion: 8 x 10-6 in/in/°F (min) ASTM C531
 - .8 Weathering: 70 hours at 120°F ASTM D573
 - .9 Hardness retained: 100% (±5%)
 - .10 Compressive strength: 100% (±5%)
 - .11 Tensile strength: 100% (±5%)
 - .12 Elongation retained: 100% (±5%)
- .3 Curb base shall be made of 100% recycled rubber and polyurethane prepolymer with a uniform load capacity of 500 pounds per linear foot of support. Each base to have a reflective yellow stripe.
- .4 Dimensions: 6-inches wide by 5/6.75 inches tall by 9.6/20.2/30.8/41.4/52.0 inches long to suit pipe size.
- .5 Steel frame: Steel, 14ga strut galvanized per ASTM A653 or 12ga strut galvanized per ASTM A653 for bridge series.
- .6 Attaching hardware: Zinc-plated threaded rod, nuts and attaching hardware per ASTM B633.

2.5 Duct Hangers and Supports

- .1 Hangers:
 - .1 Concealed - Round Duct: Galvanized steel band iron.
 - .2 Concealed - Rectangular Duct: Galvanized steel band iron or rolled angle and 9mm rods.
 - .3 Exposed - Round Duct: continuous galvanized steel band iron secured to single 9mm (1/4") hanger rod.
- .2 Wall Supports: Galvanized steel band iron or fabricated angle brackets.
- .3 Vertical Support at Floor: Rolled angle.
- .4 Support rectangular ducts 1530mm and less in width or depth with 25mm wide 1.3mm or heavier galvanized bent hangers fastened to the side and bottom of the duct at a spacing of not greater than 2240mm using bolts, rivets, or metal screws.
- .5 Support duct over 1530mm in width or depth with 10mm vertical hanger rods, bolted to galvanized steel angles at 610mm intervals.
- .6 Support round ducts up to 910mm with 25mm wide, 1.0mm thick single galvanized steel traps and 9mm diameter rods. Support larger ducts with 25mm wide, 1.6mm thick double, horizontally split galvanized steel strap and two (2) 9mm diameter rods. Space support at 3600mm intervals.
- .7 Where vertical ducts pass through floors, support with galvanized steel angles riveted and/or bolted to the cut and bearing on the structure.

2.6 Equipment Bases and Curbs

- .1 Equipment bases and curbs shall be provided by the Mechanical Contractor under this Division.
- .2 Equipment bases shall be formed concrete housekeeping pads minimum 100mm (4") high, extended 150mm (6") minimum beyond machinery bedplates.
- .3 Provide mounting plates to be formed into pads.
- .4 Curbs shall be formed concrete minimum 100mm (4") high around all ducts and pipes through mechanical room floors.

2.7 Flashing

- .1 Steel Flashing: 26 gauge galvanized steel.
- .2 Aluminum flashing: 26 gauge sheet aluminum.

2.8 Sleeves

- .1 Pipes through beams, wall, fire proofing, footings, floor: form with steel pipe, schedule 20, galvanized.
- .2 Round Ducts: form with galvanized steel.
- .3 Rectangular Ducts: form with galvanized steel.

2.9 Firestop Sealants and Collars

- .1 Firestop Sealants and collars for penetrations utilizing nonmetallic cables or combustible pipe insulations as the penetrant.
- .2 Intumescent insert: Flexible, elastomeric strip, two stage expansion, designed to firestop penetrations in fire-rated walls and floors and floor/ceiling assemblies.
- .3 Provide a minimum of 15 time free expansion.
- .4 Contain no water soluble expansion ingredients.

2.10 Roof Jacks and Vent Caps

- .1 Aluminum: Compatible with SBS torch down roofing materials and methods, 12 gauge aluminum, 12mm round flange, oversize tube neck TIG welded to flange, aluminum flashing cap.
- .2 Vent Caps: Vandal resistant; heavy gauge aluminum, slotted vents, screw secured.

2.11 Plumbing Vent Stacks

- .1 Plumbing vent stacks through roof shall be minimum 450mm high double wall, Thaler or Lexcan Hi Tuff membrane to match type of roofing system used.

PART 3 – EXECUTION

3.1 Inserts

- .1 Use inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams wherever practicable.
- .2 Set inserts in position in advance of concrete work. Provide reinforcement rod in concrete for inserts carrying pipe over 100mm (4") or ducts over 1500mm (60") wide.
- .3 Where concrete slabs form finished ceiling, finish inserts flush with slab surface.

- .4 Where inserts are omitted, drill through concrete slab from below and provide rod with recessed square steel plate and nut above slab.
- .5 Expansion bolt type connections will be approved under certain conditions. Obtain approval from the Consultant. Generally, pipe 50mm (2") or smaller, and ducts less than 600mm x 300mm (24" x 12") will be approved, subject to adequate number of support points.

3.2 Suspended Mechanical Equipment:

- .1 Suspend mechanical equipment from structure with adjustable length steel rods. Provide spreader beams to distribute weight.
- .2 The threaded rod shall be secured to trusses or to steel angle bars spanning the building trusses. The steel spanning bars are to be provided by this Division.
- .3 Construct supports of structural steel members or steel pipe and fittings. Brace and fasten with flanges bolted to structure.
- .4 Provide anchor bolts and accessories required for mounting and anchoring equipment.
- .5 Provide rigid anchors for ducts and pipes immediately after vibration connections to equipment.

3.3 Pipe Hangers and Support

- .1 Fasten hangers and supports to building structure or inserts in concrete construction.
- .2 Support horizontal metallic piping as follows:

<u>Nominal Pipe Size</u>	<u>Distance Between Supports</u>	<u>Hanger Rod Diameter</u>
13mm (1/2")	1.8m (6')	9.5mm (3/8")
19 to 38mm (3/4" to 1 1/2")	2.4m (8')	9.5mm (3/8")
50 to 63mm (2" to 2 1/2")	3.0m (10')	9.5mm (3/8")
63 to 100mm (3" to 4")	3.6m (12')	13mm (1/2")
150 to 300mm (6" to 12")	4.3m (14')	13mm (1/2")
350 to 450mm (14" to 18")	5.0m (16')	25mm (1")

- .3 Install hangers to provide minimum 32mm (1 1/4") clear space between finished covering and adjacent work.
- .4 Place a hanger within 300mm (12") of each horizontal elbow.
- .5 Use hangers which are vertically adjustable 38mm (1 1/2") minimum after piping is erected.
- .6 Support vertical piping at every floor.

- .7 Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- .8 Where practical, support riser piping independently of connected horizontal piping.
- .9 Exposed piping, with less than 2.6m (8½ ft) clearance to floors shall be provided with two times the number of hangers normally required. Spacing shall be equal or adjusted for maximum benefit.
- .10 Provide copper plated hangers and supports for copper piping or provide nonferrous packing between hanger support and piping.
- .11 Large capacity piping with vibration potential shall not be suspended from any building structure that will allow transfer of vibrations to the occupied spaces.
- .12 Obtain preapproval from Consultant for the use of split ring standoff hangers or adjustable band hangers for use in limited ceiling clearance applications only. Hanger shall not be required to wrap around outside of insulation in this application only.

3.4 Natural Gas Piping Roof Supports

- .1 Install in accordance with manufacturer's instructions and recommendations.
- .2 If gravel top roof, gravel must be removed around and under pipe support.
- .3 Where possible, consult roofing manufacturer for roof membrane compression capacities. If necessary, a compatible sheet of roofing material (rubber pad) may be installed under rooftop support to disperse concentrated loads and add further membrane protection.
- .4 Space in conformance with Gas Code and local authorities.
- .5 Use properly sized clamps to suit pipe sizes.

3.5 Duct Hangers and Supports

- .1 Hanger minimum sizes:
 - .1 Up to 750mm (30") wide or 330mm (13") diameter: 1¼" x 16 gauge at 3m (10ft) spacing.
 - .2 750mm (30") to 1200mm (48") wide or up to 450mm (18") diameter: 1½" x 16 gauge at 3m (10ft) spacing.
 - .3 Over 1200mm (48") wide: 1½" x 16 gauge at 3m (10ft) spacing.

- .2 Horizontal duct on wall supports minimum sizes:
 - .1 Up to 450mm (18") wide: 1½" x 16 gauge or 1" x 1" x 1/8" at 3m (10') spacing.
 - .2 450mm (18") to 1000mm (40") wide: 1½" x 1½" x 2" at 1.8m (6') spacing.
 - .3 Vertical duct on wall supports minimum sizes:
 - .1 Riveted or screwed to duct:
 - .1 Up to 1500mm (60") wide: 1½" x 1½" x 3"
 - .2 Over 1500mm (60") wide: 2" x 1/8"
 - .4 Vertical duct floor supports minimum sizes:
 - .1 Riveted or screwed to duct:
 - .1 Up to 1500mm (60") wide: 1½" x 1½" x 1/8"
 - .2 Over 1500mm (60") wide: 2" x 2" x 1/8"
- 3.6 Equipment Bases and Curbs
- .1 Coordinate installation of concrete housekeeping pads for all new floor mounted equipment with supplied equipment.
 - .2 Pads shall be 100mm (4") high minimum, extended 150mm (6") minimum beyond machinery bedplates. Obtain templates, anchor bolts and accessories required for mounting and anchoring equipment.
 - .3 Construct supports of structural steel members or steel pipe and fittings. Brace and fasten with flanges bolted to structure.
 - .4 Provide rigid anchors for pipes immediately after vibration connections to equipment.
 - .5 Provide curbs around all ducts and pipes through mechanical room floors.
 - .6 Paint all sides and top 12" (300mm) edge of concrete pads with two (2) coats of yellow paint.
- 3.7 Flashing
- .1 Where mechanical equipment passes through weather or waterproofed walls and roofs, roofing, flashing and counter flashing shall be provided under this Division.
 - .2 Curbs must be minimum 600mm (24") higher than the top of the roof, unless noted otherwise. Flash and counterflash with galvanized steel, to make waterproof.

- .3 Flash floor drains over finished areas by extending flashing 250mm (10") clear on sides. Fasten flashing to drain clamp device. Use lead sheet or approved nonmetallic waterproofing membrane.

3.8 Sleeves

- .1 Provide sleeves required for equipment, including openings required for placing equipment.
- .2 Set sleeves in position in advance of other work. Provide suitable reinforcing around sleeves.
- .3 Where piping passes through floor, ceiling or wall, close off space between pipe and sleeve with noncombustible insulation and fire rate as required to match the rating of the penetrated surface. Provide tight fitting metal caps on both sides.
- .4 Extend sleeves through potentially wet floors 50mm (2") above finished floor level. Caulk sleeves full depth and provide floor plate.
- .5 Where ductwork passes through floor, ceiling or wall, close off space between duct and sleeve with noncombustible insulation. Provide tight fitting metal caps on both sides.
- .6 Where piping passes through floor, ceiling or wall, close off space between pipe and sleeve with noncombustible insulation or approved non-combustible insulation, fire rated as required to match the rating of the penetrated surface. Provide tight fitting metal caps on both sides.
- .7 Install chrome plated escutcheons where piping passes through finished surfaces.
- .8 Size large enough to allow for movement due to expansion and to provide for continuous insulation.

3.9 Firestop Sealants and Collars

- .1 Clean all concrete, masonry and stone penetrations of all contaminants and impurities, concrete form release agents, water repellents, oils, surface dirt and rust, scale, all old sealants and other surface treatments.
- .2 Metal surfaces shall be cleaned by wiping them with an oil- free absorbent cloth saturated with solvent such as xylol or toluol. Do not use alcohols.
- .3 Do not apply to polycarbonates or to building materials that bleed oils, plasticizers or solvents, or where sealant is not exposed to atmospheric moisture, or to surfaces which have been or will be painted.
- .4 Collars are to be installed with steel fasteners or steel expansion anchors. Low melting temperature anchors of lead, plastic or aluminum are not approved.

- .5 Installation only when temperatures are between 4°C (40°F) and 37°C (98°F).

3.10 Roof Jacks

- .1 Provide roof jacks as required, and in compliance with the roofing specifications. Generally, SBS torch down roofing requires aluminum roof jacks. Conventional bituminous roofing accepts lead or aluminum roof jacks.
- .2 Flash pipes projecting above finished roof surface with approved material.
- .3 Gas pipes projecting through the roof shall be provided with approved roof jack and flashing flange.

END OF SECTION

PART 1 - GENERAL

1.1 Quality Assurance

- .1 Provide chemical treatment, chemicals and equipment by an agency that specializes in this type of work. Agency shall take full responsibility for providing suitable working systems.
- .2 Notify the Owner and the Consultant prior to commencing treatment, testing or cleaning operations.
- .3 Confirm all chemicals used are applied and disposed of in compliance with all guidelines, codes, regulations and requirements of Federal, Provincial, and local governments and local sewage and storm water disposal utilities.

1.2 General

- .1 The Mechanical Contractor shall supply and install a complete water treatment system which meets the requirements for the control and prevention of fouling and corrosion in all new HVAC water systems.
- .2 The following are the minimum requirements of the acceptable Water Treatment Vendor:
 - .1 Must be in business for a minimum of 10 years in treating industrial water applications.
 - .2 Must be I.S.O. certified for the manufacture and sales of water treatment chemicals.
 - .3 Must possess Certificate of Accreditation from Contractor Check.
 - .4 All biocides must be registered under the Pesticide Control Product ACT.
 - .5 Must have at least one (1) Professional Engineer on staff.

1.3 Submittals

- .1 Submit technical information, including proposed chemicals, quantities, and calculations, procedures and equipment to be supplied. Provide written operating instructions and system schematics.
- .2 Provide Material Safety Data Sheets with all chemicals. Provide one complete set posted on site when material is delivered to site. Provide complete sets for the Maintenance Manuals.
- .3 Provide written report containing log and procedure of system cleaning giving times, dates, problems encountered and condition of water.

1.4 Warranty

- .1 Provide one (1) year warranty for all products.

1.5 Acceptable Manufacturers

- .1 MK Services and Consulting Inc.
719 Robinson Drive, Cobourg, ON K9A 0H3
Kristen Riley, 1-905-376-5779

PART 2 - PRODUCTS

2.1 Closed System(s) Water Treatment:

- .1 Provide complete water treatment equipment and chemicals for corrosion protection and sidestream filtration for each upgraded closed system (hot, chilled, & glycol loops).
 - .2 Each Closed System to include the following water treatment equipment:
 - .1 One (1) Bypass Feeder, 2 US Gallon (7.5L), rated for 300 PSI @ 200°F, 4 @ ¾" ports (2 upper, 2 lower), carbon steel construction, blue epoxy finish, cast steel 3½" threaded closure high pressure cap with epoxy coated platen and Buna o-ring. Equal to General Filtration PF2X4HP, 20" (508mm) high x 6.26" (159mm) diameter, 27.5lb.
 - .2 One (1) Bypass Filter Unit with the capacity to handle 2.5-5% of the recirculating pump flow rate, rated for 175 PSI @ 200 °F, cast iron head, 304 stainless steel body, Buna-N head gasket, carbon steel centre post design, ¾" NPTF inline inlet & outlet connections, ¼" NPTF drain connection, suitable for standard DOE 2½" – 2¾" diameter cartridge. Equal to General Filtration GF010 for 10" cartridges or GF020 for 20" cartridges.
 - .3 Case of 30 filter cartridges, 20 micron removal rating, polypropylene media for water filtration with 200°F maximum temperature (or alternate to suit system), tin-free steel core with 400°F maximum temperature resistance. Equal to Viper Series Precision Wound Filter Cartridges.
 - .4 Site Flow Indicator, 304 stainless steel body with stainless and nylon internals, nickel plated steel fused class cap, rated for 150 PSI @ 212°F, ¾" NPT = 4-8gpm, 1" NPT = 7-11gpm, 2" NPT (bronze body) = 25-60gpm. Equal to STS (Specified Technical Sales Ltd.) Filter-Mate.
 - .3 Provide sufficient new system cleaner equal to MK "NC Clean" to initially clean the closed system(s).
- 2.2 Provide sufficient MK CL 100 Nitrite/Metaborate based corrosion inhibitor to treat the closed system(s) and to maintain required control levels until substantial completion.
- 2.3 Provide sufficient glycol to fill the glycol systems.
- 2.4 Aluminum boiler chemistry. In the event that aluminum boilers are used in hot-water heating applications, chemicals must be compatible to maintain a pH of 6.5 – 8.5, or as per manufacturer's specifications.

PART 3 - EXECUTION

3.1 Closed System(s):

.1 Equipment Installation

- .1 Install the feeder, filter, flow indicator and site glass in a bypass arrangement and in parallel across the headers of the primary pump set as per schematic on drawings.
- .2 Isolation, venting and drain valves should be installed as per installation drawing and on-site instruction by water treatment representative. Installation connections, as required are the responsibility of the Mechanical Contractor.

.2 System Flushing

- .1 Thoroughly flush each closed system(s) with raw water to remove loose mill scale and debris. Remove and clean all strainers and flush low points before chemical cleaner is added to the system.
- .2 Add system cleaner at amount per system volume as per manufacturer's requirements for the removal of oil, mill scale and iron oxides. Circulate for a minimum of 24 hours and flush. Repeat fill and flush procedure as often as required as per the instructions of the water treatment representative until water is sufficiently clean and clear.
- .3 Acceptability of water condition to be determined through testing and visual examination of representative water samples, by the water treatment supplier. Copies of test reports should be submitted by the water treatment supplier to the Mechanical Contractor for verification to the Consultant.
- .4 Add corrosion inhibitor at amount per system volume to the final water fill, as per manufacturer's requirements, to achieve prescribed Nitrite maintenance levels for corrosion protection.
- .5 Insert cartridges into filter canister and replace as needed.
- .6 Leave all used filters on site for witness by the Consultant.

.3 Temporary Pump Strainers

- .1 Temporary pump strainers (as supplied with pumps) shall remain in place during flushing and cleaning.
- .2 Remove temporary strainers after flushing and cleaning is complete and leave on site for witness by the Consultant.

3.2 Glycol Systems

- .1 Fill system with 40% propylene glycol.

3.3 Maintenance

- .1 Maintain inhibitor levels and other water quality control ranges as they apply, from the time the system is brought on-line, after flushing and cleaning, up to

Substantial Performance of contract. The chemical supply allotment provided by the water treatment supplier is effective from the time the system is brought online.

- .2 The water treatment supplier shall provide all necessary supervision during installation and shall test the systems over the course of the construction period to ensure that proper treatment is being maintained, up to Substantial Completion. Reports generated by the water treatment supplier and are to be compiled for the Consultant's review.
- .3 The water treatment supplier shall provide chemical supply and service until Substantial Completion.

3.4 Test Reports

- .1 Supply the Consultant with certified documentation from the water treatment supplier that the systems have been properly equipped, chemically cleaned and that they are maintaining sufficient levels of scale and/or corrosion inhibitor.
- .2 Test reports shall be received and accepted by the Consultant prior to substantial completion.

3.5 Storage

- .1 All chemicals shall be stored off site. No chemicals are permitted to be left on site at any time.

END OF SECTION

PART 1 - GENERAL

1.1 Manufacturer

- .1 Provide valves of same manufacturer throughout where possible.
- .2 Provide valves with manufacturer's name and pressure rating clearly marked on outside of body.

1.2 Quality Assurance

- .1 Valves for gas service shall be trimmed and approved for specified service.
- .2 All valves shall meet all MSS, ANSI and ASME manufacturing standards.

1.3 Submittals

- .1 Refer to Section 15010 – Mechanical General Requirements.
- .2 Manufacturer's data and shop drawings for all valves and accessories including dimensions, pressure ratings, materials, service acceptability.

PART 2 - PRODUCTS

2.1 General

- .1 All valves must be of threaded or flanged type.
- .2 Valves 300mm (12") and larger located with stem in the horizontal position shall be drilled and taped to accommodate a drain valve and equalizing bypass valve assembly.
- .3 No yellow brass valves will be allowed.
- .4 Wafer style valves (except check valves) are not allowed.

2.2 Valve Connections

- .1 Provide valves suitable to connect to adjoining piping as specified for pipe joints. Use pipe size valves.
- .2 Thread pipe sizes 50mm (2") and smaller.
- .3 Flange pipe sizes 63mm (2½") and larger.
- .4 Solder or screw to solder adaptors for copper piping.

- .5 Use grooved body valves with mechanical grooved jointed piping where approved only.
- .6 Provide butterfly valves with tapped lug body when used for isolating service.

2.3 Check Valves - Hydronic

- .1 Bronze, swing disc, solder or screwed ends.
- .2 Iron body, bronze trim, swing disc, renewable disc and seat, flanged ends.
- .3 Iron body, bronze trim, spring loaded, renewable composition disc, flanged ends.
- .4 Acceptable Models:
 - .1 Jenkins 587J
 - .2 NH T651
 - .3 Kitz #78
 - .4 Red & White (Toyo) #435
- .5 Grooved end (where approved), working pressure to 300 psi (2065 kPa).
Sizes 2-4": Ductile iron body and 316 stainless steel clapper. EPDM, Nitrile or optional Viton Bumper & Bonnet seals. Stainless steel wetted parts.
Manufacturer: Victaulic Series 716;
Sizes 4-14": Ductile iron disc, elastomer encapsulated suited for the intended service, stainless steel spring and shaft, welded-in nickel seat. Valve inlet is drilled, with venturi-like taps and plugged for flow kit (included with valve). Twin taps on both sides of valve for meter connections and flow measurement.
Manufacturer: Victaulic Series 779.

2.4 Check Valves - Domestic

- .1 2 inches (50mm) and smaller: Class 125/200PSI, lead free bronze body and cap, bronze seat, solder or threaded ends. Equal to Kitz #822 and #823.
- .2 2.5 inches (63mm) and larger: To Class 150, stainless steel body, hard face seat, 13% chrome, flanged ends. Equal to Kitz #150UOAM.

2.5 Butterfly Valves

- .1 Iron body, lug pattern, bronze or stainless steel disc, resilient replaceable EPDM liner seat, plain flanged or grooved ends.
- .2 Acceptable Models:
 - .1 Jenkins 2232ELJ (Lever) 2232EGJ (Gear)
 - .2 NH 45-313321 (Lever) 45-313322 (Gear)
 - .3 Kitz #6122-EL (Lever) #6122-EG (Gear)
 - .4 Kitz #6141-EL (Lever) #6141-EG (Gear)

- .5 Red & White (Toyo) #918BESL (Lever) #918-BESG (Gear)
 - .6 Crane Model 44

 - .3 Grooved end (where approved): 2.5" and larger where grooved end piping systems are allowed, shall be rated to 300 psi and be both bi-directional and dead-end service capable to full rated pressure. Body material shall be ductile iron with blow-out proof stainless steel stems and electroless nickel coated ductile iron disc. Seat material shall be EPDM (or lubricated nitrile or fluoroelastomer) and have a full 360° continuous contact with the seating surface. Stem seals shall be of the same material grade as the seats. Disc shall be offset from the centerline of the stems and shall be connected to the stem without the use of fasteners or pins. Acceptable manufacturers: Victaulic Vic-300 MasterSeal, Vic-300 AGS.
- 2.6 Control Valves
- .1 Globe valve. Refer to Section 15900.
 - .2 Control Valve bodies to be supplied by Controls Contractor and turned over to the Heating Contractor for installation.
- 2.7 Ball Valves – Hydronic
- .1 Up to 38mm (1½"): Forged bronze body, delrin seat and seals, chrome plated ball, forged steel pin, screwed ends, 1206 kPa (175 psi). Acceptable material: Victaulic Series 722.
 - .2 Tail piece supply isolation valves: ball type valves, angle configuration, screw driver operated, compression fittings or threaded as required, chrome plated if exposed.
 - .3 Acceptable Models:
 - .1 Jenkins
 - .2 NH
 - .3 Kitz #58 and #59
 - .4 Red & White (Toyo) #5044A and #5049A
 - .5 MAS #B3 and #B4
- 2.8 Ball Valves – Domestic
- .1 600 WOG, lead free brass, two or three piece body, chrome plate ball, full port, teflon seats, blow-out proof stem, threaded or soldered ends, lever handle. Soldered up to 3", threaded up to 4".
 - .2 Acceptable Manufacturers:
 - .1 Jenkins
 - .2 NH

- .3 Kitz #858 & #859
- .4 Red & White (Toyo) 5044A-LF & 5049-LF
- .5 MAS #B3-LF and #B4-LF

2.9 Gate Valves

- .1 Bronze, inside screw, double wedge or disc, solder or screwed ends.
- .2 Over 100mm (4"): Iron body, bronze trim, rising stem, OS&Y solid wedge, flanged ends.
- .3 Acceptable Models:
 - .1 Jenkins 454J
 - .2 NH T504
 - .3 Kitz #72
 - .4 Red & White (Toyo) #421

2.10 Globe or Angle Valves

- .1 Bronze, renewable composition disc, solder or screwed ends.
- .2 Over 100mm (4"): Iron body, bronze trim, rising stem, OS&Y, renewable composition disc, flanged ends.
- .3 Acceptable Models:
 - .1 Jenkins 2342J
 - .2 NH T731
 - .3 Kitz #726
 - .4 Red & White (Toyo) #400

2.11 Circuit Balancing Valves (CBV) – Hydronic

- .1 Valves shall be Y-pattern globe style design with provision for connecting a portable differential (ft. of head) pressure meter.
- .2 Valves shall have all metal parts of nonferrous, pressure die cast, nonporous Ametal.
- .3 The valves shall be suitable for the following functions:
 - .1 Precise flow measurement
 - .2 Precise flow balancing
 - .3 Positive shut-off with no drip seat eliminating the need of an additional isolation valve.
 - .4 Drain connection using 3/4" NPT hose end thread.

- .4 Valves shall have four (4) 360° adjustment turns of the handwheel for precise setting with hidden memory to provide a temper-proof balancing setting. Handwheel shall have digital readout. The handwheel can be installed in any position without affecting performance.
- .5 For sizes ½” to 2”:
 .1 300 PSI, Y-pattern, globe type with soldered or threaded ends, non-ferrous metal brass copper alloy body, EPDM o-ring seals.
 .2 4-turn digital readout handwheel for balancing, hidden memory feature with locking tamper-proof setting, and connections to portable differential meter.
 .3 Acceptable Manufacturer: TA Hydronic Series 786 STAS (solder), 787 STAD (threaded) or 78K (MxF) or Armstrong equal.
- .6 For sizes 2½” to 16”:
 .1 300 PSI, Y-pattern, globe type with flanged or grooved ends, ASTM A536 ductile iron body, all other parts of metal brass copper alloy, EPDM o-ring seals.
 .2 8, 12, 16, 20 or 22 turn digital readout handwheel for balancing, hidden memory feature with locking tamper-proof setting, and connections to portable differential meter.
 .3 Acceptable Manufacturer: TA Hydronic Series 788 STAF (flanged) or 789 STAG (grooved) or Armstrong equal.
- .7 Acceptable Manufacturers
 .1 Tour & Anderson
- .8 Circuit Balancing Valve sizing (schedule based on Tour & Anderson):

Size (in)	Nominal Flow			
	Min. (gpm)	Max. (gpm)	Min. (l/s)	Max. (l/s)
½	0.6	2.8	0.038	0.177
¾	2.0	6.0	0.126	0.379
1	3.9	10.0	0.246	0.631
1-¼	5.0	15.0	0.316	0.947
1-½	6.6	20.0	0.416	1.262
2	12.6	36.0	0.795	2.272
2-½	38.0	100.0	2.398	6.310
3	31.0	130.0	1.956	8.203
4	68.0	200.0	4.291	12.62
5	90.0	320.0	5.679	20.19
6	182.0	450.0	11.48	28.39
8	367.0	820.0	23.16	51.74

10	540.0	1300.0	34.07	82.03
12	960.0	1500.0	60.58	94.65

2.12 Circuit Balancing Valves (CBV) – Domestic Water

- .1 Provide circuit balancing valve on each domestic recirculation loop designed specifically for use in drinking water applications, NSF/ANSI 61-G rated for commercial hot water service (temperature rated to 180F / 82C) and certified by the NSF with all wetted parts stainless steel.
- .2 Lead free construction in compliance with ANS/NSF-372.
- .3 Series 300 stainless steel body, nickel plated brass union nut, and tamper-resistant 300 series stainless steel flow cartridge.
- .4 Valve shall be suitable for minimum flow of 0.3gpm and maximum flow of 12.0 gpm, and flow rate pre-set accuracy variation of +/- 5% over 95% of the control range.
- .5 Valves shall have a full body rating of 400 psi, but is suitable for working pressures with differential control ranges of 2 – 32 psi or 5 – 60 psi differential.
- .6 All wetted parts shall comply with NSF/ANSI Standard 372 for minimal lead content.
- .7 Compact inline design for tight installations.
- .8 Acceptable Manufacturer

- .1 Tour & Anderson, Victaulic ICSS, TA Series 76X, RWV 9519AB

2.13 Pressure Reducing Valves - Water

- .1 Less than 100mm (4"): Bronze body, brass bonnet, composition rubber diaphragm, plated or stainless steel spring, internal strainer.
- .2 100mm (4") and over: High tensile cast iron body and bonnet, seat, composition disc and diaphragm, bronze needle control pilot valve with small pressure regulating valve. Flanged body and bonnet.

2.14 Vacuum Breakers – Water

- .1 Bronze body, brass trim, composition silicone float disc, full size orifice.

2.15 Relief Valves

- .1 Provide ASME rated direct spring loaded type, lever operated nonadjustable factory set discharge pressure as indicated.

2.16 Drain Valves

- .1 Bronze compression stop with 3/4" hose threaded.
- .2 Brass ball valve with 3/4" hose thread.
- .3 Provide hose thread connection on valve or piping.
- .4 Equal to #868C (Lead Free), KITZ #68AC (Non Lead Free)

2.17 Double Check Valve Assembly - Reduced Pressure Type

- .1 Bronze or red brass body, stainless steel springs, composition diaphragm.
- .2 Independent acting spring loaded double internal disc valve, three chamber, discharge to atmosphere.
- .3 Acceptable Models:
 - .1 Watts 009 QT
 - .2 Zurn 975 XL
 - .3 Febco 825 Y
 - .4 Conbraco 40-200
- .4 Non-electronic testing apparatus including gauge, hoses, fittings, accessories, and case. Maximum temperature 104.4°C (220°F), maximum pressure 1034 kPa (150 psi). Equal to Watts TK-9A.

2.18 Strainers

- .1 Strainers 50mm (2") and smaller shall be constructed for 250 psig operating pressure at 406 degrees F and shall have a cast iron threaded body and 20 mesh Type 304 stainless steel screen.
- .2 Strainers larger than 50mm (2") shall be constructed for 125 psig @ 150 degrees F and shall have a cast iron flanged body and a 3/64" perforated Type 304 stainless steel screen up to 75mm (3") and a 1/8" perforated Type 304 stainless steel screen on 100mm (4") and larger.
- .3 Screen free area shall be minimum three times area of inlet pipe. Provide valved drain and hose connection off strainer bottom.
- .4 Strainers 50mm (2") and smaller shall have straight thread and gasketed caps and plugged blow-off connections.
- .5 Strainers larger than 50mm (2") shall include drain connections complete with ball valve, cap and chain.

- .6 Grooved end (where approved): 50mm (2") and larger, 300 PSI (2065 kPa) Y-Type Strainer shall consist of ductile iron body, ASTM A-536, Grade 65-45-12, Type 304 stainless steel perforated metal removable baskets with 1/16" (1,6mm) diameter perforations 2"-3" (DN50-DN75) strainer sizes, 1/8" (3,2mm) diameter perforations 4"- 12" (DN100-DN300) strainer sizes, and 0.156" (4mm) diameter perforations for larger sizes. Victaulic Style 732 and W732.

2.19 Pressure Ratings

- .1 Unless otherwise indicated, use valves suitable for minimum 860 kPa (125 psi) and 232°C (450°F).
- .2 Use valves for fire protection suitable for 1206 kPa (175 psi).

2.20 Manual Valve Operators

- .1 Provide suitable handwheels for gate, globe or angle, radiation and drain valves.
- .2 Provide one plug cock wrench for every plug cock valve.
- .3 Butterfly Valves: Provide lever lock handle with toothed plate for shutoff service.
- .4 Provide valves sized 4" and larger located more than 8 feet from floor in equipment room areas with chain operated sheaves. Extend chains to approximately 60" above floor and hook to clips arranged to clear walking aisles.

PART 3 - EXECUTION

3.1 General

- .1 All valves shall be located such that the removal of their bonnets is possible.
- .2 Install valves with stems upright or horizontal, not inverted.
- .3 All flanged valves in horizontal lines with the valve stem in the horizontal position shall be positioned so that the valve stem is inclined one bolt hole above the horizontal position.
- .4 Screw pattern valves placed in horizontal lines shall be installed with their valve stems inclined at an angle of a minimum of 30 degrees above the horizontal position.
- .5 All valves shall be installed to allow for ease of access, service and reading of devices from the floor.

3.2 Application

- .1 Use ball valves for gas service. Plug cocks are not to be used for gas isolation service.
- .2 Use ball valves on pressure gauges.
- .3 Use plug cocks, globe valves, ball valves, butterfly valves, and metering valves in water systems for throttling service.

3.3 Isolation Valves

- .1 Isolation valves are to be ball type valves, pipe size as required, but in no case less than 13mm ($\frac{1}{2}$ " diameter).
- .2 For equipment removal purposes, isolation valves are to be installed with companion screwed unions on piping less than 75mm (3") diameter, or flanged connections on piping 75mm (3") and larger. Grooved mechanical couplings may be used for equipment removal, subject to accessibility, suitability and where approved by specification terms for that piping system or equipment.
- .3 Install valves as close as possible to isolated equipment in order to minimize the amount of water lost during maintenance, replacement or drain down operations.
- .4 Isolation drain valves are to be provided with combination air inlet fitting as required to relieve vacuum during draining operations.
- .5 Install gate valves or ball valves where approved for shutoff and isolating service, or to isolate equipment, parts of systems or vertical risers.
- .6 Provide drain valves at main shutoff valves, low points of piping and equipment.

3.4 Control Valves

- .1 Control Valves bodies to be supplied by Controls Contractor and turned over to the Heating Contractor for installation.
- .2 Install valves to allow proper access and clearance and so actuators are in horizontal position visible from the floor.
- .3 Provide a union upstream and downstream of each control valve.

3.5 Circuit Balancing Valves (CBV) – Hydronic

- .1 The Contractor shall size and install balancing valves according to design flow.
- .2 Install CBVs in accordance with manufacturer's instructions.

- .3 Use flanged type for 2½" and over in areas where welded pipe is to be used. Grooved type is only acceptable where grooved piping is specified.
 - .4 Valves shall be installed with flow in the direction of the arrow on the valve body.
 - .5 Install at least five pipe diameters downstream from any fitting or valve, and at least ten pipe diameters downstream from any pump.
 - .6 Two pipe diameters downstream of the CBV shall be free from any fittings.
 - .7 Install such that easy and unobstructed access to the valve handwheel and metering port for adjustment and measurement is provided.
 - .8 Mounting in valve in piping must prevent sediment build-up in metering ports.
 - .9 Mark up set of as-built drawings indicating balanced flow value and CBV setting.
- 3.6 Circuit Balancing Valves (CBV) – Domestic Water
- .1 The Contractor shall install a CBV on each recirculating loop.
 - .2 Install CBVs in accordance with manufacturer's instructions including straight pipe run upstream and downstream of CBV.
 - .3 Valves shall be installed with flow in the direction of the arrow on the valve body.
 - .4 Label ceiling tile or gypsum board ceilings where CBV is installed above ceiling. Provide access door for access where required.
- 3.7 Drain Valves
- .1 Provide ball valves for drains on open systems.
 - .2 Provide unions downstream of the valve to allow breaking the piping system.
 - .3 Provide hose thread connection on drain valve and piping.
- 3.8 Specialty Valves
- .1 Provide relief valves on hot water tanks and where required and pipe to drain.
 - .2 Provide pressure reducing valves where shown or where required. Provide adequately rated shutoff gate valves.
- 3.9 Double Check Valve Assembly
- .1 Provide reduced pressure type backflow preventers where shown or where required as follows: Make-Up water supply. Pipe overflow to drain with air gap.

- .2 Provide shutoff valves and unions on both sides of backflow preventers for testing purposes.

- .3 Double check valve assemblies shall be installed maximum 1.5m above floor and are to be installed in a manner which allows a minimum of 1m (3') clearance above the device for connection and operation of testing equipment.

END OF SECTION

PART 1 - GENERAL

1.1 Work Included

- .1 Pressure gauges and pressure gauge taps
- .2 Thermometers and thermometer wells
- .3 Combination instrumentation taps and gauges

1.2 Submittals

- .1 Refer to Section 15010.
- .2 Submit shop drawings for gauges and thermometers complete with a list which indicates use, operating range, and suitable range of each.

PART 2 - PRODUCTS

2.1 General

- .1 All gauges and thermometers shall be calibrated and shall display in either/both metric and imperial units.

2.2 Acceptable Manufacturers

- .1 Weiss
- .2 Winters

2.3 Pressure Gauges

- .1 Steel case, liquid filled, 100mm (4") diameter, phosphor bronze bourdon tube brass movement, extruded brass socket, accurate to 1.5%.

2.4 Pressure Gauge Taps

- .1 Provide brass needle or gate valve.

2.5 Digital Thermometers

- .1 Thermometers shall be equal to Weiss Instruments solar digital vari-angle type, model DVU35 complete with CWE35-75BS well.
 - .1 Case: Hi-impact ABS
 - .2 Range (with F/C switch): -50/300°F (-40/450°C)
 - .3 Display: ½" LCD digits, wide ambient formula
 - .4 Accuracy: 1% of reading or 1° whichever is greater

.5	Resolution:	1/10° between -19.9/199.9°F (-28/93°C)
.6	Recalibration:	Through case potentiometer adjustment
.7	Lux Rating:	10 Lux (one foot-candle)
.8	Update:	10 seconds
.9	Ambient Operating:	-30/140°F (-35/60°C)
.10	Ambient Temp Error:	0
.11	Humidity:	100%
.12	Sensor:	Glass passivated thermistor – NTC
.13	Stem Assemblies:	Industrial glass full conformance with Fed Spec GG-T-321D. Fully interchangeable with Industrial Glass Thermometers.

.2 Thermowells shall be brass separable socket, ¾" NPT, complete with gasket and cap, size as required.

.3 Provide tilt adjustment to view without climbing from floor.

2.6 Stem Type Thermometers

.1 11" long, adjustable scale, red indicator, brass separable socket.

.2 Well: Brass separable socket complete with gasket and cap, size as required.

.3 Provide tilt adjustment on devices if required to view without climbing from floor.

2.7 Stem Type Thermometers for Limited Access Ceiling Spaces:

.1 Resin Angle Form 6" scale with well.

.2 Equal to Weiss Instruments HW5A2 complete with SF12-BS.

2.8 Sensor Wells

.1 Sensor wells shall be supplied by Controls Contractor and turned over to the Heating Contractor under this Section for installation.

PART 3 - EXECUTION

3.1 Pressure Gauges

.1 Install where indicated on drawings complete with ball valve.

.2 Provide only one pressure gauge per pump. Install common header, ½ " diameter pipe, complete with four control ball valves to allow selection of pressure reading from each of the following points. Refer to schematic diagram.

.1 before strainers

.2 on pump suction

- .3 on pump discharge
- .4 on check valve discharge if so equipped

3.2 Pressure Gauge Taps

- .1 Both sides of two-way control valves
- .2 All lines to three-way control valves
- .3 All lines to control valves 25 mm and larger
- .4 As shown on drawings.

3.3 Thermometers

- .1 Install digital type in Boiler Room, Mechanical Rooms and other Service Rooms unless otherwise indicated.
- .2 Install stem type in ceiling spaces. Use smaller units in limited access ceilings.
- .3 Install thermometers so they can be easily read from floor level. If this cannot be accomplished, install remote reading units.
- .4 Install in locations allowing ease of accurate observation without obstruction, light glare or danger to the reading technicians.
- .5 Provide tilt adjustment on devices to view without climbing from floor.
- .6 Thermometers are to be installed in thermowells so that they can be replaced without draining the system.

3.4 Sensor Wells

- .1 Sensor wells shall be supplied by Controls Contractor and turned over to the Heating Contractor under this Section for installation.

END OF SECTION

PART 1 - GENERAL

1.1 Quality Assurance

- .1 Comply with Provincial Regulations and have CSA approval.

1.2 Submittals

- .1 Provide shop drawings and schedules of manufactured products for review and inclusion in Operating and Maintenance Manuals as per Section 15010.

PART 2 - PRODUCTS

2.1 Automatic Air Vents

- .1 Pipe Mains & Lines, Mechanical Rooms, Equipment, Coils, Ceilings spaces and all other spaces except noted above:

- .1 Self-closing, float-operated, vertical mounting, 1/4" I.P. male connection, designed for pressures up to 150psi, 4-3/8" x 2-1/4", bright brass finish.

- .2 Acceptable Manufacturers:

- .1 Maid-O-Mist #71
- .2 Spirax Sarco 13WS
- .3 Armstrong

- .2 Wallfin, Convectors, Radiators:

- .1 Float-operated, vertical mounting, 1/8" I.P. male connection, designed for pressures up to 50psi, 3-3/4" x 9/16", bright brass finish.

- .2 Acceptable Manufacturers:

- .1 Maid-O-Mist #67
- .2 Spirax Sarco
- .3 Armstrong

2.2 Air Separator

- .1 Air separator shall have tangential inlet nozzles.
- .2 The air separator shall be designed and constructed in accordance with Section VIII, Div 1 of the ASME Boiler and Pressure Vessel Code.
- .3 The unit shall be fitted with an NPT vent connection (for connection to a compression tank or an air vent).
- .4 An additional NPT tapping shall be provided on the bottom of the air separator to facilitate blow-down.

- .5 2" to 3" models should be supplied with a cast iron body and NPT system connections, while 4" to 6" models should be supplied with a cast iron body and ANSI flanges. 8" to 24" models are to be supplied with a fabricated steel body and carbon steel ANSI flanges.
- .6 Acceptable Manufacturers:
 - .1 Armstrong Vortex Model VA
 - .2 ITT/Bell & Gossett
- 2.3 Air Eliminator / Air Vents
 - .1 Heavy duty.
 - .2 Acceptable Manufacturers (except glycol systems)
 - .1 Armstrong 1-AV
 - .2 Spirax Sarco 13WS
 - .3 ITT
 - .3 Acceptable Manufactures (glycol systems)
 - .1 Xylem 107A (suitable for field piping to glycol tank)
- 2.4 Relief Valves
 - .1 Provide ASME rated direct spring loaded type, lever operated nonadjustable factory set discharge pressure as indicated.
- 2.5 Flow Indicators (Water)
 - .1 Single Double tempered glass window, bronze body, ABS impeller.
 - .2 Suitable for pressure twice that of working pressure, minimum 125 psig.
 - .3 Suitable for temperature 200 deg F.
 - .4 Equal to Ashland Filter-Mate 304SS.
 - .5 Supplied under Section 15095.
- 2.6 Side Stream Filter
 - .1 Body: Heavy Duty, type 304 stainless steel, cast brass nickel plated head, removable gasketed top, drain valve, 1/4" diameter inlet and outlet threaded fittings.
 - .2 Filter: Multiple paper cartridge, disposable, 5 micron, flow rate 20 usgpm, minimum flow.

- .3 Supplied under Section 15095.

2.7 Pressure Reducing Valves

- .1 Externally piloted pressure reducing valves. Refer to drawings for size and capacity.
- .2 Coordinate with Supplier to make sure selection of flow switches suits pipe diameter.
- .3 Pressure Reducing Valves shall be equal to Watts U5B-LP (low pressure).

PART 3 - EXECUTION

3.1 Air Separator

- .1 Provide on suction side of system circulation pump and connect to expansion tank.
- .2 Install high and/or away from access routes so as not to interfere with access routes. If they are installed in access routes the bottom of the unit must be minimum 8' above finished floor.

3.2 Automatic Air Vents

- .1 Install size as specified herein and in locations as per drawings, at all system high points and as required for complete air purging.
- .2 Where large air quantities can accumulate, provide enlarged air collection standpipe.
- .3 Provide ball valve of size to match air vent I.P connection under each air vent. Shut off valve is to allow isolation, removal and service of fitting.
- .4 Air vents on glycol systems shall be piped to glycol tank.

3.3 Relief Valves

- .1 Provide relief valves at pressure tanks, low pressure side of reducing valves, heating convertors, expansion tanks and where indicated.
- .2 Pipe relief valve to nearest floor drain.
- .3 System relief valve capacity shall equal make up pressure reducing valve capacity. Equipment relief valve capacity shall exceed input rating of connected equipment.

- .4 Where one line vents several relief valves, cross sectional area shall equal sum of individual vent areas.

3.4 Side Stream Filter

- .1 Install new filter across hydronic primary piping. Refer to drawings.
- .2 Provide isolation valves on inlet and outlet, and drain valve to allow filter maintenance with system in operation.
- .3 Provide sight glass indicator on discharge piping.
- .4 Extend piping from connection to a point within 60" from the floor, to allow service from the floor without a ladder.

3.5 Pressure Reducing Valve

- .1 Install as per manufacturer's recommendations.
- .2 Install in vertical position only.

END OF SECTION

PART 1 - GENERAL

1.1 Work Included

- .1 Piping Insulation
- .2 Adhesives, Tie wires, Tapes
- .3 Recovering

1.2 References

- .1 ASTM C547 Specification for Mineral Fiber Pipe Insulation
- .2 ASTM C552 Standard Specification for Cellular Glass Thermal Insulation
- .3 ASTM C585 Practice for Inner and Outer Diameter of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System)
- .4 ASTM E84 Test Method for Surface Burning Characteristics of Building Materials
- .5 CAN/ULC S102 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies
- .6 ASTM C1729 Standard Specification for aluminum jacketing for Insulation

1.3 Quality Assurance

- .1 All workers engaged in the application of insulation shall be journeymen, or indentured apprentices working under a journeyman who is on the site. Trades Qualification certificates must be submitted prior to commencing work and must be on site for inspection.
- .2 All installation work shall conform with the information in the NAIMA Guide for Chilled Water Pipe Systems Insulated with Mineral Fiber Insulation or other accepted industry and trade installation standards for commercial and industrial insulations, or shall conform with manufacturer's recommendations.

1.4 Submittals

- .1 Product Data: Provide product description, list of materials and thickness for each pipe section or equipment scheduled to be insulated.
- .2 Shop Drawings: Include installation details for valves, fittings, pipe and all other items to be insulated.

1.3 Job Conditions

- .1 Deliver material to job site in original non-broken factory packaging, labeled with manufacturer's density and thickness.
- .2 Perform work at ambient and equipment temperatures as recommended by the adhesive manufacturer. Make good separation of joints or cracking of insulation due to thermal movement or poor workmanship.
- .3 Protect the insulation from dirt, water, chemical attack and mechanical damage before, during and after installation. Damaged or contaminated insulation should be discarded and removed from job site.

1.4 Acceptable Manufacturers:

- .1 Fibreglass Canada
- .2 Knauf
- .3 Manson
- .4 Owens Corning
- .5 Johns Manville

PART 2 - PRODUCTS

2.1 General

- .1 Adhesives, Insulation, Coatings, Sealers and Recovering Jackets shall have composite fire and smoke hazard ratings not exceeding 25 for flame spread and 50 for smoke developed.
- .2 Adhesives, coatings and sealers shall be waterproof.
- .3 All accessories materials such as field installed jackets, mastics, coatings, tapes, fasteners shall be recommended by each component manufacturer for the specified application or as listed in the NAIMA Guide to Insulating Chilled Water Systems with Mineral Fiber Pipe Insulation.

2.2 Materials

- .1 Preformed mineral fiber pipe insulation with factory applied all-service vapor-retarder jacket (ASJ) jacket shall have a flame spread rating not greater than 25 and a smoke developed rating not greater than 50 when tested as in accordance with ASTM E84, UL 723 or CAN/ULC S102 (Canada).

- .2 Preformed mineral fiber pipe insulation shall have a water vapor sorption of less than 5% by weight as tested in accordance ASTM C 547.
- .3 All service jacket (ASJ) shall have a water vapor permeance of 0.02 perms or less as tested in accordance to ASTM E96, procedure "A".
- .4 When a vapor mastic is required, a water vapor permeance of 0.02 per ASTM E-96 Procedure B must be achieved.
- .5 Heating piping insulation shall be 38mm (1.5") thick for pipe diameters up to and including 32mm (1-1/4") and 50mm (2") thick for pipe diameters 38mm (1-1/2") and larger.
- .6 Chilled water piping insulation shall be 25mm (1.0") thick for pipe diameters up to and including 150mm (6") and 38mm (1.5") thick for pipe diameters 200mm (8") and larger.
- .7 Hydronic Piping, Exposed Vents: Fine fibrous glass insulation with factory applied vapour barrier jacket, molded to conform to piping, conductivity value at 0.25-0.29 btu/in/sq ft/deg F/hr.
- .8 Recovering Jackets, Indoor Exposed Finished Areas (i.e. Mechanical Rooms, Custodial Rooms, Storage Rooms, etc.): PVC pre-formed.
- .9 Protective Jackets, Outdoor piping: minimum 0.4mm (0.016 in.) aluminum jacket for insulation outside diameters. Aluminum jacketing shall conform to ASTM C1729. Secure to piping using SS banding.

PART 3 - EXECUTION

3.1 Preparation

- .1 Do not install covering before piping and equipment has been tested and approved.
- .2 Ensure surface is clean and dry prior to installation. Ensure insulation is dry before and during application. Finish with systems at operating conditions.

3.2 Installation

- .1 In non fire rated surfaces, ensure insulation is continuous through inside walls. Pack around pipes with fireproof self-supporting insulation material, properly sealed.
- .2 Finish insulation neatly at hangers, supports and other protrusions.
- .3 Provide recovering jackets on exposed insulation as specified herein.

- .4 Coat recovering jacket with two coats of waterproof fire retardant coating.
- .5 Do not install and seal vapour proof insulation if ambient air has a high humidity.
- .6 **Pipe hangers shall wrap around outside of insulation for all sizes.** Piping shall be provided with insulation flashing of heavy gauge metal to prevent crushing and hanger sized for exterior of insulation.
- .7 All pipe insulation longitudinal and circumferential joints must be sealed using the self-seal lap and butt strips. All self seal-laps and butt strips must be firmly rubbed with a sealing tool such as a squeegee to assure proper adhesion. The butt strip must be centered on the circumferential joint and the end of the strip should overlap itself by a minimum of 1" (25.4mm).
- .8 Stapling of the ASJ jacket or self-sealing joints is prohibited.

3.3 Hydronic Piping

- .1 Insulate all new hydronic supply and return piping.
- .2 Insulate valves, unions, flanges, strainers, flexible connections and expansion joints for all cold water and hybrid water systems. Not required on hot water loop.
- .3 Cover elbows, tees and similar fittings with equivalent thickness of insulation material.
- .4 The outermost ASJ vapor retarder must have a continuous, unbroken vapor seal. Hangers, supports, anchors, etc., that are secured directly to cold surfaces must be adequately insulated and vapor sealed to prevent condensation.
- .5 For chilled water piping, the butt end of every fourth pipe insulation section, and the ends or raw edges of insulation terminations at equipment connections, fittings and fire stop systems shall be sealed with vapor retarder mastic.
- .6 When a vapor retarder mastic is required, a maximum water vapor permeance of 0.02 per ASTM E-96 Procedure B must be achieved. Follow the mastic manufacturer's recommendations for application to achieve the 0.02 perm rating.
- .7 Vapor dams shall be used on all chilled water systems. Vapor dams or vapor seals shall be installed at every fourth section and at the termination of all fittings.
- .8 Install PVC (indoor) or metal jacket (outdoors). PVC or metal jackets are installed over factory applied ASJ jacket in order to provide abuse protection, cleanable surface or a specific appearance as required by the space or area of the installation. Overlap PVC jacket at all joints with PVC tape. Install metal jacket with overlap at all joints and secure using SS bands and seal as per manufacturer's instructions. Do not use screws or any fasteners which penetrate the jacket(s).

- .8 Do not insulate within radiation enclosures, where applicable.
- 3.4 Domestic Water Piping – Hot, Cold and Tempered
- .1 Insulate all new domestic hot, cold and tempered water piping.
 - .2 Insulate valves, unions, flanges, strainers, flexible connections and expansion joints for all cold water systems. Not required for hot or tempered water systems.
 - .3 Cover elbows, tees and similar fittings with equivalent thickness of insulation material.
- 3.5 Roof Drainage
- .1 Insulate all roof hoppers.
 - .2 Insulate all roof drainage piping including horizontal *and* vertical piping.
 - .3 Insulate all drain piping located in un-insulated spaces.
- 3.6 Plumbing Vents
- .1 Insulate plumbing vents within 1.5m (5') of insulated surface penetration.

END OF SECTION

PART 1 - GENERAL

1.1 Work Included

- .1 Duct thermal insulation
- .2 Duct acoustic insulation
- .3 Recovering

1.2 Quality Assurance

- .1 All workers engaged in the application of insulation shall be journeymen, or indentured apprentices working under a journeyman who is on the site.

1.3 Job Conditions

- .1 Deliver material to job site in original nonbroken factory packaging, labeled with manufacturer's density and thickness.
- .2 Perform work at ambient and equipment temperatures as recommended by the adhesive manufacturer. Make good separation of joints or cracking of insulation due to thermal movement or poor workmanship.

PART 2 - PRODUCTS

2.1 General

- .1 Adhesives, Insulation, Coatings, Sealers and Recovering Jackets shall have composite fire and smoke hazard ratings not exceeding 25 for flame spread and 50 for smoke developed.
- .2 Adhesives, coatings and sealers shall be waterproof.

2.2 Thermal Duct Insulation – Interior to Building

- .1 Insulation shall be pre-covered, preformed insulation complete with foil or kraft all purpose jacket unless otherwise noted.
- .2 Use 25 millimeter (1 inch) thick insulation unless otherwise noted.
- .3 Exposed Rectangular Ducts: Rigid fibrous glass insulation, "K" value at 0.24 b.t.u. per inch per square foot per degree Fahrenheit per hour with factory applied reinforced aluminum foil vapour barrier.
- .4 Round Ducts and Concealed Rectangular Ducts: Flexible fibrous glass insulation, "K" value at 0.26 b.t.u. per inch per square foot per degree Fahrenheit per hour with factory applied reinforced aluminum foil vapour barrier.

- .5 Recovering Jackets (Interior): U.L.C. listed "Thermo Canvas", treated cotton fabric. Alternatively, U.L.C. listed PVC recovering jacket. PVC recovering jacket shall be suitable for use in plenum (flame spread and smoke developed ratings)
- .6 Acceptable Manufacturers:
 - .1 Fibreglass Canada
 - .2 Knauf
 - .3 Manson
 - .4 Owens Corning
 - .5 Johns Manville

2.3 Thermal Duct Insulation – Exterior to Building

- .1 Insulation: 3.0 PCF density, 50mm (2") thick rigid fiberglass insulation board with factory applied fsk facing. Equal to Knauf insulation board with ecosse technology.
- .2 Jacket: Weatherproof flexible jacket equal to Alumaguard 60.

2.4 Acoustic Duct Insulation

- .1 Fiberglass insulation with "K" value at 0.26 b.t.u. per inch per square foot per degree Fahrenheit per hour absolute roughness of exposed surface not to exceed 0.033 millimeters coated to prevent fibre erosion at air velocities up to 400 f.p.m.
- .2 All substrate material to be non-darkened, contrasting colour from liner layer.
- .3 Use 25 millimeter (1 inch) thick insulation unless otherwise noted.

PART 3 - EXECUTION

3.1 Preparation

- .1 Do not install covering before ductwork and equipment has been tested and approved.
- .2 Ensure surface is clean and dry prior to installation. Ensure insulation is dry before and during application. Finish with systems at operating conditions.

3.2 Installation - General

- .1 In non fire rated surfaces, ensure insulation is continuous through inside walls. Pack around ducts with fireproof self-supporting insulation material properly sealed.
- .2 Finish insulation neatly at hangers, supports and other protrusions.

- .3 Locate insulation or cover seams in least visible locations.

3.3 Thermal Duct Insulation

- .1 Provide insulation on:

- .1 All new supply air ductwork, except where internally insulated.
- .2 All new outside air ductwork.
- .3 All new exhaust air ductwork within 3 meters (10 feet) of insulated surface penetration.

- .2 Exposed Rectangular Ducts: Secure rigid insulation with 50 percent coverage of adhesive and 12 gauge galvanized impale anchor tabs on 400 millimeter (16 inch) centres. Seal joints with 100 millimeter (4 inch) wide foil tape.

- .3 Round Ducts and Concealed Rectangular Ducts: Adhere flexible insulation to ductwork with adhesive applied in 150 millimeter (6 inch) wide strips on 400 millimeter (16 inch) centres. Provide 16 gauge annealed tie wire, or polypropylene twine, spiral wound or half hitched at 100 millimeter (4 inch) centres for securing duct insulation until adhesive sets. Butt insulation and seal joints and breaks with 100 millimeter (4 inch) foil tape.

- .4 Jacket:

- .1 Interior to Building: Provide canvas recovering jackets on exposed insulation throughout including but not limited to Mechanical Rooms. Coat recovering jacket with two coats of waterproof fire retardant coating.
- .2 Exterior to Building: Provide weatherproof flexible jacket over all duct insulation exterior to building.

3.5 Acoustic Duct Insulation

- .1 Apply to interior of:

- .1 First 3 meters (10 feet) of supply and return ducts on inlet and discharge of all air handling units including but not limited to A.H.U. and E.F.
- .2 Transfer ducts and elbows.
- .3 As indicated on drawings or as otherwise noted.

- .2 Secure to ductwork with adhesive using 50 percent coverage and 12 gauge impale anchor tabs on 400 millimeter (16 inch) centres. Cut off excess fastener length and cover with brush coat of sealer.

- .3 Shop fabrication cuts shall be coated with J.M.'s SuperSeal Duct Butter and Edge Treatment products.

END OF SECTION

PART 1 - GENERAL

1.1 Quality Assurance

- .1 Heating coils shall be products of manufacturer regularly engaged in production of such units who issues complete catalogue data on such products.
- .2 One year warranty.

1.2 Submittals

- .1 Submit certified performance data, water flow, pressure drop.

PART 2 – PRODUCTS

2.1 Heating Coils

- .1 Primary surface of round, seamless copper tubes suitable for 250 PSIG and 300°F working conditions.
- .2 Secondary surface shall consist of aluminum plate type fins contoured for maximum heat transfer. Draw full collars from the fins to provide continuous surface cover over the entire tube. Mechanically expand the tubes into the fins. Ensure the fins are continuous across the coil section and ensure no air bypass.
- .3 Construct flanged casing of galvanized steel.
- .4 Headers of seamless copper tubing complete with steel stub outs with MPT connections and drain and vent fittings.
- .5 Do not exceed fin density, tube length, air pressure drop, or water pressure drop scheduled.
- .6 Certify coils according to ARI Standard 410.
- .7 Select coils ensuring no water carry over.
- .8 Circuit coils for drainability without removing plugs from each tube.
- .9 Pressure test coils at 125% of design pressure with compressed air under water.
- .10 Supply booster coils with flanges for slip and drive fasteners.
- .11 Acceptable Manufacturers:
 - .1 McQuay
 - .2 Carrier
 - .3 Trane

PART 3 - EXECUTION

3.1 Mock-Up

- .1 Mock-ups of 3-way and 2-way control valve piping arrangements to be provided for review.

3.2 Installation

- .1 Install coils as per manufacturer's requirements and recommendations.
- .2 Installation shall ensure coils are readily accessible.
- .3 Contractor shall coordinate handing of coil connections.
- .4 Provide duct transitions for reheat coils as required.
- .5 Provide access door in ductwork both upstream and downstream of each coil. Access doors to be minimum 450mm (18") long and as wide as possible. Refer to detail on drawings.
- .6 Provide each unit with isolation ball valve, circuit balancing valve, control valve, and all other accessories and components as per details on drawings.
- .7 Provide each unit with easily accessible automatic air vent at high point.

END OF SECTION

PART 1 - GENERAL

1.1 Quality Assurance

- .1 Meet the requirements of CSA, CGA, Provincial and Municipal Codes and be CSA listed.
- .2 Heating capacity and fan performance shall be ARI certified. Complete unit shall be ETL- Canada listed.
- .3 Fabricate and label refrigeration system to comply with CSA B52 and ASHRAE 15, "Safety Code for Mechanical Refrigeration."
- .4 Energy Efficiency Ratio: Equal to or greater than prescribed by ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."

1.2 Delivery, Storage, and Handling

- .1 Unit shall be stored and handled per manufacturer's recommendations.
- .2 Lifted by crane requires either shipping top panel or spreader bars.
- .3 Unit shall only be stored or positioned in the upright position.

1.3 Submittals

- .1 Shop drawings must be submitted and reviewed by the Consultant prior to the contractor ordering or shipping any subject equipment.
- .2 Submit certified shop drawings for the following:
 - .1 Fan curves and sound data
 - .2 Heating and air delivery performance data
 - .3 Filter frame and media details, dimensions and efficiency
 - .4 Heating components, materials and accessories
 - .5 Fan details, isolation and details
 - .6 Cabinet construction, gauge, access doors, fasteners
 - .7 Dimensions and weights.
 - .8 Power wiring diagrams and electrical characteristics.
 - .9 Control wiring diagrams and interfacing details.
 - .10 Calculations and technical data to support drive selection.
 - .11 Maintenance requirements.
 - .12 Installation and hoisting instructions.

1.4 Warranty

- .1 Provide twenty-five (25) year non-prorated parts warranty on gas furnace heat exchangers.

1.5 Acceptable Manufacturers:

- .1 Aeon
- .2 Daikin Rebel
- .3 Engineered Air
- .4 Other Alternate Manufacturers shall be pre-approved by the Consultant prior to tender close as per Section 15010.

PART 2 - PRODUCTS

2.1 General

- .1 Units shall be completely factory assembled, piped, wired, tested and shipped in one piece to the job site. Refer to schedules for unit performance.
- .2 Units shall be specifically designed for outdoor rooftop application and include a weatherproof cabinet.
- .3 The unit shall undergo a complete factory run test prior to shipment. The factory test shall include final balancing of the supply and return fan assemblies, a unit control system operations checkout, test and adjustment of the gas furnace and a final unit inspection.

2.2 Casing

- .1 Unit shall be specifically designed for outdoor rooftop application with a fully weatherproof cabinet. Cabinet shall be constructed entirely of G90 galvanized steel with the exterior constructed of 20 gauge or heavier material.
- .2 Unit shall be designed to reduce air leakage and infiltration through the cabinet. Cabinet leakage shall not exceed 1% of total airflow when tested at 3 times the minimum external static pressure provided in AHRI Standard 210/240. Panel deflection shall not exceed L/240 ratio at 125% of design static pressure, at a maximum 8 inches of positive or negative static pressure, to reduce air leakage. Deflection shall be measured at the midpoint of the panel height and width. Continuous sealing shall be included between panels and between access doors and openings to reduce air leakage. Piping and electrical conduit through cabinet panels shall include sealing to reduce air leakage.
- .3 Paint finish shall be capable of withstanding at least 2500 hours, with no visible corrosive effects, when tested in a salt spray and fog atmosphere in accordance with ASTM B 117-95 test procedure. Unit exterior shall be "Grey" in color.
- .4 The unit roof shall be sloped or cross-broken to assure drainage.

- .5 Access to filters, blower, heating section, cooling section, and other items needing periodic checking or maintenance shall be through hinged, double walled access doors with quarter turn lever handles with ability to lock. Units shall have full-length stainless steel hinges and full perimeter gasketing. Air side service access doors shall have rain break overhangs. Temporary shipping fasteners through doors to be retained and used to secure doors closed.
- .6 All openings through the base pan of the unit shall have upturned flanges of at least 1/2" in height around the opening through the base pan.
- .7 Cabinet walls, access doors, roof and floors shall be constructed of a 2" thick high performance composite panel with G90 galvanized steel on both sides, a thermal break, and a closed cell polyurethane foam interior core providing a rigid, impact resistant surface. Unit insulation shall be minimum density of 2 pounds/cubic foot and have a minimum R-value of 13.
- .8 Unit base shall be insulated.

2.3 Fans

- .1 Supply fans shall be direct drive plenum type. Power exhaust and ERV exhaust fans shall be direct drive. Fans shall have all aluminum construction.
- .2 Fans attached to 1760 rpm motors shall be rated for a minimum of 1800 RPM maximum speed. Fans attached to 1170 rpm motors shall be rated for a minimum of 1200 RPM maximum speed.
- .3 Fans and motors shall be dynamically balanced. Supply fan assemblies shall be mounted on Rubber in Shear isolators.
- .4 Supply and return air connections shall be from the bottom of the unit.
- .5 Motors shall be premium efficiency. Motors for use with VFD shall be premium efficiency inverter rated only. Motor bearings shall be ball bearing and shall have external lubrication connections. Ball bearings shall be rated for 200,000 hours.
- .6 Direct drive fans shall be complete with VFD drives and shall be factory mounted and wired to the fan motors.
- .7 VFD shall accept a 0-10Vdc signal from the BAS.

2.4 Filters

- .1 The filter section shall be supplied complete with galvanized steel filter racks as an integral part of the unit. Filters shall slide out from a side access door. The filter section shall be provided with 2" 30% MERV- 8 efficient filters. Specified filter areas are minimum acceptable. Provide one (1) spare set of filters.

- .2 Prior to construction but before air balancing, the mechanical contractor shall replace the MERV-8 filters in the unit with 2" MERV-13 filters.
- .3 Provide magnehelic pressure gauges with clogged filter switch for each filter bank. Clogged filter switch shall have dry contact output signal suitable for tie-in to BAS. Mount gauges in control compartment and provide factory mounted probes. Gauges shall be rated for temperature conditions within control compartment.

2.5 Outside Air

- .1 Unit shall include 0-100% economizer consisting of a motor operated outside air damper and return air damper assembly constructed of extruded aluminum, hollow core, airfoil blades with rubber edge seals and aluminum end seals.
- .2 Damper blades shall be gear driven and designed to have no more than 15 CFM of leakage per sq. ft. of damper area when subjected to 2 inches w.g. air pressure differential across the damper.
- .3 Damper assembly shall be controlled by spring return DDC actuator. Unit shall include outside air opening bird screen, outside air hood with rain lip and powered exhaust.

2.6 Gas Heating Section

- .1 Unit shall be provided with a High Turndown Modulating Natural Gas Furnace consisting of a stainless steel heat exchanger with multiple concavities, an induced draft blower and an electric pressure switch to lockout the gas valve until the combustion chamber is purged and combustion air flow is established. Furnace shall be equipped with modulating gas valves, adjustable speed combustion blowers, stainless steel tubular heat exchangers, and electronic controller. Combustion blowers and gas valves shall be capable of modulation. Gas heater shall be capable of capacity turndown ratio as shown on the unit rating sheet and schedules.
- .2 Furnace shall include a gas ignition system consisting of an electronic igniter to a pilot system, which will be continuous when the heater is operating, but will shut off the pilot when heating is not required.
- .3 Electronic controller includes a factory wired, field installed supply air temperature sensor. Sensor shall be field installed in the supply air ductwork. Supply air temperature setpoint shall be adjustable on the electronic controller within the controls compartment.
- .4 Heat trace shall be included on the condensate drain.
- .5 Modulating gas burner shall be complete with an integral temperature controller and shall accept a 0-10V DC reset signal from the BAS to reset the supply air temperature from 50°F to 100°F.

- .6 Unit shall have gas supply piping entrances in the unit base for through the curb gas piping and in the outside cabinet wall for across the roof gas piping.

2.7 Cooling Section (RTU-1, RTU-3 & RTU-4)

- .1 Units without cooling shall be designed for future cooling coil including space (i.e. casing size and access door) and performance (i.e. pressure drop).

2.8 Cooling Coils (RTU-2 only)

.1 Evaporator Coils

- .1 Coils shall be designed for use with R-410A refrigerant and constructed of copper tubes with aluminum fins mechanically bonded to the tubes and aluminum end casings. Fin design shall be sine wave rippled.
- .2 Coils shall be furnished with factory installed thermostatic expansion valves.
- .3 Drain pan shall be stainless steel.

.2 Refrigeration System

- .1 Unit shall be factory charged with R-410A refrigerant.
- .2 Compressors shall be scroll type with thermal overload protection and carry a 5-year non-prorated warranty, from the date of original equipment shipment from the factory.
- .3 Compressors shall be mounted in an isolated service compartment which can be accessed without affecting unit operation. Lockable hinged compressor access doors shall be fabricated of double wall, rigid polyurethane foam injected panels to prevent the transmission of noise outside the cabinet.
- .4 Compressors shall be isolated from the base pan with the compressor manufacturer's recommended rubber vibration isolators, to reduce any transmission of noise from the compressors into the building area. Provide compressor sound blankets.
- .5 Each refrigeration circuit shall be equipped with automatic reset low pressure and manual reset high pressure refrigerant safety controls, Schrader type service fittings on both the high pressure and low pressure sides and a factory installed replaceable core liquid line filter driers.
- .6 Lead circuit shall be a modulating digital scroll compressor to allow capacity control from 10% to 100% based on a 1-5V signal from the BAS system.

.3 Condensers – Air-Cooled

- .1 Condenser fans shall be a vertical discharge, axial flow, direct drive fans.
- .2 Coils shall be designed for use with R-410A refrigerant.
- .3 Condenser coils shall be multi-pass and fabricated from aluminum microchannel tubes.
- .4 Coils shall be designed for a minimum of 10°F of refrigerant sub-cooling.

- .5 Condenser fans shall be variable speed high efficiency electrically commutated or VFD motor driven. Condenser airflow shall continuously modulate based on head pressure and cooling operation shall be allowed down to 35°F with adjustable compressor lockout. Alternatively, condenser fans shall have multiple speeds which are controlled with a fan cycle switch based on head pressure and allow matching condenser airflow with cooling capacity steps.

2.9 Damper Actuators

- .1 Provide electric actuators of the enclosed reversible gear drive type that can accept modulating control signals as required. Actuators using balance relays or mechanical travel limiting switches are not acceptable.
- .2 Provide damper actuators that develop sufficient force to maintain damper rated leakage characteristics. Supply actuator with limit switch for position proving as required in sequence of operation.

2.10 Field Installed DDC Controls by Others

- .1 Controls shall be supplied and field installed by others.
- .2 Manufacturer shall wire all unit controls to a terminal block for connection by the BAS contractor.
- .3 Refer to Controls Schematics on drawings.

2.11 Variable Frequency Drives

- .1 Provide fully programmable digital type variable frequency AC drives (VFD) for the control of the fan motor(s). Enclose drives in NEMA 1 enclosures installed within the unit. Provide input line fuses and disconnect switch. VFD enclosure shall be maintained above 0°C for proper operation.
- .2 VFD shall be totally digital pulse width modulated (PWM) type utilizing insulated gate bipolar transistors (IGBT's) in the inverter section of the drive. VFD shall accept AC line voltage variation of +10%, -15%.
- .3 VFDs shall provide the following protection:
 - .1 Line over and under voltage protection
 - .2 Phase loss protection
 - .3 Phase unbalance protection
 - .4 Inherent short circuit protection for line to line and line to ground faults
 - .5 Electronic instantaneous overcurrent protection
 - .6 Current limit adjustable between 25% and 120%
 - .7 Internal over temperature protection
 - .8 Electronic motor stall protection

- .4 VFD shall have minimum 97% efficiency at maximum load and speed, minimum line side displacement power factor of 0.96 at all speeds, separately adjustable acceleration and deceleration ramps and separately adjustable minimum and maximum frequency range from 0 to 120 Hz.
- .5 VFD shall be capable of starting with the fan already rotating by starting the motor at the speed the fan is operating at and then changing to the speed called for by the unit controller. Provide auto re-start after power interruption.
- .6 Provide unit-mounted 32-character display control pads on each drive to monitor and adjust VFD parameters. Provide an additional main control pad in the rooftop control section outside of the airstream for monitoring and adjusting both the supply and return fan VFD.
- .7 VFD's shall include remote enable/disable contacts, alarm relay, 0-10V DC control signal input and local/remote control.

2.12 Options

- .1 Unit shall be provided with a factory installed and wired disconnect. Disconnect to be internal where unit configuration permits.
- .2 Unit shall be provided with a 20AMP 115V GFCI receptacle. Receptacle shall be field wired and powered.
- .3 Unit shall be provided with phase and brownout protection.
- .4 Unit shall be provided with remote safety shutdown contacts.
- .5 Units shall be provided with powered exhaust.

2.13 Roof Curb

- .1 Each unit shall be provided with a prefabricated galvanized steel mounting curb designed and manufactured by the unit manufacturer, for field assembly on the roof decking prior to unit shipment.
- .2 The roof curb shall be a perimeter type with complete perimeter support of the air handling section. The curb shall be a minimum of 24 inches high, or as specified on the drawings, and include a nominal 2 x 4-inch wood strip. Curb shall include vertical discharge for supply air and vertical discharge for return air. The curb shall be designed with curb area (except supply air section) as a plenum for return air where required or noted.
- .3 Curbs shall be designed for down discharge or side discharge as noted on the drawings.
- .4 The roof curb shall be approved by the National Roofing Contractors Association.

- .5 The roof curb shall be designed and sized to allow for all necessary offsets and transitions required to tie the new roof top unit into the existing ductwork below while maintain the required unit clearances. Curb shall include plenum for return air where required or noted.
- .6 Unit supplier and contractor shall site verify all curb dimensions prior to submitting shop drawings.
- .7 Gasketing shall be provided for field mounting between the unit base and roof curb.

2.14 Start-Up, Demonstration and Warranty

- .1 Manufacturer shall furnish a factory trained service technician to perform the unit startup.
- .2 Contractor and manufacturer shall provide instruction and demonstration to the owner's personnel on the operation and maintenance of the unit.
- .3 The warranty period shall commence at the date of initial startup and shall continue for a period of one (1) year not to exceed eighteen (18) months from shipment. Manufacturer's warranty shall include all parts and labour to install parts.
- .4 Perform two (2) separate start-ups and demonstrations for heating and cooling.

2.15 Spare Parts

- .1 Supply one (1) complete set of spare belts and filters for all units.

PART 3 - EXECUTION

3.1 Installation

- .1 Hoist and install units in full accordance to the manufacturer's instructions, generally accepted practice and all applicable codes.
- .2 Ensure new structural steel is in place for new units.
- .3 Install units flat and level on roof curb in accordance with manufacturer's installation literature. Install gasketing between unit base rails and curb.
- .4 Provide new insulation on the new roof curb side wall. The minimum standard of acceptance will be 32mm (1¼") thick rigid foam insulation with an insulation value of 7.5 deg F/sq.ft./ hr/btu R). Fill inside curb cavity with Roxul insulation. Contractor shall provide a picture of the completed and insulated curb before installation of unit.

- .5 Coordinate flashing and counter flashing with Roofing Contractor.
- .6 Provide flange gasket material to perfectly seal ducts to rooftop unit. Provide caulking and sealing material to create weather proof fittings.
- .7 Contact Consultant for inspection of duct terminations and insulation prior to placing rooftop equipment. All duct flanging, gasketing systems and insulation must be inspected or equipment will be removed for specified inspection.
- .8 Install and wire all control accessories and power wiring to the unit. Coordinate with Division 16 for all power wiring 120V and over.
- .9 Provide drain pipe complete with trap for the unit. Drain shall terminate beyond roofcurb. Provide extension for adapter curbs as required.
- .10 The Contractor shall clean or replace filters prior to turning over to the owner.
- .11 Temporary shipping fasteners through doors to be retained and used to secure doors closed.

3.2 Start-Up and Demonstration

- .1 Perform start-up using a manufacturer's factory trained service technician.
- .2 Provide training and demonstration to the owner's personnel on the operation and maintenance of the unit. Factory technician to be present with the Mechanical Contractor.
- .3 Perform two (2) separate start-ups and demonstrations for heating and cooling within the applicable seasons to suit the required outdoor air temperature even if outside overall project schedule. In general, cooling start-ups shall be done when outdoor air is greater than 15C and heating start-ups shall be done when outdoor air is less than 15C, however temperatures should be confirmed with equipment manufacturers.
- .4 A start-up report shall be submitted to the Engineer, signed and dated by the Technician.
- .5 Temporary shipping fasteners through doors to be retained and used to secure doors closed.

3.3 Spare Parts

- .1 Turn over one (1) complete set of belts and filters to Owner upon completion of work prior to substantial completion.

END OF SECTION

PART 1 - GENERAL

1.1 Reference Standards

- .1 Ontario Building Code
- .2 SMACNA
- .3 NFPA 90A – Air Conditioning and Ventilation Systems
- .4 ASTM A653
- .5 ULC
- .6 Local Codes and Requirements

1.2 Acceptable Sheet Metal Subcontract Bidders:

- .1 Refer to Division 0 for acceptable sheet metal subcontractors.

PART 2 - PRODUCTS

2.1 General

- .1 Provide ductwork as recommended and specified in the latest revision of the Sheet Metal and Air Conditioning Contractors National Association incorporated (SMACNA).

2.2 Ductwork

- .1 Ductwork shall be galvanized steel with G90 designation zinc coating lock forming quality to ASTM A525M.
- .2 Rectangular or Square:
 - .1 Conform to SMACNA standards.
- .3 Round:
 - .1 Factory fabricated, spiral wound, with matching fittings and specials. Longitudinal seam type is not acceptable.
 - .2 Transverse joints up to 900mm (36"): slip type with tape and sealants.
 - .3 Transverse joints over 900mm (36"): Ductmate or Exanno Nexus Duct System.
- .4 Exposed Ductwork in Finished Areas (i.e. Gymnasiums):
 - .1 All exposed ductwork in finished areas shall be satin finish (galvannealed) to allow for painting without peeling.
 - .2 All exposed ductwork in finished areas shall be spiral unless otherwise indicated.

- .3 All exposed ductwork in finished areas shall be painted.
- .5 Comply with NFPA standards for exhaust ductwork and hoods which are used in applications resulting in airborne grease entrainment. 18 gauge stainless steel continuous welded. Refer to drawings for details and specifications.

2.3 Duct Construction

- .1 All supply air ductwork from air handling unit fan discharge to first VAV component or first reheat coil shall be constructed to SMACNA 750 Pa (3" wg) duct construction class. All other supply air ductwork upstream of VAV components or reheat coils shall be constructed to SMACNA 500 Pa (2" wg) duct construction class. For all other constant volume systems, all supply air ductwork installed in mechanical rooms shall be constructed to SMACNA 500 Pa (2" wg) duct construction class.
- .2 All supply air ductwork downstream of VAV components or reheat coils shall be constructed to SMACNA 250 Pa (1" wg) duct construction class.
- .3 All return air ductwork and all exhaust air ductwork installed in mechanical rooms shall be constructed to SMACNA 500 Pa (2" wg) duct construction class. All other return air ductwork and exhaust air ductwork shall be constructed to 250 Pa (1" wg) duct construction class.
- .4 Tie rods shall not be used in lieu of external duct reinforcement except where specifically mandated by SMACNA duct construction standards.
- .5 Duct tapers to be at 14 degrees maximum (1:4 ratio) for all systems with air velocities less than 1500fpm and 8 degrees (1:7 ratio) for velocities 1500 fpm and greater.
- .6 Provide a schedule of proposed duct construction, meeting SMACNA standards, to be used on the project. Schedule shall include panel width, gauge, transverse connector, reinforcement, longitudinal seam, sealing class and sealing compound. Submit schedule prior to performing any duct fabrication/installation.

2.4 Fittings

- .1 Fabrication: to SMACNA.
- .2 Radiused elbows:
 - .1 Rectangular: standard radius and or short radius with double thickness turning vanes Centreline radius: 105 times width of duct.
 - .2 Round: in exposed areas one-piece smooth radius, 1.5 times diameter.
- .3 Mitred elbows, rectangular:
 - .1 To 400mm (16"): with double thickness turning vanes.
 - .2 Over 400mm (16"): with double thickness turning vanes.

- .4 Branches:
 - .1 Rectangular main and branch: with 45° entry on branch.
 - .2 Round main and branch: enter main duct at 45° with conical connection.
 - .3 Provide volume control damper in branch duct near connection to main duct.
 - .4 Main duct branches: with splitter damper.
 - .5 Diffuser connection to main:
 - .1 High efficiency takeoffs complete with rectangular duct opening and 45° slope body. Takeoffs shall be furnished complete with balancing damper and locking quadrant.
 - .2 Contractor shall notify Consultant if height of takeoff is required to be reduced to suit ceiling clearances and obtain approval from the same prior to installing or fabricating.
 - .3 Takeoffs shall be equal to SMC H.E.T.O. or fabricated on site.
 - .6 Transitions:
 - .1 Diverging: 20° maximum included angle.
 - .2 Converging: 30° maximum included angle.
 - .7 Offsets:
 - .1 Full short radiused elbows.
 - .8 Obstruction deflectors: maintain full cross-sectional area.
- 2.5 Acoustic Insulation
- .1 Refer to Section 15258.
- 2.6 Firestopping
- .1 40mm x 40mm x 3mm (1-1/2" x 1-1/2" x 16ga) retaining angles all around duct, on both sides of fire separation.
 - .2 Firestopping material and installation must not distort duct.
 - .3 All ductwork passing through partition walls shall be firestopped.
- 2.7 Fasteners
- .1 Fasteners shall be sheet metal screws, rivets, and bolts.
- 2.8 Flexible Ductwork
- .1 Listed in accordance with ULC-S110 and classified Class 1.
 - .2 Flame spread rating not more than 25. Smoke developed rating not more than 50.

- .3 Semi-rigid and lightweight air duct, manufactured using a dead soft aluminum strip which is spirally wound and mechanically joined together to form an air tight and leak-proof three ply mechanical seam. Self-supporting and corrosive resistant that provides excellent strength and rigidity.
- .4 Provide insulated or uninsulated as noted.
- .5 Performance - Uninsulated:
 - .1 Material: Aluminum
 - .2 Maximum rated velocity: 5500 fpm
 - .3 Maximum positive pressure: 2.5 kPa (10 in.wc.)
 - .4 Maximum negative pressure: 3.0 kPa (12 in.wc.)
 - .5 Temperature Range : -51C to 315C (-60F to 600F)
 - .6 Bend Radius : 1.5 times diameter
 - .7 Available sizes : 50mm to 610mm (2 inches to 24 inches)
- .6 Performance - Insulated:
 - .1 Core material: Aluminum
 - .2 Thermal Resistance: Available in R4.2, R6, R8
 - .3 Maximum rated velocity: 4000 fpm
 - .4 Maximum positive pressure: 3.0 kPa (12 in.wc.)
 - .5 Maximum negative pressure: 0.25 kPa (1 in.wc.)
 - .6 Temperature Range : -40C to 121C (-40F to 250F)
 - .7 Bend Radius : 1.5 times diameter
 - .8 Available sizes : 100mm to 500mm (4 inches to 20 inches)
- .7 Acceptable Manufacturers:
 - .1 Uninsulated: Flexmaster Triple Lock T/L Aluminum Flexible Ducting
 - .2 Insulated: Flexmaster Triple Lock T/L Aluminum Thermal Flexible Ducting
- 2.9 Hangers and Supports
 - .1 Refer to Section 15090.
- 2.10 Duct Sealer
 - .1 Duct Sealer to be ULC classified for surface burning characteristics and be water based.
 - .2 Duct Sealer shall be Duro-Dyne DWN, grey, water-based for medium and high pressure duct systems, non-flammable (wet state), fire retardant (dry state).
 - .3 Duct Sealer shall be clear silicone type on all exposed ductwork or duct sealer shall be applied to inside of fittings to ensure clean look.
- 2.11 Turning Vanes
 - .1 Turning vanes shall be of steel construction with prime coat finish and complete with supports and fastenings.

- .2 Turning vanes shall be double wall with correct airfoil pattern.

2.12 Instrument Test Ports

- .1 Instrument port covers shall be Duro-Dyne IP-1 for bare ducts and IP-2 for insulated ducts.

PART 3 - EXECUTION

3.1 Rigid Ductwork

- .1 Coordinate with other trades prior to installing ductwork.
- .2 All ductwork and fittings shall be installed in accordance with SMACNA and ASHRAE standards.
- .3 All exposed ductwork shall be satin finish (galvannealed) to allow for painting. Paint all exposed ductwork in finished areas.
- .4 Duct tapers to be at 14 degrees maximum (1:4 ratio) for all systems with air velocities less than 1500fpm and 8 degrees (1:7 ratio) for velocities 1500 fpm and greater.
- .5 Provide acoustic liner as per drawings and Section 15258.
- .6 Ductwork shall be properly constructed, braced, connected and jointed. Suspend with hangers to SMACNA Standards. Refer to Section 23 05 29.
- .7 Do not suspend hangers including wires and rods from the steel roof deck nor from other mechanical or electrical components. Support hangers from structural bearings such as beam, top chords of steel joists or structural concrete slabs. Where structural bearings do not exist, provide angle or channel iron form nearest structural bearings to support hangers.
- .8 Use of "S and drive" or equivalent slip joint method, or Ductmate flange joint method is permissible. Fabricate and install in accordance with SMACNA reinforcement standards. Leave smooth finish on edges and interior of duct runs. Install internal ends of slip joints in direction of flow.
- .9 Ducts and joints shall be tight and rigid so as not to leak, rattle, or vibrate.
- .10 Install ductwork to allow adequate space for normal operation and maintenance of equipment nearby.
- .11 Where possible, radiused duct elbows with radiused splitter vanes are preferable over square elbows with turning vanes. Where square duct elbows are necessary, turning vanes to be double thickness airfoil type installed in every slot on the vane rail.

- .12 Direct size duct spin-ons are not acceptable. Conical spin-on or square-to-round fittings shall be provided. Where take-off is same size as main, use a 45 degree lead-in fitting.
- .13 Where ducts pass through walls, seal around ducts with noncombustible material.
- .14 All openings through wall must be sleeved and lined as specified. Openings shall be 50mm (2") larger all around than duct or piping and filled with fireproof Rockwool type insulation complete with fire retardant sealant both sides.
- .15 All open ductwork, not being worked on, must be completely covered during construction phase until all sanding, plastering, painting, and finishing is complete.
- .16 Inspect and test ductwork prior to any required painting or insulation for air leakage at joints and connections under normal operating conditions. Air leakage tests shall be performed as specified herein.
- .17 Paint all ductwork in exposed areas.
- .18 Paint ductwork visible through registers, grilles and diffusers flat black.
- .19 Under no conditions are pipes, rods or wires allowed to penetrate ducts.
- .20 Kitchen exhaust duct shall be welded, sloped and with access doors in conformance with NFPA 96.

3.2 Flexible Ductwork

- .1 Install in accordance with SMACNA.
- .2 Maximum length shall be 1.8m (6'). Minimum 12" (300mm) straight vertical duct run to be provided at all diffusers.
- .3 Provide support at centre of flexible duct.

3.3 Duct Sealing

- .1 Seal all ductwork with duct sealer as specified herein. Ducts constructed to SMACNA 500Pa (2") duct construction class and under shall be sealed to SMACNA Standard Section 1.6 and 1.7, Class C. Ducts constructed to SMACNA 750Pa (3") duct construction class shall be sealed to SMACNA Standard Section 1.6 and 1.7, Class B. Duct sealer shall be applied behind fittings for all exposed ductwork in finished areas.
- .2 The sealer shall be stored at room temperature for at least 24 hours prior to use. Surfaces shall be clean, dry and free from oil, grease, and any other foreign material.
- .3 Clean fittings to a depth of four inches with a solvent, exercising safe practices as recommended by the manufacturer.

- .4 Stir sealer thoroughly before application.
- .5 Use a brush, cartridge guns or spatula to apply the sealer to male section of spiral duct or to both fittings of rectangular duct. Join joints while sealer is wet (within approximately 15 minutes) and secure with sheet metal screws applied as close as possible (1/2" or less). Apply sealer to outside of assembly with a 2" wide band of sealer, thoroughly covering joint head and sheet metal screws. Allow sealer to set (approximately 72 hours) before pressure testing. Do not thin.
- .6 The Consultant shall inspect the duct sealing prior to any insulation being installed. Provide minimum four (4) working days' notice.

3.4 Instrument Test Ports

- .1 Ports shall be supplied and installed by the mechanical contractor prior to installation of external insulation.
- .2 With the assistance of the balancing contractor, the contractor will mark the spacing for the instrument ports on the ductwork after installation of the ductwork and notify the commissioning team of the number of ports.

3.5 Duct Leakage Tests

- .1 All new duct distribution systems are to be pressure tested for leakage.
 - All new Rooftop Unit Systems
 - Exception: Gym Rooftop Unit System not required (due to exposed duct system)
- .2 Tests shall include:
 - .1 All supply ductwork between new air handling units (RTUs & AHUs) to spin-ons for diffusers, including heating coils, fire dampers and access doors. Provide temporary blank ends on grilles and open ducts.
 - .3 All return ductwork between new air handling units (RTUs & AHUs) and all return grilles including fire dampers and access doors. Provide temporary blank ends on grilles and open ducts.
- .3 Tests to be performed in accordance with SMACNA procedures. Calibrated orifices shall be used to measure all leakage airflow rates. All ductwork shall be pressure tested at minimum 500 Pa (2"WG). For any system, total leakage at the test pressure shall not exceed 5% of respective fan design air flow rate. Repair all leaks and repeat test. Pressurize with small blower. Test system as a whole, or in parts, provided that all ductwork is accessible for inspection at the time of test.
- .4 Tests shall be performed before ducts are insulated or enclosed. Submit notice of all tests in ample time to allow the Consultant or their representative to be present when the tests are conducted. All tests shall be witnessed by the Consultant and/or the Owner's third-party commissioning agent (where applicable) or they shall be repeated.

- .5 Any components of the systems which might be damaged during the tests shall be removed before the tests and reinstalled after the tests.
- .6 Provide all test holes (including prefabricated insulated capped test hole fittings), dampers, access facilities, etc. as required for air balancing and make any changes required for the final balancing results. Cooperate with the Balancing Contractor to ensure satisfactory completion of his work. Provide test holes prior to application of thermal insulation.
- .7 Submit report of air tests to Consultant and include in maintenance manuals.

3.6 Painting

- .1 All exposed ductwork in finished areas shall be painted. Coordinate colour with Owner.

3.7 Cleaning (prior to start-up)

- .1 Keep ductwork and duct liners clear from dust and debris during construction.
- .2 Prior to starting HVAC equipment, inspect and clean all equipment, and ductwork on the inside and outside to ensure that they are completely free from dust and debris.
- .3 Install clean filters in all units.

END OF SECTION

PART 1 - GENERAL

1.1 Quality Assurance

- .1 Fabric shall be inherent fire resistant IFR. Fire retardant treated fabric is not acceptable.

1.2 Standard and Code Compliance

- .1 Product shall be ULC classified and under AJIJ "Distribution Device, Air". It shall also be classified by ULC in accordance with ICC Evaluation Service AC167 and UL Subject 2518.
- .2 It shall meet the latest revision NFPA 90A requirement, generating flame spread and smoke developed index less than 25/50 respectively when evaluated in accordance to UL723 and CAN/ULCS102, latest revision.

1.3 Submittals

- .1 Manufacturer's specifications on both material and finished project.
- .2 Documentation for compliance with NFPA 90A, latest revision, showing flame spread and smoke developed index less than 25/50 respectively when tested in accordance to both UL723 and CAN/ULC S102, latest revision.

1.4 Warranty

- .1 Manufacturer shall provide at least 10-year product warranty. Prorated warranty is not acceptable.

1.5 Delivery

- .1 Fabric air dispersion system shall be properly packaged during shipping, handling and storage to prevent damage.
- .2 Product shall be stored in indoor location and protected from weather.

1.6 Acceptable Manufacturers

- .1 NanoSox (DurkeeSox)
- .2 DuctSox
- .3 Prihoda (Nailor)

PART 2 - PRODUCTS

2.1 Fabric

- .1 Air dispersion system shall be constructed of a woven fabric that comply with

following physical characteristics:

- .1 Fabric shall be the inherent fire-resistant woven fabric. Treated and/or coated fabric is NOT acceptable.
- .2 Fabric shall meet flame and smoke requirement of NFPA 90 and ULC S102 standards. The flame spread index tested shall be less than 5, and no dripping flame balls when subject to flame.
- .3 Fabric shall be constructed of 100% inherent fire-resistant polyester yarn.
- .4 Fabric weight shall be 6.5 oz/yd² (200 g/m²) tested per ASTM D3776, latest revision.
- .5 Fabric shrinkage shall be less than 0.5%.
- .6 Fabric permeability: 0, 0.5, 2, 6, 16, and customized (all + - 5%) per ASTM D737. Selected fabric permeability and effect on system performance shall be documented in design. Fabric with leakage larger than 30% supply air is not allowed.
- .7 Standard colors: White, Red, Blue, Gray, Green, Yellow, Beige, Light Grey, Black.
- .8 Design for silk screen shall include a minimum of 4 colours, and school logo in four (4) places a directed by the Consultant. School team name shall be silk screened across straight sections of fabric duct on one side only.

2.2 System Fabrication

- .1 Air is discharged through mesh vent, and /or fabric permeation.
- .2 Location and dimension of vents shall be approved by manufacturer.
- .3 Inlets are to be connected to metal duct via anchor patches supplied by manufacturer. Zip screw fastener used for secure inlet anchor patches are to be supplied by contractor.
- .4 Zipper connection shall be used to connect inlet, end cap and duct segments when deemed necessary by manufacturer for easy removal and maintenance.
- .5 System shall include connectors to attach to suspension system listed below.

2.3 Design

- .1 Fabric air dispersion system shall only be used for positive pressure situation in the mechanical ventilation system.
- .2 System shall not be used in concealed space.
- .3 System shall be designed to work with inlet static pressure from 70 Pa, or 0.25" water gage to 750 Pa, or 3" water gage, with standard pressure of 120 Pa, or 0.5" water gage.
- .4 Designed temperature shall be between -53C to 100C (-63F to 212F).

- .5 System length, diameter, static pressure and airflow shall be as per drawings and approved by manufacturer.
- .6 Manufacturer shall provide throw distance and end air velocity design.

2.4 Suspension System

.1 Galvanized Tension Cable

- .1 Suspension system consists of one row or two rows of plastic-coated galvanized cables located 25mm to 100mm (1" to 4") above fabric duct mounting points. Mounting points shall locate at 12 o'clock (for single row suspension). Distance between clips shall not exceed 609mm (24").
- .2 Double row suspension is recommended for ducts with diameter larger than 610 mm (24"). Cable and accessories include eye bolts, turnbuckles, cable clamps shall be supplied by manufacturer.
- .3 Mounting bracket at both ends of tension cables shall be supplied by Contractor.

.2 IRR (Internal Retention Ring) Support System

- .1 IRR support system shall consist of flexible composite material rods inserted into a sew-in pocket inside fabric duct, to form a 360 degree support ring, providing internal structural support to the flexible fabric material. The rods shall be factory installed and easily removable for laundering purpose. Field assembled method is not acceptable.
- .2 Each straight section shall be tensioned along axial direction with tension cable connected to the sew-in metal rings at each end, to keep the fabric in round shape without static pressure. Internal metal support structures exposed to air stream are not acceptable. Half round hoops are not allowed. System without axial tension is not allowed.
- .3 IRR system shall be applied along with additional support method, including cable or track suspension. Support system without longitudinal tension is not acceptable

PART 3 - EXECUTION

3.1 Fabric Air Dispersion System Installation

- .1 Examine designated installation space, avoid interference with existing piping, fixtures, and structures.
- .2 Install suspension system as per manufacturer's instruction. Installation manual shall be supplied with product by manufacturer.
- .3 Contractor to wear latex or protective gloves during installation to ensure product is not soiled.

END OF SECTION

PART 1 - GENERAL

1.1 Reference Standards

- .1 Ontario Building Code
- .2 ASHRAE
- .3 SMACNA
- .4 NFPA 90A – Air Conditioning and Ventilation Systems
- .5 ULC
- .6 CSA
- .7 Local Codes and Requirements

1.2 Submittals

- .1 Submit shop drawings showing location, ratings, sizes of all fire dampers.
- .2 One copy of all stamped reviewed shop drawings plus operation and maintenance data shall be included in the maintenance manual.

1.3 Delivery, Storage and Handling

- .1 Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.
- .2 Storage: Store materials in a dry area indoor, protected from damage and in accordance with manufacturer's instructions.
- .3 Handling: Handle and lift dampers in accordance with manufacturer's instructions. Protect materials and finishes during handling and installation to prevent damage.

PART 2 - PRODUCTS

2.1 General

- .1 All required accessories shall conform to ASHRAE and SMACNA standards and recommendations.

2.2 Fire Dampers

- .1 Provide fire dampers in ducts penetrating fire rated walls, floors, or ceiling as indicated on the drawings.
- .2 Fire dampers shall be UL STD 555 to 1-1/2 hour fire ratings.
- .3 Fire dampers shall be equipped for vertical or horizontal suitable for application.
- .4 Frame: 4-7/8", 20 gauge galvanized steel channel.
- .5 Blades: 24 gauge galvanized steel blades, curtain type, recessed out of air stream.
- .6 Fusible link: 165°F.
- .7 Provide duct access doors of adequate size to service fire dampers. Provide Pull Tab for horizontal dampers where access door is located below the fire damper. Refer to Duct Access Doors within this section.
- .8 Acceptable Manufacturers
 - .1 Ruskin – Series IBD2 Style B
 - .2 Nailor Industries – 0120 Type B
 - .3 National Controlled Air (NCA) – FD – 80 Type B
 - .4 Tamco

2.3 Combination Fire Smoke Dampers

- .1 Combination fire/smoke dampers meeting or exceeding the following specifications shall be furnished and installed at locations shown on plans or as described in schedules.
- .2 Combination fire smoke dampers shall be triple-V groove blades.
- .3 Dampers shall meet the requirements of NFPA90A, 92A and 92B and shall be classified for use for fire resistance ratings of less than 3 hours, in accordance with UL555, and classified as Smoke Dampers in accordance with the latest version of UL555S.
- .4 Quality Assurance
 - .1 Dampers shall be warranted against manufacturing defects for a period of 5 years.
 - .2 Dampers shall be tested, rated and labeled in accordance with the latest ULC requirements.
 - .3 Damper pressure drop ratings shall be based on tests and procedures performed in accordance with AMCA 500 and certified by AMCA (if applicable).

- .4 Factory Tests: Factory cycle damper and actuator assembly to assure proper operation.

- .5 Ratings:
 - .1 Fire Resistance: 1-1/2 hours in accordance with ULC555.
 - .2 Smoke Rating: Leakage Class II Smoke Damper in accordance with UL555S. A Class II smoke damper leaks no more than 20 cubic feet per minute (.57 m³/min) at 4 in. wg. (1 kPa) differential pressure.
 - .3 Elevated Temperature Rating: 165°F.
 - .4 Air Flow Rating: 2000 fpm.
 - .5 Differential Pressure Rating: 4 in. wg.

- .6 Construction:
 - .1 Frame: 5 inches x minimum 16 gage (127 x minimum 1.6 mm) roll formed, galvanized steel hat-shaped channel, reinforced at corners. Structurally equivalent to 13 gage (2.3 mm) U-channel type frame.
 - .2 Blades:
 - .1 Style: Single skin with 3 longitudinal grooves (flat blades are not acceptable).
 - .2 Action: Opposed.
 - .3 Material: Minimum 16 gage (1.6 mm) galvanized steel.
 - .4 Width: Maximum 6 inches (152 mm).
 - .3 Bearings: Self-lubricating stainless steel sleeve type, turning in extruded hole in frame.
 - .4 Seals:
 - .1 Blade: Inflatable silicone fiberglass material to maintain smoke leakage rating to a minimum of 450°F (232°C) and galvanized steel for flame seal to 1,900°F (1,038°C). Mechanically attached to blade edge (glue-on or grip type seals are not acceptable).
 - .2 Jamb: Stainless steel, flexible metal compression type.
 - .5 Linkage: Concealed in frame.
 - .6 Axles: Minimum ½ inch (13) diameter plated steel, hex-shaped, mechanically attached to blade.
 - .7 Mounting: Vertical and/or Horizontal.
 - .8 Temperature Release Device: Heat-Actuated, Quick Detect.
 - .1 Close (in a controlled manner) and lock damper during test, smoke detection, power failure, or fire conditions through actuator closure spring. At no time shall actuator disengage from damper blades.
 - .2 Allow damper to be automatically and remotely reset after test or power failure conditions. After exposure to high temperature or fire, inspect damper before reset to ensure proper operation.

- .3 Controlled closing and locking of damper in 7 to 15 seconds to allow duct pressure to equalize. Instantaneous closure is not acceptable.
- .9 Release Temperature:
- .10 Actuator:
 - .1 Type: Electric 120V, 60 Hz, two-position, fail close.
 - .2 Mounting: External
- .11 Finish: Mill galvanized.
- .7 Accessories
 - .1 Sleeves, sized to suit wall or floor thickness.
- .8 Acceptable Manufacturers:
 - .1 Ruskin - FSD36 or equal
 - .2 National Controlled Air (NCA) – FSD-3V
 - .3 Nailor - 1271
 - .4 Tamco
- 2.4 Balancing Dampers
 - .1 Single blade damper: Galvanized steel minimum 18 gauge, provide with quadrants and lock screw.
 - .2 Multi-blade damper: Galvanized steel minimum 16 gauge, provide with quadrants or adjustment rods and lock screw.
 - .3 Fabricate splitter dampers of double thickness sheet metal to streamline shape, properly stiffened to avoid vibration. Size on basis of straight air volume proportioning.
 - .4 Fabricate single blade dampers for duct sizes to a maximum of 300mm (12") tall and a maximum of 1200mm (48") wide.
 - .5 Fabricate multi-blade dampers of opposed blade pattern with maximum blade sizes 300mm (12") to 1.8m (6'). Assemble centre and edge crimped blades in prime coated or galvanized channel frame with approved type hardware.
 - .6 Include for the supply and installation of twelve (12) extra balance dampers in installed ductwork pending balance results and comments.
- 2.4 Turning Vanes
 - .1 Factory or shop fabricated double thickness to SMACNA standards.

.2 Acceptable Manufacturers:

- .1 Duro Dyne
- .2 Ductmate

2.5 Automatic Dampers

- .1 Damper frames and blades shall not be less than 12 gauge, 0.081" (2.1mm) extruded aluminium. Channel frame to be 4" (101.6mm) deep.
- .2 Blades to be single unit, internally reinforced and connected to frame with a 7/16" hexagon rod. Internal hollows to be insulated with 7/8" thick polyurethane foam with T factor of 5.0 per inch. Blades shall be thermally broken. All fresh air intake dampers to be complete with insulated frame and blade.
- .3 Blade and frame seals to be extruded synthetic rubber secured in an integral slot within the blade extrusion.
- .4 Frame shall be insulated with polystyrene, R factor of 5.0 per inch.
- .5 Bearings to be comprised of Celcon inner bearing fixed onto a hexagon rod rotating within a Polycarbonate outer bearing inserted into frame, resulting in no metal to metal contact.
- .6 Linkage hardware to be out of air stream and constructed of aluminium and corrosion resistant zinc plated steel, equipped with cup-point trunnion screw for slip-proof grip.
- .7 Dampers shall be suitable for operating in temperatures ranging between -40°F (-40°C) and 165°F (731°C).
- .8 Leakage shall not exceed 0.6% of the rated air flow at 10" WG differential static pressure across the damper.
- .9 This Contractor shall provide all 120-24V transformers as required.
- .10 Acceptable Manufacturers:
 - .1 Tamco 9000
 - .2 Ruskin
 - .3 Nailor

2.6 Damper Actuators

- .1 Damper actuators shall be supplied with the unit by the unit manufacturer or by Controls Contractor under Section 15900 as indicated in the equipment schedules, equipment specifications and controls details.

2.7 Duct Access Doors

- .1 Provide access doors in ductwork of adequate size in the following locations:
 - .1 at each fire damper
 - .2 before and after each reheat coil
 - .3 bottom of all duct risers part of or next to outside air intakes and outlets
 - .4 in plenum and equipment casings to facilitate maintenance and cleaning of all components.
- .2 Construct access doors from double thickness 22 gauge galvanized steel sheets or aluminium in equal strength where required, 25mm apart, with necessary reinforcing inside for rigidity. Fill the 25mm space with glass fibre insulation.
- .3 Access doors to be ultra-low leakage with positive seal polyethylene gasket.
- .4 Access doors shall be square, rectangular or flat oval. Square and rectangular access doors shall be equal to Nailor 085CL. Flat oval access doors shall be equal to Nailor 0800.
- .5 Access Doors shall have minimum two plated steel camlock fasteners for sizes up to 350mm (14"), and four camlock compression latches for sizes over 350mm (14").
- .6 Sizes
 - .1 Fire dampers and reheat coils
 - .1 Square/rectangle: minimum 16x16" or 2" less duct size
 - .2 Flat Oval: minimum 18x10" or 2" less duct size
 - .2 Duct Risers
 - .1 Square/rectangle: minimum 24x24" or 2" less duct size
- .7 Acceptable Manufacturers
 - .1 Nailor
 - .2 Price
 - .3 Ruskin

2.8 Flexible Connections

- .1 Flexible Connections shall be Duro Dyne heavy glass, ULC listed, non-combustible, waterproof fabric, double coated with neoprene and shall be 150 mm minimum width, 0.81mm thick, density of 1.3 kg/m². Temperature rating shall be -40C (-40F) to +90C (+194F).
- .2 Flexible connectors shall be attached to 24 gauge metal strips minimum 75mm

(3") wide.

.3 Acceptable Manufacturers:

- .1 Duro Dyne
- .2 Mercer Rubber Co.

2.9 Test Ports

.1 Test ports shall be equal to Duro Dyne TH-1, IP-2, IP-4 to suit application complete with screw in cap, neoprene gasket, insulating plug, and extensions for insulated ductwork.

.2 Acceptable Manufacturers:

- .1 Duro Dyne
- .2 Ductmate

PART 3 - EXECUTION

3.1 Installation

.1 Provide access doors of adequate size to service, maintain, or inspect within duct stream where required. Locations include but are not limited to automatic dampers, fire dampers, and filters. Coordinate installation with General Contractor.

.2 Install flexible connections where rigid duct connects to equipment that is susceptible to vibration and as indicated on drawings.

.3 Install instrument test ports to allow Pitot tube insertion with cam-action handle.

3.2 Fire Dampers

.1 Confirm rating of devices with ratings of surfaces or separations.

.2 Provide fire dampers at locations shown, where ducts and outlets pass through fire rated components, and where required by authorities having jurisdiction.

.3 Fire dampers shall be complete with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.

.4 Where access door is located below horizontal fire damper, damper shall be equipped with pull tab release.

.5 Provide duct access doors to service fire dampers for those air transfer openings mounted with ducts.

- .6 Provide fire stop flaps on air outlets penetrating fire rated membranes or surfaces.

3.3 Combination Fire Smoke Dampers

- .1 Inspect areas to receive dampers. Notify the Engineer of conditions that would adversely affect the installation or subsequent utilization of the dampers. Do not proceed with installation until unsatisfactory conditions are corrected.
- .2 Install dampers at locations indicated on the drawings and in accordance with manufacturer's ULC approved installation instructions.
- .3 Install dampers square and free from racking with blades running horizontally.
- .4 Do not compress or stretch damper frame into duct or opening.
- .5 Handle damper using sleeve or frame. Do not lift damper using blades, actuator, or jackshaft.
- .6 Install bracing for multiple section assemblies to support assembly weight and to hold against system pressure. Install bracing as needed.

3.4 Balancing Dampers

- .1 Provide balancing dampers, whether shown or required, at points on supply, return and exhaust systems, where branches are taken from larger ducts, for proper air balancing.
- .2 Review balance damper locations with the Balancing Contractor prior to installation. Additional costs to add balance dampers for proper balancing after installation will not be accepted.
- .3 Include for the supply and installation of twelve (12) extra balance dampers in the already installed ductwork pending balance results and comments.

3.4 Turning Vanes

- .1 Install in conformance with SMACNA standards.
- .2 Install in all square elbows and short radius elbows for supply and return air ductwork.

3.5 Automatic Dampers

- .1 Install opposed blade automatic control dampers as indicated on drawings.
- .2 Opposed Blade Dampers: Use for shut off service, modulating service without companion dampers, throttling services.

- .3 Parallel Blade Dampers: Use for mixing or relief service, variable position service with companion dampers.
- .4 Coordinate installation of operator and controls with Controls Contractor where applicable.
- .5 Damper actuators shall be supplied by Controls Contractor under Section 15900 as indicated in the equipment schedules, equipment specifications and controls details.

3.6 Access Doors

- .1 Provide access doors in ductwork of adequate size in the following locations:
 - .1 at each fire damper
 - .2 before and after each reheat coil
 - .3 bottom of all duct risers – part of, or next to, outside air intakes and outlets
 - .4 in plenum and equipment casings to facilitate maintenance and cleaning of all components.
- .2 Sizes
 - .1 Fire dampers and reheat coils
 - .1 Square/rectangle: minimum 16x16” or 2” less duct size
 - .2 Flat Oval: minimum 18x10” or 2” less duct size
 - .2 Duct Risers
 - .1 Square/rectangle: minimum 24x24” or 2” less duct size

3.7 Flexible Connections

- .1 Provide flexible connections on inlet and outlet duct connections of air handling units or other equipment likely to be affected by, or to cause vibration or noise to be transmitted through ductwork.
- .2 Install in accordance with SMACNA.

END OF SECTION

PART 1 - GENERAL

1.1 Requirements

- .1 Air outlets shall meet the following standards and requirements:
 - .1 ASHRAE
 - .2 AMCA
 - .3 Local Codes and Requirements
- .2 Air flow tests and sound levels shall be made in accordance with ASHRAE standards.
- .3 Manufacturers shall certify performance and application.

1.2 Submittals

- .1 Shop Drawings:
 - .1 Submit shop drawings to the Consultant for review prior to ordering or installation.
 - .2 Shop drawings shall include manufacturer, model numbers, performance data, and indicate conformance to above reference standards. Louver shop drawings shall include free area, pressure drop and water carry over data.
 - .3 One copy of all stamped reviewed shop drawings shall be included in maintenance manual.
- .2 Operation and Maintenance Data:
 - .1 Provide operation and maintenance literature for all equipment indicating manufacturer and model of equipment, instructions for operation and maintenance of same, and parts list.
 - .2 Operation and maintenance data shall be included in the maintenance manual.

PART 2 – PRODUCTS

2.1 General

- .1 Air flow tests and sound levels shall be made in accordance with ASHRAE standards.
- .2 Manufacturers shall certify performance and application.
- .3 All supply grilles shall be adjustable with double deflection.

2.2 Grilles and Diffusers

- .1 Provide grilles, registers and diffusers of the types as shown on the drawings.
- .2 Provide vertical throw type as noted based on ceiling heights.
- .3 Construction shall be heavy duty, with 14 gauge steel blades and heavy duty steel support bars and frame unless otherwise noted.
- .4 Grilles shall be complete with steel volume damper of the opposed blade type for balancing purposes as noted.
- .5 Supply diffusers mounted in t-bar shall not contain integral balance dampers. Balance dampers must be installed in branch duct runs to diffusers.
- .6 Acceptable Manufacturers:
 - .1 Price
 - .2 Nailor
 - .3 Titus
 - .4 Metal Aire
 - .5 Kreuger

PART 3 - EXECUTION

3.1 Grilles and Diffusers

- .1 Confirm location, type of mounting and size of all outlets with site conditions prior to ordering and installing.
- .2 Provide flanged connection off ductwork for mounting of grilles.
- .3 **Paint inside of ductwork flat black behind supply and return wall grilles.**
- .4 Position vertical throw diffusers and deflection of grilles to achieve best air flow in area. Adjust to suit Balancing Contractor and Engineer's requirements.
- .5 Provide birdscreen on all open-ended return air ducts unless otherwise noted.

END OF SECTION

PART 1 – GENERAL

1.1 Scope

.1 New BAS Controls

.1 Installation and wiring of all low voltage electronic/BAS controls for both demolition and new scope of work shall be performed by the installing Controls Contractor under a cash allowance. DDSB will select a pre-qualified installing controls contractor based on the scope of work outlined on the drawings. The Mechanical (Prime) Contractor shall carry the successful installing control contractor as a sub-trade under the allotted cash allowance. Refer to “Cash Allowances” Section.

.2 All parts will be supplied by DDSB. DDSB supplied parts shall not be included in the tender price. The Mechanical Contractor and installing Controls Contractor shall arrange for pick-up of control valves, sensor wells and all other controls devices at the DDSB Maintenance shop on Bayly Street in Ajax.

.2 Division 16 shall remove all existing line voltage electric controls and components from site.

.3 The Mechanical Contractor shall install the following products supplied by DDSB as specified in this Section and as indicated on the Drawings which shall include, but not be limited to:

.1 Installation of control valves

.2 Installation of pipe wells for temperature sensors

.4 The Mechanical Contractor shall provide full coordination of all services and provide all patching, repairs, sealing and other services as required based on demolition and new controls work.

.5 The installing Controls Contractor shall install products supplied by DDSB as specified in this Section and as indicated on the Drawings which shall include, but not be limited to:

.1 Decommissioning and removal of all redundant electronic/BAS controls along with removal of all redundant wiring. Devices shall be turned over to the Board as confirmed

.2 Installation of an electronic building automation system as outlined in the specifications, and drawings and as required to execute the sequence of operations.

.3 Integration to new and existing equipment.

1.2 Related Sections

- .1 The General Conditions of the Contract, Supplementary Conditions, and General Requirements are part of this specification and shall be used in conjunction with this section as part of the contract documents.
- .2 The following sections constitute related work:
 - .1 Section 15010 – General Mechanical Requirements
 - .2 Section 15100 – Valves
 - .3 Section 15122 – Gauges, Thermometers & Wells

1.3 Description

- .1 The new BAS system will be Siemens as an extension of the existing BAS system elsewhere in the school.

1.4 Codes and Standards

- .1 Comply with rules and regulations of codes and ordinances of local, provincial, and federal authorities; such codes and ordinances, when more restrictive, take precedence over the Contract Documents.
- .2 Provide products listed and classified by the testing firm acceptable to the authority having jurisdiction as suitable for the purpose indicated and specified.

1.5 Warranty

- .1 Warrant the installation work in accordance with the General Conditions and as amended below. Failure of parts will not fall under the Contractors warranty. Workmanship and failure of wiring and communication will fall under the Contractors warranty.
- .2 Warranty start date will be the date the Work is accepted and confirmed operational by DDSB.
- .3 Provide a single warranty start date even when the Owner has received beneficial use prior to acceptance of the Work. For Work split into multiple contracts or for a multi-phase contract, provide a separate warranty start date and period for each contract or phase.
- .4 Adjust, repair or replace defects and failures in the Work at no additional cost during the warranty period and without reduction in service to the Owner. Provide warranty service during normal business hours and within 24 hours of the Owner's request for service.

PART 2 – GENERAL

2.1 Field Devices

.1 Control Valves

- .1 All control valves shall be supplied by the DDSB and turned over to the Mechanical Contractor for installation. The Mechanical Contractor shall be responsible for picking up valves from DDSB Office and transporting valves to Site. Coordinate with DDSB.
- .2 A control valve schedule has been included in the Contract Drawings for reference and use by the Mechanical Contractor.
- .3 All control valves shall be 2-way or 3-way Globe Valves as manufactured by Siemens.

.2 Pipe Temperature Sensor

- .1 Temperature sensor wells shall be supplied by the DDSB and turned over to the Mechanical Contractor for installation. The Mechanical Contractor shall be responsible for picking up wells from DDSB Office and transporting wells to Site. Coordinate with DDSB.
- .2 Locations for new temperature sensor wells are indicated on the Contract Drawings. Coordinate with DDSB.

.3 Control Dampers

- .1 Control Dampers shall be supplied and installed by the Sheet Metal Contractor except where supplied integral to equipment such as air handling units and unit ventilators.

.4 Control Damper Actuators

- .1 Control Damper Actuators shall be supplied by DDSB and turned over to the installing Controls Contractor for installation.
- .2 Any mounting accessories or rework required to mount new damper actuators to existing control dampers shall be provided by the installing Controls Contractor.

.5 Control Devices

- .1 All other control devices shall be supplied by DDSB and turned over to the installing Controls Contractor for installation. Mechanical Contractor shall coordinate with DDSB and allow adequate installation and service clearances for all control devices.

2.2 Communication

- .1 Mechanical contractor shall take precautions during demolition and new work to ensure BAS communications wiring remains fully functional and operational

during the renovation. Contractor shall notify DDSB of any temporary wiring required to maintain system uptime and integrity.

2.3 Controllers

- .1 All new controllers, control panels, power supplies, and related accessories shall be supplied DDSB and turned over to the installing Controls Contractor for installation.

PART 3 – EXECUTION

3.1 Examination

- .1 Thoroughly examine project plans for control device and equipment locations prior to construction. Report discrepancies, conflicts, or omissions to Engineer for resolution before starting work.
- .2 Inspect site to verify that equipment can be installed as shown. Report discrepancies, conflicts, or omissions to Engineer for resolution before starting rough-in work.
- .3 Examine drawings and specifications for work of others. Report inadequate headroom or space conditions or other discrepancies to Engineer and obtain written instructions for changes necessary to accommodate Section 15900 work with work of others.

3.2 General Workmanship

- .1 Install in readily accessible locations to the Canadian Electrical Code.
- .2 Install products to manufacturer's installation instructions.
- .3 Install parallel to building walls and floors unless indicated or specified or required by manufacturer's installation instructions.

3.3 Scope of Work

- .1 Division 16 shall remove all existing line voltage electric controls and components from site.
- .2 All pneumatics controls demolition and new scope of work shall be performed by the pneumatics Controls Contractor. Division 15 shall retain and carry the services of the pneumatics Controls Contractor under their contract
- .3 All low voltage electronic/BAS controls demolition and new scope of work shall be performed by the installing Controls Contractor. Division 15 shall retain and carry the services of the installing Controls Contractor under their contract.

- .4 The Mechanical Contractor shall install products supplied by DDSB as specified in this Section and as indicated on the Drawings which shall include, but not be limited to, the following work:
 1. Installation of Control Valves.
 2. Installation of pipe wells for temperature sensors.
- .5 The installing Controls Contractor shall install products supplied by DDSB as specified in this Section and as indicated on the Drawings which shall include, but not be limited to, the following work:
 1. Decommissioning and removal of all redundant controls along with removal of all redundant tubing and wiring. Devices shall be turned over to the Board as confirmed
 2. Installation of an electronic building automation system as outlined in the specifications, and drawings and as required to execute the sequence of operations.
 3. Integration to new and existing equipment.
- .6 The Mechanical Contractor and installing Controls Contractor shall arrange for pick-up of control valves, sensor wells and all other controls devices at the DDSB Maintenance shop on Bayly Street in Ajax.
- .7 Existing Equipment
 1. The Contractor is not responsible for repair or replacement of existing equipment and systems, valves, dampers, or actuators. Notify Engineer in writing immediately of existing equipment that requires maintenance.
 2. The Mechanical Contractor shall patch holes and finish to match existing walls. Stainless steel coverplates are acceptable where pre-approved by the Engineer and DDSB.
 3. Dispose of all removed controls.

3.4 Coordination

- .1 Variable Speed Drives:
 - .1 Provide remote interface using one of the specified communication protocols to drives under Section 15723 Variable Speed Drives to the requirements of this Section.
 - .2 Coordinate with manufacturer's representative under 15723 Variable Speed Drives for testing and commissioning of remote functions to drives.
- .2 Testing and Balancing Piping Systems:
 - .1 Command control valves as instructed under 15043 Balancing.
- .3 Testing and Balancing Air Systems:

- .1 Furnish one set of tools for testing and balancing air systems and for use under Section 15043 Balancing. Provide three hours of training in use of tools furnished. At the end of testing and balancing receive the tools furnished.
- .2 Assist with the Work of Section 15043 Balancing for: two controllers for each type of variable air volume application; and for one primary air system.
- .3 Set up an operator with view access to all objects and command access to testing and balancing objects for use under Section 15043 Balancing.

3.5 Protection

- .1 The Contractor shall protect against and be liable for damage to work and to material caused by Contractor's work or employees.

3.6 Controllers

- .1 Install controllers in cabinets.
- .2 Under power failure, control device fails to normal position. Under return from power failure, programs start after time delay. Provide time delays to stage equipment starts and to minimize electrical demand.

3.7 Cabinets

- .1 Install rigidly to wall or to an independent frame installed to the floor slab. Installation to duct, equipment and locations subject to vibration is not accepted.
- .2 Cabinets for ASC controllers: Install to terminal equipment. Installation to duct, equipment and locations subject to vibration that could affect controller operation or calibration of control device is not accepted.

3.8 Control Devices

- .1 Install control devices as indicated on the drawings and to the requirements of this Section and to execute sequence of operation.
- .2 Motor Operated Dampers:
 - .1 Motor operated dampers shall be installed under Section 15820 Duct Accessories or be supplied with equipment.
- .3 Actuators for Dampers, Electronic:
 - .1 Installing Controls Contractor to install actuator to damper and provide all required linkages and hardware to mount and actuator dampers.

- .4 Control Valves:
 - .1 Mechanical Contractor to install control valves as supplied by DDSB.
- .5 Actuators for Control Valves, Electronic:
 - .1 Installing Controls Contractor to install actuators to valve body.
- .6 Low Limit Electromechanical Thermostat:
 - .1 Installing Controls Contractor to install hardwire interlocked to supply fan starter for respective system.
 - .2 Provide to Part 4 – Sequence of Operation.
 - .3 Shut down the supply fan and return fan when duct temperature is equal to or less than 1.67 deg. C (35 deg. F).
 - .4 Provide to adequately cover potential areas of low level stratification. Provide one low-limit thermostat for each 2.8 sq M (20 sq ft) of duct cross section. Mount sensing element on plastic clips.
 - .5 Ensure outside air and exhaust air dampers close upon low-limit trip.
- .7 High Limit Electromechanical Thermostat:
 - .1 Installing Controls Contractor to install hardwire interlocked to fan starters for respective system.
 - .2 Provide at the following locations:
 - .1 Discharge of return air fans.
 - .2 Discharge of exhaust air fans.
 - .3 Shut down the fans when duct temperature is equal to or greater than 51.7 deg. C (125 deg. F).
 - .4 Provide one high-limit thermostat for each 3.7 sq M (40 sq ft) of duct cross section.
- .8 Electromechanical Thermostats and Temperature Sensors:
 - .1 Mechanical Contractor to install wells.
 - .2 Installing Controls Contractor to install thermostats and sensors.
 - .3 Wall Mount Type:
 - .1 Install to furred-in columns and permanent walls. Installation to mobile and temporary partitions is not accepted.
 - .2 Installation to exposed architectural concrete columns and walls is not accepted, unless otherwise indicated or specified. For installation to concrete, set conduit in place before pouring of concrete.
 - .4 Single Point Type, Duct:
 - .1 Provide sufficient contact with process fluid to measure average

- conditions.
- .2 Install Duro Dyne Instrument Test Port Model IP-4, or equivalent, to duct adjacent to control device; apply pipe sealing compound to plug thread.
- .5 Single Point Type, Pipe: Provide sufficient contact with process fluid to measure average conditions.
- .6 Outdoor Type:
 - .1 Install to north side of building away from sources of heat such as lamps and exhaust vents; to greater than 1500 mm (5 ft) above horizontal surfaces.
 - .2 Where indicated or specified for installation in outside air intake, locate so as not to be affected by exhaust air flow or reverse flow.
 - .3 Provide solar shield. Install shield to open downward.
 - .4 Seal interior of conduit at penetration through exterior wall.
- .9 Guards for Thermostats and Temperature Sensors:
 - .1 Install on wall mount sensors and thermostats where indicated on the drawings.
- .10 Air Static Pressure Sensors:
 - .1 Install where indicated on the drawings and as specified under Part 4 – Sequence of Operation.
- .11 Relative Humidity Sensors:
 - .1 Install to requirements for Electric Thermostats and Temperature Sensors.
- .12 AC Current Sensors and Transducers:
 - .1 Install in motor starter cabinet.
- .13 Air Flow Sensors, Duct Mount:
 - .1 Install where indicated on the drawings and as specified under Part 4 – Sequence of Operation.
- 3.9 Wire and Conduit
 - .1 Controls shall be fed through base of roof mounted equipment wherever possible. Where not possible supply 90 degree pitch pocket and coordinate roofing with General Contractor. Seal end of pitch pocket after feeder is installed.
 - .2 Wire shall be neatly tie wrapped to conduit mounted to the building structure

but must be installed at right angles or parallel to the building. Loose wiring shall only be allowed over a distance of 1500 mm (5 ft.) but must not pass over lighting fixtures.

- .3 Wiring in Equipment Room, between floors, or between concrete walls shall be installed in conduit. Exposed wiring will not be accepted. Conduit shall be installed at right angles or parallel to the building walls.
- .4 Where the wire terminates at a screw connection, provide a crimp spade connector.
- .5 Should it become necessary to splice field wiring it shall be soldered. If soldering is not possible, approved B type crimp connectors are an acceptable alternative. Wire nuts and Marr connections are not acceptable. Provide a 500 mm (20 in.) loop length at all splices.
- .6 Conceal conduit within finished shafts, ceilings, and walls as required. Install exposed conduit parallel with or at right angles to the building walls.
- .7 Plug or cap unused conduit openings and stubs with compatible fittings.
- .8 Route all conduit to clear beams, plates, footings and structural members except through column footings and grade beams.
- .9 Provide watertight seals at penetrations through outside foundation walls.
- .10 Support conduit 25 mm (1 in.) and smaller to the building with one-hole non-perforated malleable iron or steel pipe straps. Suspend conduits larger than 1 in. on pipe racks with split-ring hangers and rods.
- .11 Maintain caps on conduit openings throughout construction.
- .12 Where conduit is attached to vibrating or rotating equipment, install and anchor flexible metal conduit with a minimum length of 450 mm (18 in.) and a maximum length of 900 mm (36 in.) in such a manner that vibration and equipment noise will not be transmitted to the rigid conduit.
- .13 Where exposed to weather or in damp or wet locations, provide waterproof flexible conduit.
- .14 Fill conduit to maximum of 40% of its capacity. Provide a pull rope within the conduit when the installation is complete. Bend conduit to a radius of greater than 3 times the conduit diameter to a maximum of three 1/4 bends permitted between pull boxes.
- .15 Wire within cabinets shall be installed in a plastic tray with a cover. Terminate wires to field-removable, modular terminal strips.
- .16 All field sensors shall be provided with a flexible conduit connection minimum length of 450mm (18 in.) and an enclosure for the electrical connections.

3.10 Identification

- .1 All wires shall be tagged at both ends. The tagging shall identify the device it is connected to. Use of the point object name is acceptable.
- .2 All wires passing through a junction box shall be tagged with the device identity or its termination point.
- .3 The junction boxes shall be tagged "BAS" with a sequential number suffix.
- .4 Label wires, control devices, controllers.

3.11 Testing and Commissioning

- .1 Participate and assist DDSB with testing and commissioning of the BAS system.
- .2 Final acceptance will not be considered until DDSB has completed all testing and commissioning to confirm no system installation issues.

PART 4 – SEQUENCE OF OPERATION

4.1 General

- .1 Refer to this Section and to the Drawings for control points included in the Work.
- .2 Confirm setpoints with Owner's representative.
- .3 Coordinate alarm requirements with Owner's representative.

4.2 Heating Water Plant:

- .1 Existing Heating Water System consists of existing boilers and pumps.
- .2 Existing controls sequence to remain.

4.4 Rooftop Units (RTU-1, RTU-3 & RTU-4)

- .1 System Description
 - .1 System consists of a variable volume rooftop unit with modulating gas fired heating, economizer and powered exhaust providing conditioned air to the zones.
- .2 Scheduling

- .1 The occupied period shall be initially set to 8:00am to 6:00pm, Monday to Friday. The occupancy schedule shall be adjustable by the owner at the front end.
- .3 Fan Control
 - .1 The fan shall be enabled and run continuously during the occupied period unless shutdown on safeties.
 - .2 The fan shall be disabled during the unoccupied period unless required for heating or cooling are not able to satisfy the call. If there is a call for heating or cooling, the fan shall be enabled for the duration of the call.
 - .3 The unit shall be configured as a constant volume unit. A high and low speed shall be established for "cooling" and heating modes respectively. Low speed for heating shall be available as an option in the future when air changes in each room are not as critical.
 - .4 The supply fan speeds shall be determined during balancing so that unit provides the scheduled airflow capacity. Coordinate work with balancing contractor. Fan speed shall be adjustable through the BAS.
 - .5 The exhaust fan speed shall be determined during balancing. Coordinate work with balancing contractor. The following conditions shall be tested, and corresponding speed values programmed into the BAS for operation points:
 - .1 Condition 1 (minimum position):
 - .1 Exhaust Air Flow at MIN. O/A CFM
 - .2 Economizer Dampers set for MIN. O/A CFM
 - .2 Condition 2 (full economizer):
 - .1 Exhaust Air Flow at TOTAL S/A CFM
 - .2 Economizer Dampers set for TOTAL S/A CFM (full economizer)
 - .3 Exhaust fan speed shall be set by the BAS based on the operation conditions.
 - .4 Standard occupied mode shall use the speed determined at Condition 1.
 - .5 In Economizer mode, the BAS shall ramp the exhaust fan speed to Condition 2 based on cooling demand. The Economizer damper shall be ramped in unison with the fan.
- .4 Temperature Setpoints
 - .1 The occupied heating and cooling setpoints shall initially be set to 22°C (adj.) and 24°C (adj.), respectively.
 - .2 The unoccupied heating and cooling setpoints shall initially be set to 16°C (adj.) and 29°C (adj.), respectively.

- .5 Temperature Control – Occupied Period
 - .1 On a call for heating, and the fan is ON, the gas heating shall be enabled. Refer to Heating Control section.
 - .2 The economizer shall be enabled for cooling when the outside air temperature is less than 22°C (adj.).
 - .3 On a call for cooling when the economizer is enabled, the economizer damper signal shall be modulated for free cooling.

- .6 Temperature Control – Unoccupied Period
 - .1 On a call for heating, the unit shall be enabled with the dampers closed to the outdoor air. The supply fan speed shall be set to maximum. The gas heating shall be enabled and reset, if required, for a discharge temperature of 32°C (adj.) for the duration of the call.
 - .2 On a call for cooling, if the outside air temperature is at least 5°C (adj.) less than the space temperature, the unit will be enabled for night purge. The dampers shall be configured for 100% outside air (adj.) and the unit shall provide free cooling to the space.

- .7 Heating Control
 - .1 The gas heating shall be enabled for control when the supply fan status is on and the Outside Air temperature is lower than 12 deg. C (adjustable).
 - .2 Following an initial heat exchanger warmup cycle, the gas heating shall fire at low fire.
 - .3 The unit's integral discharge air temperature controller shall increase the firing rate of the gas heating based on the reset signal from the BAS. The BAS shall provide a reset signal that shall maintain the discharge air temperature at 23°C using a 0-10VDC signal. The BAS shall not directly control the gas valve.
 - .4 The unit's integral discharge air temperature controller is not capable of reducing the firing rate below low fire. The unit's integral controller shall increase the firing rate of the gas heating to reach the requested discharge air temperature setpoint. At moderate ambient conditions, the discharge air temperature at low fire may exceed the requested discharge air temperature setpoint via the reset signal.
 - .5 The BAS shall reset the requested discharge air temperature reset signal and/or cycle the gas heating enable contact as required to maintain space temperature setpoint.
 - .6 If the Outside Air temperature is above 12 deg. C (adjustable) and the boilers are disabled for use, the gas heating shall be enabled. When there is a call for heating, the gas heating shall be modulated to maintain space temperatures.

- .8 Ventilation Control
 - .1 Ventilation shall be enabled when the system is running during the occupied period or for night purge mode.

- .2 When the ventilation is enabled, the economizer dampers shall be modulated as required for economizer, or night purge mode.
 - .3 Ventilation shall be disabled at all times during the scheduled unoccupied period unless required for night purge mode and during morning start-up mode.
- .9 Economizer / Mixed Air Damper Control
- .1 The mixed air dampers shall be set to minimum position during the occupied period when the economizer is not enabled. The minimum position shall be initially set to 20% (adj.). Coordinate minimum position with balancing contractor to ensure fresh air requirements are met.
 - .2 The economizer shall be enabled when cooling is required, the outside air temperature is less than 22°C (adj.), the return air temperature is greater than the outside air temperature, and the supply fan is on. The mixed air dampers shall be modulated to maintain the mixed air temperature 2°C (adj.) less than the supply air temperature setpoint. Mixed air damper position shall be reset towards closed if the mixed air temperature drops below 7°C (adj.). Power exhaust shall be internally controlled by the unit (where option is specified).
 - .3 When the economizer mode is enabled, the Exhaust Fan speed and economizer dampers shall be modulated for economizer temperature control.
 - .4 The mixed air dampers shall be set to full recirculation during the unoccupied period unless required for cooling demands and economizer is available.
- .10 Morning Start-up Mode
- .1 The unit shall use an optimal start algorithm for morning start-up. This algorithm shall minimize the unoccupied warm-up and cool-down period while still achieving comfort conditions by the start of scheduled occupied period.
 - .2 The unit shall be set to full recirculation during morning start-up.
- .11 Monitoring
- .1 The following data points shall be monitored:
 - .1 Supply air temperature
 - .2 Mixed air temperature
 - .3 Return air temperature
- .12 Alarms
- .1 Alarms shall be provided as follows:
 - .1 Fan Alarm

- .1 If the fan has Failed-to-Command after 5 minutes (adj.)
 - .2 Low Space Temperature Alarm
 - .1 If the space temperature is more than 5°C (adj.) below setpoint for 15 minutes (adj.)
 - .3 High Space Temperature Alarm
 - .1 If the space temperature is more than 5°C (adj.) above setpoint for 15 minutes (adj.)
 - .4 High Supply Air Temperature Alarm
 - .1 If the supply air temperature is more than 5°C (adj.) above setpoint for 15 minutes (adj.)
 - .5 Filter Alarm
 - .1 If the filter alarm contact is closed indicating filters are loaded and require replacing. Coordinate device trip setting with balancer.
 - .2 Coordinate additional alarm requirements with Owner.
- 4.5 Rooftop Units (RTU-2)
- .1 System Description
 - .1 System consists of a variable volume rooftop unit with DX cooling, modulating gas fired heating, economizer and powered exhaust providing conditioned air to the zones.
 - .2 Scheduling
 - .1 The occupied period shall be initially set to 8:00am to 6:00pm, Monday to Friday. The occupancy schedule shall be adjustable by the owner at the front end.
 - .3 Fan Control
 - .1 The fan shall be enabled and run continuously during the occupied period unless shutdown on safeties.
 - .2 The fan shall be disabled during the unoccupied period unless required for heating or cooling are not able to satisfy the call. If there is a call for heating or cooling, the fan shall be enabled for the duration of the call.
 - .3 The unit shall be configured as a constant volume unit. A high and low speed shall be established for “cooling” and heating modes

- respectively. Low speed for heating shall be available as an option in the future when air changes in each room are not as critical.
- .4 The supply fan speeds shall be determined during balancing so that unit provides the scheduled airflow capacity. Coordinate work with balancing contractor. Fan speed shall be adjustable through the BAS.
 - .5 The exhaust fan speed shall be determined during balancing. Coordinate work with balancing contractor. The following conditions shall be tested, and corresponding speed values programmed into the BAS for operation points:
 - .6 Condition 1 (minimum position):
 - .1 Exhaust Air Flow at MIN. O/A CFM
 - .2 Economizer Dampers set for MIN. O/A CFM
 - .7 Condition 2 (full economizer):
 - .1 Exhaust Air Flow at TOTAL S/A CFM
 - .2 Economizer Dampers set for TOTAL S/A CFM (full economizer)
 - .8 Exhaust fan speed shall be set by the BAS based on the operation conditions.
 - .9 Standard occupied mode shall use the speed determined at Condition 1.
 - .10 In Economizer mode, the BAS shall ramp the exhaust fan speed to Condition 2 based on cooling demand. The Economizer damper shall be ramped in unison with the fan.
 - .4 Temperature Setpoints
 - .1 The occupied heating and cooling setpoints shall initially be set to 22°C (adj.) and 24°C (adj.), respectively.
 - .2 The unoccupied heating and cooling setpoints shall initially be set to 16°C (adj.) and 29°C (adj.), respectively.
 - .5 Temperature Control – Occupied Period
 - .1 On a call for heating, and the fan is ON, the gas heating shall be enabled. Refer to Heating Control section.
 - .2 The economizer shall be enabled for cooling when the outside air temperature is less than 22°C (adj.).
 - .3 On a call for cooling when the economizer is enabled, the economizer damper signal shall be modulated for free cooling. Mechanical cooling shall be available to supplement economizer cooling if enabled based on outside air temperature.
 - .3 On a call for cooling when the economizer is disabled, the mechanical cooling shall be enabled. The mechanical cooling capacity shall be modulated to maintain space temperature setpoint. Refer to Direct Expansion Cooling Control section.

.6 Temperature Control – Unoccupied Period

- .1 On a call for heating, the unit shall be enabled with the dampers closed to the outdoor air. The supply fan speed shall be set to maximum. The gas heating shall be enabled and reset, if required, for a discharge temperature of 32°C (adj.) for the duration of the call.
- .2 On a call for cooling, if the outside air temperature is at least 5°C (adj.) less than the space temperature, the unit will be enabled for night purge. The dampers shall be configured for 100% outside air (adj.) and the unit shall provide free cooling to the space. Mechanical cooling shall be disabled during night purge.

.7 Heating Control

- .1 The gas heating shall be enabled for control when the supply fan status is on and the Outside Air temperature is lower than 12 deg. C (adjustable).
- .2 Following an initial heat exchanger warmup cycle, the gas heating shall fire at low fire.
- .3 The unit's integral discharge air temperature controller shall increase the firing rate of the gas heating based on the reset signal from the BAS. The BAS shall provide a reset signal that shall maintain the discharge air temperature at 23°C using a 0-10VDC signal. The BAS shall not directly control the gas valve.
- .4 The unit's integral discharge air temperature controller is not capable of reducing the firing rate below low fire. The unit's integral controller shall increase the firing rate of the gas heating to reach the requested discharge air temperature setpoint. At moderate ambient conditions, the discharge air temperature at low fire may exceed the requested discharge air temperature setpoint via the reset signal.
- .5 The BAS shall reset the requested discharge air temperature reset signal and/or cycle the gas heating enable contact as required to maintain space temperature setpoint.
- .6 If the Outside Air temperature is above 12 deg. C (adjustable) and the boilers are disabled for use, the gas heating shall be enabled. When there is a call for heating, the gas heating shall be modulated to maintain space temperatures.

.8 Direct Expansion Cooling Control

- .1 The economizer shall be enabled for cooling when the outside air temperature is less than 15°C (59°F) (adj.).
- .2 The cooling system has two compressor circuits; the first circuit is modulating (10%-100%) and the second is on-off control.
- .3 The cooling shall be enabled for control when the supply fan status is on, the outside air temperature is greater than 16°C (adj.), and the unit is in the occupied mode.
- .4 On a call for cooling, the first compressor circuit shall be enabled. The first compressor circuit shall be modulated to maintain the supply air temperature setpoint.

- .5 On a further call for cooling, the second compressor circuit shall be enabled, and the first compressor circuit shall be ramped to minimum position. Upon reaching minimum position, the first compressor circuit shall be modulated to maintain the supply air temperature setpoint.
 - .6 A minimum 5 minute (adj.) delay between first and second compressor circuit stages shall be implemented to prevent short cycling.
 - .7 The cooling shall be disabled during the unoccupied period.
- .9 Ventilation Control
- .1 Ventilation shall be enabled when the system is running during the occupied period or for night purge mode.
 - .2 When the ventilation is enabled, the economizer dampers shall be modulated as required for economizer, or night purge mode.
 - .3 Ventilation shall be disabled at all times during the scheduled unoccupied period unless required for night purge mode and during morning start-up mode.
- .10 Economizer / Mixed Air Damper Control
- .1 The mixed air dampers shall be set to minimum position during the occupied period when the economizer is not enabled. The minimum position shall be initially set to 20% (adj.). Coordinate minimum position with balancing contractor to ensure fresh air requirements are met.
 - .2 The economizer shall be enabled when cooling is required, the outside air temperature is less than 22°C (adj.), the return air temperature is greater than the outside air temperature, and the supply fan is on. The mixed air dampers shall be modulated to maintain the mixed air temperature 2°C (adj.) less than the supply air temperature setpoint. Mixed air damper position shall be reset towards closed if the mixed air temperature drops below 7°C (adj.). Power exhaust shall be internally controlled by the unit (where option is specified).
 - .3 When the economizer mode is enabled, the Exhaust Fan speed and economizer dampers shall be modulated for economizer temperature control.
 - .4 The mixed air dampers shall be set to full recirculation during the unoccupied period unless required for cooling demands and economizer is available.
- .11 Morning Start-up Mode
- .1 The unit shall use an optimal start algorithm for morning start-up. This algorithm shall minimize the unoccupied warm-up and cool-down period while still achieving comfort conditions by the start of scheduled occupied period.
 - .2 The unit shall be set to full recirculation during morning start-up.

.12 Monitoring

.1 The following data points shall be monitored:

- .1 Supply air temperature
- .2 Mixed air temperature
- .3 Return air temperature

.13 Alarms

.1 Alarms shall be provided as follows:

.1 Fan Alarm

.1 If the fan has Failed-to-Command after 5 minutes (adj.)

.2 Low Space Temperature Alarm

.1 If the space temperature is more than 5°C (adj.) below setpoint for 15 minutes (adj.)

.3 High Space Temperature Alarm

.1 If the space temperature is more than 5°C (adj.) above setpoint for 15 minutes (adj.)

.4 High Supply Air Temperature Alarm

.1 If the supply air temperature is more than 5°C (adj.) above setpoint for 15 minutes (adj.)

.5 Filter Alarm

.1 If the filter alarm contact is closed indicating filters are loaded and require replacing. Coordinate device trip setting with balancer.

.2 Coordinate additional alarm requirements with Owner.

4.6 Hot Water Heating Coils

.1 Heating coil controls shall only be active during the shoulder seasons unless required to support the gas-fired heating. Heating coil control valve shall be enabled for use when Outside air temperature is above 12 deg. C (adjustable). Heating coil control valve shall remain closed during cooling season (heating system disabled).

.2 Heating coil control valve modulates to maintain leaving air temperature to set point, initially set to 23 deg. C (adjustable) during occupied period. Heating coil control valve shall remain closed during the unoccupied period.

- .3 Heating Morning Warmup: When triggered by the AHU, the zone controller operates under morning warm-up mode to heat the zone to the occupied mode set point.
- 4.7 Hot Water Wallfin Radiation
- .1 Wallfin radiation control valve shall modulate to maintain space temperature setpoint when enabled. Utilize 2 floating points.
 - .2 The occupied and unoccupied heating setpoints shall initially be set to 22 deg. C (adjustable) and 18 deg. C (adjustable), respectively. Confirm setpoints with DDSB representative.
- 4.8 Hot Water Force Flow Heater
- .1 Unit is enabled and disabled to maintain space air temperature to set point, initially set to 22 deg. C (adjustable) during occupied period and 18 deg. C (adjustable) during unoccupied period.
- 4.9 Exhaust Fans
- .1 Start and stop the fan to a Time-of-Day schedule, initially set to 7:00am to 4:30pm, Monday to Friday. The occupancy schedule shall be adjustable by the owner.
- 4.10 Existing Points List:
- .1 For existing equipment being demolished, Controls Contractor shall decommission respective control points.
 - .2 For existing equipment to remain, Controls Contractor shall integrate existing and remaining control points onto new BAS controllers and integrate the Work onto existing BAS network.
 - .3 For new equipment, Controls Contractor shall provide new control points, components and new BAS controllers, and integrate the Work onto existing BAS network.

END OF SECTION

INDEX TO SPECIFICATIONS

Section No.	Section Title
16010	General Electrical Requirements
16045	Documentation and Manuals
16100	Materials and Devices
16500	Lighting
16800	Fire Alarm System

PART 1 - GENERAL

1.1 General Requirements

- .1 The requirements of this section shall apply to all sections in Division 16 – Electrical.
- .2 All material, labour, equipment, and services required under this section shall be the full responsibility of the Contractor including any material, labour, equipment, and services provided by their sub-contractors.
- .3 Complete and submit the Electrical Supplementary Bid Form including list of equipment and materials to be used on this project and forming part of the tender documents.

1.2 Pre-Qualified Electrical Contractors

- .1 Refer to front end documents and Division 0 for pre-qualified electrical subcontractor list. Only those pre-qualified subcontractors shall bid on this project.

1.3 Definitions

- .1 “Supply” shall mean supply only.
- .2 “Install” shall mean install and connect.
- .3 “Provide” shall mean supply, install, connect and test.
- .4 “Drawings and Specifications” shall mean Contract Documents.
- .5 “Authorities” or “Authorities having jurisdiction” shall mean all agencies that enforce the applicable laws, ordinances, rules, regulations, or codes of the Place of Work.
- .6 “Work” shall mean all equipment, materials, labour, and permits to provide a complete and operational electrical system as detailed in the drawings and specifications.
- .7 “Owner” or “DDSB” shall mean Durham District School Board.

1.4 Related Work

- .1 Division 1 – General
- .2 Division 15 – Mechanical
- .3 Division 16 specifications form a part of the Contract Documents and shall be read, interpreted, and coordinated with all other Divisions. The Instructions to

Bidders, General Conditions, General Requirements, Supplementary General Conditions and Amendments and Supplements thereto form a part of this Division and contain items related to the electrical work.

1.5 Intent

- .1 The drawings and specifications are not a detailed set of installation instructions. Drawings and specifications are complementary to one another and that which is shown on one is as binding as that which is shown on both.
- .2 The Consultant shall be immediately informed of any discrepancies between drawings and specifications leaving in doubt the true intent of the work.
- .3 Supply all labour, equipment, and materials necessary to install a complete and operational electrical system described herein and shown on the drawings.
- .4 It is the intent of these drawings and specifications to provide for an electrical installation complete and in operating condition. The responsibility for supplying and installing all material necessary to accomplish this, except where specifically noted that such work or materials is not included, shall be part of this section.
- .5 Assess and be familiar with existing site conditions prior to pricing and construction and allow for same in tender price.
- .6 All work must be done by qualified and certified persons in such line of work. Trade certificates must be available on demand.
- .7 All work shall be in accordance with standard industry practice accepted and recognized by the Consultant and the Trade.
- .8 The Contractor shall coordinate with and cooperate with all other trades prior to installation. Where work interferes with other trades due to failure to coordinate or cooperate, the work shall be removed and relocated as approved by the Consultant at no extra cost to the Owner.
- .9 The Consultant shall have the right to reject any work that does not conform to the Contract Documents and accepted standards of practice including but not limited to performance, quietness of operation, and finish.
- .10 Responsibility to determine which Division provides various products and work rests with the Contractor. Additional compensation will not be considered because of differences in interpretation of specifications.

1.6 Codes, Bylaws, Standards, and Regulations

- .1 The electrical system shall comply with the latest editions and revisions of applicable codes, bylaws, bulletins, standards, and regulations including but not limited to:

- .1 Ontario Building Code
- .2 Ontario Electrical Safety Code
- .3 Canadian Standards Association
- .4 Local Municipal Codes
- .5 Local Building Bylaws
- .6 Ontario Occupational Health and Safety Act
- .7 IEEE

- .2 Provide work in accordance with the requirements of all applicable government codes, local by-laws, underwriter's regulations base building standards, contract documents, and all authorities having jurisdiction.
- .3 Where discrepancies occur between contract drawings and specifications and above codes and standards referred to herein, the Contractor is to notify the Consultant in writing and obtain clarification prior to proceeding with the work.
- .4 Contractors shall not reduce the requirements on the contract drawings and specifications by applying any codes and standards referred to herein.

1.7 Permits and Fees

- .1 Apply for, obtain, and pay for all permits, fees, connections, inspections, licenses, certificates or charges necessary including all taxes.
- .2 Coordinate all required inspections and give necessary notice to all authorities.
- .3 Upon completion of project, provide inspection certificates confirming acceptance by all authorities having jurisdiction.

1.8 Contract Breakdown

- .1 After the tenders close, submit a breakdown of the price into scope and trades to the satisfaction of the Consultant based on the sections of the specifications.
- .2 Breakdown shall include but not be limited to:
 - .1 Mobilization and shop drawing submission
 - .2 Permits and Fees
 - .3 Distribution equipment/Breakers
 - .4 Conduits, cable and wiring
 - .5 Fire Alarm
 - .6 Close-out Submittals – Manual information & As-built Drawings
- .3 Progress claims shall be based on the breakdown. Submit in table format showing contract amount, work complete to date as percentage, previous draw, amount this draw and balance for each line item.

1.9 Shop Drawings

- .1 Within two (2) weeks of award, the Contractor shall submit shop drawings of all equipment for the project.
- .2 Prior to ordering of products or delivery of any products to job site, submit shop drawings electronically in PDF format to the Consultant for review and comments. Submit sufficiently in advance of construction to allow ample time for review. Size of shop drawings shall be 8.5x11. 11x17 will be acceptable where appropriate for content and scale.
- .3 Submittals shall contain but not be limited to details, dimensions, construction, size, arrangement, operating clearances, performance characteristics and capacities of products and parts of the work. Include wiring drawings and schematics showing interconnection with work of other Divisions.
- .4 Clearly mark each sheet of printed submittal material, using arrow, underlining or circling, to show particular sizes, dimensions, wiring diagrams, operating clearances, control diagrams, project identification, types, model numbers, ratings, capacities and options actually being proposed. Cross out non applicable material. Note on the submittal specified features such as special tank linings, pump seals, materials or painting.
- .5 **Prior to submission to the Consultant, the Electrical Contractor shall review all shop drawings. By this review the Electrical Contractor represents that he has determined and verified all field measurements, field construction criteria, materials, catalogue numbers and similar data or will do so and that he has checked and coordinated each shop drawing with the requirements of the Work and of the Contract Documents.**
- .6 **The Electrical Contractor's review of each shop drawing shall be indicated by his approval stamp, date and signature on the front of each page. Drawings will not be considered if not previously checked by the Electrical Contractor.**
- .7 Review comments from Consultant. If shop drawings are modified, confirm changes before proceeding. If shop drawings are not approved, revise and resubmit changes for approval.
- .8 Review of the shop drawings by the Consultant does not relieve the contractor or his supplier of the responsibility to provide the correct and complete equipment, material or installation.
- .9 Keep one complete set of shop drawings at job site during construction.
- .10 Include stamped reviewed shop drawings in the Maintenance Manuals.

1.10 Product Delivery Schedule

- .1 Within two (2) weeks from shop drawing review, a schedule must be submitted by the Contractor showing projected delivery dates of all products to meet required construction schedule.

1.11 Construction Meetings

- .1 The Electrical Contractor shall attend all site meetings unless otherwise pre-approved.
- .2 Sub-trades shall attend site meetings as requested or as required.

1.12 Record Drawings

- .1 Refer to Section 16045.
- .2 Maintain accurate, neat, and clean Record Drawings on an **on-going basis** during construction to be reviewed periodically by the Consultant during construction.
- .3 Record drawing mark-ups shall be made available at every site meeting or inspection.
- .4 Record drawings shall include but not be limited to final location of all **component locations and conduit runs.**
- .5 Upon completion of the work, submit to the Consultant for review, one (1) complete set of clear, legible, certified as-built drawings.

1.13 ESA Certificates

- .1 Furnish an unconditional Certificate of Acceptance from Electrical Safety Authority on completion of work. Arrange for interim and rough-in inspections. Arrange and pay for Occupancy Inspections if required for partial occupancies.
- .2 Incorporate a copy of the final ESA Certificate in the operating and maintenance manual.

1.14 Maintenance Manuals

- .1 Refer to Section 16045.
- .2 Provide information to Prime Contractor for inclusion into combined Maintenance Manual in both hard copy and electronic format.
- .3 Information shall include:
 - .1 Warranty Letter

- .2 Final ESA Certificate
- .3 Fire Alarm Verification Report
- .4 PA Test Letter/Report
- .5 Communications/Data Test Report
- .6 Shop drawings (as reviewed and stamped by engineer)
- .7 Panel Schedules
- .8 As-built drawings

1.15 Testing

- .1 The installation shall be free of open circuits and grounds.
- .2 On completion, measure insulation resistances and comply with Table 24 of Ontario Electrical Safety Code.
- .3 Test all wiring and connections for continuity and grounds before equipment is energized.
- .4 Carry out all tests and furnish all equipment required to demonstrate safe and proper completion of the work, without cost to the Owner.
- .5 Check load balance on all feeders and make necessary adjustments to provide a "balanced" load.
- .6 Fully coordinate all testing and commissioning with all trades, the Consultant, and authorities having jurisdiction.
- .7 Test and verify all existing systems being modified due to construction including but not limited to fire alarm, P.A., data and voice.
- .8 Provide a minimum of forty-eight (48) hours written notice to all parties.

1.16 Demonstration

- .1 Work with and assist Division 15 during Division 15 training as required.
- .2 The Contractor shall arrange for all necessary personnel and equipment specialists to be in attendance for purposes of demonstration and training.
- .3 Provide instruction by a manufacturer's representatives as required too fully demonstrate the systems.

1.17 Substantial Completion and Performance

- .1 Substantial completion and performance shall be determined and awarded by the Consultant.
- .2 Complete the following to the satisfaction of the Consultant prior to request for substantial completion:

- .1 Submit Electrical Safety Authority Certificate
- .2 Submit reports as specified herein
- .3 Fire stopping
- .4 Inclusion of material for draft copy of maintenance manual
- .5 As built Drawings

1.18 Warranty

- .1 Provide a one (1) year full parts and labour warranty for the new system from date of substantial completion.
- .2 Submit warranty letter on Company letterhead signed by Company representative stating warranty terms including warranty period from date of substantial completion.

PART 2 - PRODUCTS

2.1 General

- .1 All material used shall be new, free from defects, of quality specified, and installed in accordance with manufacturer's instructions.
- .2 Major components shall have nameplates on the exterior of the equipment in a visible location containing manufacturer's name, model number, serial number, performance data, and electrical characteristics.
- .3 The same manufacturer shall be used for types of components used in similar applications.
- .4 It is the responsibility of the Contractor to store and protect materials supplied by this scope.
- .5 Materials must be stored in original containers.
- .6 Remove and dispose of all redundant materials and garbage from site.

2.2 Selected Products and Equivalentents

- .1 Sections within Division 16 list "Acceptable Manufacturers" which must meet characteristics of the specified equipment and products for each section.
- .2 Base specified products are specified and/or shown on the drawings, and identified by manufacturer's name, type and catalogue number.
- .3 Any alternate manufacturers from base specified products and equipment must equal or exceed the quality, finish and performance of those base specified and/or shown, and not exceed the space requirements allotted on the drawings. Include

costs for any associated work to accommodate such substitutions, including the Consultant's time and revisions to the work of other divisions.

- .4 If item or material specified is unobtainable, state in Tender proposed substitute and amount added or deducted for its use. Extra monies will not be paid for substitutions after the Contract has been awarded.
- .5 If item of size indicated is unobtainable, supply next larger size without additional charge.

2.3 Quality of Product

- .1 All products provided shall be CSA approved, approved by other relevant authorities.
- .2 If supplied products are not CSA approved, obtain approval of provincial regulatory authority. Pay all applicable charges levied and make all modifications required for approval.
- .3 All products provided shall be new including those not specified and shall be of a quality best suited to the purpose required and their use subject to approval by the Consultant.

2.4 Voltage Ratings

- .1 Operating Voltages: to CAN3-C235.
- .2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

2.5 Electric Motors, Equipment and Controls

- .1 Refer to Drawings for Contractor's equipment wiring responsibility.
- .2 Control wiring and conduit shall be covered under this Division except connections below 50V which are related to control systems specified under Division 15.

2.6 Access Doors

- .1 Provide access doors/panels as required for access, adjustment, operation, service, and maintenance.
- .2 Access doors shall be flush mounted 600mmx600mm (24"x24") for body entry and 300mmx300mm (12"x12") for hand entry. Doors to open 180 degrees, have rounded safety corners, concealed hinges, screwdriver latches and anchor straps.

.3 Acceptable Manufacturers:

- .1 Acudor
- .2 Zurn
- .3 Nailor Industries
- .4 Le Hage

2.7 Sleeves

- .1 Provide sleeves for all cables passing through masonry, concrete or fire rated assemblies unless run in conduit.
- .2 Sleeves shall be EMT conduit.
- .3 Coordinate exact location of sleeves prior to construction of walls, floors, etc.

2.8 Fire Stopping

- .1 This Contractor shall work with all other Contractors on the project in providing one common method of fire stopping all penetrations made in the fire rated assemblies.
- .2 Approved fire stopping and smoke seal material in all fire separations and fire ratings within annular space between pipes, ducts, insulation and adjacent fire separation and/or fire rating.
- .3 Do not use cementious or rigid seals around penetrations for pipe, ductwork, or other mechanical items.
- .4 Provide materials and systems capable of maintaining effective barrier against flame, smoke and gases. Ensure continuity and integrity of fire separation.
- .5 Comply with the requirements of CAN4-S115-M35, and do not exceed opening sized for which they have been tested.
- .6 Systems to have an F or FT rating (as applicable) not less than the fire protection rating required for closures in a fire separation. Provide "fire wrap" blanket around services penetrating fire walls. Extent of blanket must correspond to ULC recommendations.
- .7 The fire stopping materials are not to shrink, slump or sag and to be free of asbestos, halogens and volatile solvents.
- .8 Firestopping materials are to consist of a component sealant applied with a conventional caulking gun and trowel.
- .9 Fire stop materials are to be capable of receiving finish materials in those areas which are exposed and scheduled to receive finishes. Exposed surfaces are to be acceptable to consultant prior to application of finish.

- .10 Firestopping shall be inspected and approved by local authority prior to concealment of enclosure.
- .11 Install material and components in accordance with ULC certification, manufacturer's instructions and local authority.
- .12 Submit product literature and insulation material on fire stopping in shop drawing and product data manual. Maintain copies of these on site for viewing by installers and Consultant.
- .13 Manufacturer of product shall provide certification of installation. Submit letter to the consultant.
- .14 Acceptable Manufacturers:
 - .1 Fryesleeve Industries Inc.
 - .2 General Electric Pensil Firestop Systems
 - .3 International Protective Coatings Corp.
 - .4 Rectorseal Corporation (Metacaulk)
 - .5 Proset Systems
 - .6 3M
 - .7 AD Systems
 - .8 Hilti
- .15 Ensure firestop manufacturer representative performs on-site inspections and certifies installation. Submit inspection reports/certification at time of substantial completion.

PART 3 - EXECUTION

3.1 Site Examination

- .1 Examine the site of work and become familiar with all features and characteristics affecting this work before submitting tender.
- .2 No additional compensation will be given for extra work due to existing conditions which such examination should have disclosed.
- .3 Report to the Consultant any unsatisfactory conditions which may adversely affect the proper completion of this work.

3.2 Interference and Coordination Drawings

- .1 Examine the drawings and all divisions of the specifications.
- .2 Prepare interference and equipment layout drawings to ensure all components will be properly accommodated within the spaces provided.

- .3 Lay out the work and equipment with due regard to architectural, structural and mechanical features, and service requirements.
- .4 Submit interference drawings to the Consultant.
- .5 Before commencing any work, obtain a ruling from the Consultant if any conflict exists, otherwise no additional compensation will be made for any necessary adjustments.

3.3 Separation of Services

- .1 Maintain separation between electrical wiring system and building piping, ductwork, etc. so that wiring system is isolated (except at approved connections to such systems) to prevent galvanic corrosion.
- .2 In particular, contact between dissimilar metals, such as copper and aluminum, in damp or wet locations is not permitted.
- .3 Do not support wiring from pipes, ductwork, etc. Hangers for suspended ceilings may be used for the support of wiring only when approval is obtained from ceiling installer, and approved clips or hangers are used.

3.4 Workplace Safety

- .1 The workplace must be kept safe at all times.
- .2 Conform to all ministries of labour, and health and safety regulations at all times.
- .3 Use ladders and proper techniques as approved by the ministry of labour to perform all work.
- .4 Cover all holes/openings and provide barriers around hazards, etc. to ensure occupants and workers are not at risk.
- .5 Where work does not conform to such regulations, stop work immediately and report the situation to the Owner's representative or Consultant or rectify the situation immediately.
- .6 Report any hazards or concerns to the Owner's representative immediately.
- .7 Conform to the Owner's safety requirements and construction regulations.

3.5 Temporary Requirements

- .1 Provide grounded extension cords and temporary lights required for work.
- .2 Any specific task lighting required on site is the responsibility of this Division.

3.6 Location of Luminaires

- .1 Locations may have to be revised to suit construction and equipment arrangements and it is expected that such changes will not result in additional cost to the Owner, provided that no additional labour or material is required and installation has not been completed.

3.7 Mounting Heights

- .1 Mounting height of equipment is from finished floor to centerline of equipment unless specified or indicated otherwise. Coordinate with block coursing (if applicable).
- .2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

3.8 Welding, Grinding, Noisy Work, Odours

- .1 No welding, grinding, other noisy work or work generating odours shall be done during regular operating/school hours.
- .2 All above work shall be done after hours or on weekends outside of regular hours.
- .3 Submit hot work permit prior to any welding.

3.9 Cutting, Coring, Repairs and Restoration

- .1 Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown. Surface finishes shall exactly match existing finishes of same materials.
- .2 Each Section of this Division shall bear expense of cutting, patching, and repairing to install their work and/or replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it.
- .3 Cutting, patching, and repairing to permit installation of work of this Division is responsibility of Section installing work.
- .4 All patching, painting and making good of the existing walls, floors, ceilings, partitions and roof will be at the expense of this Contractor but performed by the Contractor specializing in the type of work involved unless otherwise noted.

3.10 Painting

- .1 Refer to other Divisions for Painting unless otherwise specified herein.
- .2 Apply at least one (1) coat of corrosion resistant primer paint to ferrous supports and site fabricated work.

- .3 Prime and touch up marred finished paintwork to match original.
- .4 Restore to new condition, or replace equipment at discretion of Consultant, finishes which have been damaged too extensively to be merely primed, painted and touched up.

3.11 Concealment

- .1 All equipment, components, piping, and conduit shall be concealed in ceiling spaces, bulkheads or walls where possible unless otherwise noted on the drawings or approved by the Owner or Consultant.
- .2 Exposed equipment, components, piping, and conduit installed in unfinished areas, shall be installed as high as possible. Run piping and conduit tight to roof deck and down columns.
- .3 Any surface mounted conduit requirements must be pre-approved by consultant and/or owner prior to installation.

3.12 Clearances and Accessibility

- .1 Install all work for easy access for adjustment, operation, and maintenance.
- .2 Maintain clearances for all components as per code and manufacturer's instructions.
- .3 Provide access panels of adequate size as required to access components in concealed areas. Do not install access doors in specialty walls or ceilings.
- .4 Provide fire rated access doors shall be installed in fire separations and match rating of separation.

3.13 Equipment and System Protection

- .1 Protect components and materials from damage in storage and on site before, during, and after installation until final acceptance.
- .2 Protect inside and outside of components from dust and debris with appropriate covers that will withstand through the construction.
- .3 Where equipment and system components become dirty or damaged, clean and repair to new condition to the satisfaction of the Consultant at the expense of this Contractor.

3.14 Supports

- .1 Provide all miscellaneous metals and materials as required for support, hanging, anchoring, and guiding of all components.

- .2 All supports must be securely mounted to structures.

3.15 Fire Stopping

- .1 Refer to Part 2 herein.

3.16 Cleaning

- .1 In preparation for final acceptance, clean and refurbish all equipment and leave in operating condition.

3.17 Equipment Identification

- .1 Identify electrical equipment with nameplates as follows:

- .2 Nameplates:

- .1 Lamacoid 3mm (1/8") thick plastic engraving sheet, black face, white core, mechanically attached with self-tapping screws.

Nameplate Sizes

Size 1	9mm x 50mm (3/8" x 2")	1 line	3mm (1/8") high letters
Size 2	12mm x 70mm (1/2" x 2-1/2")	1 line	5mm (3/16") high letters
Size 3	12mm x 70mm (1/2" x 2-1/2")	2 lines	3mm (1/8") high letters
Size 4	20mm x 90mm (3/4" x 3-1/2")	1 line	9mm (3/8") high letters
Size 5	20mm x 90mm (3/4" x 3-1/2")	2 lines	5mm (3/16") high letters
Size 6	25mm x 100mm (1" x 4")	1 line	12mm (1/2") high letters
Size 7	25mm x 100mm (1" x 4")	2 lines	6mm (1/4") high letters

- .3 Wording on nameplates labels to be approved by Consultant prior to manufacture.
- .4 Allow for average of twenty-five (25) letters per nameplate.
- .5 Identification to be English.
- .6 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .7 Nameplates for disconnects, starters and contactors must indicate equipment being controlled, voltage and amperage (if not visible on equipment).
- .8 The nameplates for switchboards, distribution panels, power panels, etc shall be Lamacoid with typical identification such as "PP-A, 208V 3PH 4W, fed from switchboard 'A'".
- .10 Provide neatly typed circuit directories on panel boards to indicate the area or equipment controlled by each branch circuit.

- .11 Clearly mark all receptacles with circuit number.

3.18 Wiring Identification

- .1 Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.
- .2 Maintain phase sequence and colour coding throughout.
- .3 Colour code: to CSA C22.1.
- .4 Use colour coded wires in communication cables, matched throughout system.

3.19 Conduit and Cable Identification

- .1 Colour code conduits, boxes and metallic sheathed cables.
- .2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15m (45') intervals.
- .3 This Contractor must paint all system junction boxes and covers in conformance with the existing colour coding scheme in the building. Contractor to confirm with Owner.

3.20 Wiring Terminations

- .1 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.

3.21 Warning Signs

- .1 Meet requirements of Electrical Safety Authority and Consultant.
- .2 Provide porcelain enamel signs, with a minimum size of 175mm x 250mm (7" x 10").

3.22 Field Quality Control

- .1 Conduct and pay for following tests:
 - .1 Systems: fire alarm system, and public address system.
 - .2 Furnish manufacturer's certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions.
 - .3 Insulation resistance testing.
 - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.

- .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
 - .3 Check resistance to ground before energizing.
 - .4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
 - .5 Submit test results for Consultant's review.
- 3.23 Coordination of Protective Devices
- .1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings as indicated on drawings or as determined from coordination study.
- 3.24 Testing and Verification
- .1 Provide all material and labour required for all testing and verification.
 - .2 Submit reports of all testing and verification results for review to Consultant.
- 3.25 Field Review and Deficiencies
- .1 The Contractor shall notify the Consultant when the job is ready for field review at various stages including rough-in stages.
 - .2 During the course of construction, the Consultants will monitor construction and provide written reports of work progress, discussions and deficiencies.
 - .3 The Contractor shall correct all deficiencies within the work period prior to the next review.
 - .4 The Contractor shall not conceal any work until inspected. Where work was concealed, the Contractor shall remove and replace tiles, coverings or other obstructions to allow proper inspection at the Contractor's expense.
 - .5 Upon completion of the project the Consultant will do a final review. Upon receiving the final inspection report, the Contractor must correct and sign back the inspection report indicated all deficiencies are completed. A re-inspection will only be done once the Consultant receives this in writing. Where the Consultant performs the re-inspection and the work is not complete, the Contractor is responsible for reimbursing the Consultant for the field review. The fee for additional reviews will be at the Consultant's hourly rates plus mileage and applicable taxes to be paid directly to the Consultant prior to performing the next field review.

END OF SECTION

PART 1 - GENERAL

1.1 Work Included

- .1 Operating and Maintenance Manuals
- .2 Assembly of tests reports for systems
- .3 Assembly of shop drawings for new systems
- .4 Assembly of equipment and systems operating and maintenance instructions for new systems
- .5 Assembly of identification schedule
- .6 Record Drawings

1.2 Related Work

- .1 Division 1
- .2 General Electrical Requirements – Section 16010

PART 2 - PRODUCTS

2.1 Operation and Maintenance Materials

- .1 Provide information to Prime Contractor for inclusion into combined Maintenance Manual.
- .2 Assemble or develop complete and correct documentation for the operation and preventative maintenance of equipment and systems provided.
- .3 Assemble or develop copies of all certified shop drawings and material required to complete the documentation. This generally includes but is not limited to the following:
 - .1 Contractor Information and Contact Information
 - .2 Contractor's Warranty Letter and Equipment Warranties
 - .3 Equipment shop drawings (must be those that were reviewed and stamped by the Consultant)
 - .4 Manufacturer's operating and maintenance instructions.
 - .5 Test Reports
 - .6 Electrical Safety Authority (ESA) Certificate
 - .7 Fire Alarm Verification Report
 - .8 Record Drawings

2.2 Record Drawings

- .1 Record drawings shall be kept up-to-date on an ongoing basis during construction for periodic review by the Consultant. Record drawings shall always be kept in the same location on site known to the Consultant.
- .2 Upon completion of the work, submit to the Consultant for review, one (1) complete set of clear, legible, red-lined certified record drawings.
- .3 Provide a set of clear, legible, red-lined certified as-built drawings with the maintenance manuals.
- .4 Contractors shall certify that final reproducible record drawings to be correct by notation and signature on the drawings.
- .5 Record drawings shall precisely identify the configuration, size and location of all systems and equipment installed under this Division.
- .6 Record drawings shall be submitted to the Consultant.

PART 3 - EXECUTION

3.1 General

- .1 Provide information to Prime Contractor for inclusion into combined Maintenance Manual.
- .2 Substantial Completion will not be granted until a draft hard copy of the complete manual has been submitted by the Contractor and reviewed and accepted by the Consultant.

3.2 Record Drawings

- .1 Upon completion of the work, submit to the Consultant for review, one (1) complete set of clear, legible, red-lined certified Record Drawings. The Contractor shall certify and sign the completed Record Drawings.
- .2 Substantial completion will not be granted until the Record Drawings have been submitted to the Consultant.

END OF SECTION

PART 1 - GENERAL

1.1 General

- .1 The following specification represents the minimum standard required for installation of basic electrical components.

1.2 Work Included

- .1 Refer to Section 16010.
- .2 Work to be done under this Section includes labour, materials, and equipment required to install, test and operate Electrical and Communication Systems.
- .3 Removal of all redundant wiring and conduit including where specifically requested by the Owner.

1.3 Codes and Standards

- .1 Ontario Electrical Safety Code – Current Edition.
- .2 CSA
- .3 ULC
- .4 American Electronic/Telecommunication Industry Association
- .5 Commercial Building for Telecommunications Pathways and Spaces
- .6 Local Codes and Requirements

1.4 Submittals

- .1 Shop Drawings:
 - .1 Submit shop drawings to the Consultant for review prior to ordering or installation.
 - .2 Shop drawings shall include manufacturer, model numbers, electrical data, wiring diagrams, and indicate conformance to above reference standards.
 - .3 One copy of all stamped reviewed shop drawings shall be included in maintenance manual.
- .2 Operation and Maintenance Data:
 - .1 Provide operation and maintenance literature for all equipment indicating manufacturer and model of equipment, instructions for operation and maintenance of same, and parts list.
 - .2 Operation and maintenance data shall be included in the maintenance

manual.

1.5 Standard of Materials

- .1 Materials and equipment are specifically described and named in this Specification in order to establish a standard of material and workmanship.
- .2 Materials required for performance of work shall be new and the best of their respective kinds and of uniform pattern throughout work.
- .3 Equipment items shall be standard products of approved manufacture. Identical units of equipment shall be of same manufacture.
- .4 Chemical and physical properties of materials and design performance characteristics and methods of construction and installation of items of equipment, specified herein, shall be in accordance with latest issue of applicable Standards or Authorities when such are either mentioned herein, or have jurisdiction over such materials or items of equipment.
- .5 Materials shall bear approval labels as required by Code and/or Inspection Authorities.
- .6 Install materials in strict accordance with manufacturer's recommendations.
- .7 Include items of material and equipment not specifically noted on Drawings or mentioned in Specification but which are necessary to make a complete and operating installation.
- .8 Remove materials, condemned as not approved for use, from job site and deliver and install suitable approved materials in their place.
- .9 Where a specific manufacturer is noted herein, other manufacturers may be considered where approved by the owner.

PART 2 - PRODUCTS

2.1 General

- .1 Provide all equipment as per the following description to complete the entire works as shown on drawings and as indicated in the specifications to provide a complete and operational system.
- .2 Coordinate with other trades to provide the components required to make all systems operational – see mechanical schedules for details of equipment provided to make sure the works are complete.

2.2 Outlet Boxes

- .1 Outlet boxes shall conform to C.S.A. Standard C22.2 No. 18-1972.
- .2 Ceiling boxes shall be 103 mm octagon or square, complete with fittings, where required to support fixtures.
- .3 Where boxes are surface mounted in unfinished areas they shall be FS conduits.
- .4 Standard outlet boxes shall be manufactured from code gauge galvanized steel.
- .5 Provide a suitable outlet box for each light, switch, receptacle or other outlet, approved for the particular area it is to be installed.
- .6 Boxes shall be of a size suitable for the number and size of conductors and the space requirements for the wiring device.

2.3 Conduit Accessories, Condulets and Fittings

- .1 Conduit accessories, condulets and fittings shall conform to C.S.A. Standard C22.2 No. 18-1972.
- .2 Rigid conduit bushings shall be as manufactured by:
 - .1 Thomas & Betts Ltd. – Series 5031
 - .2 Efcor of Canada Ltd. – Series 720B
 - .3 Commander / Iberville
- .3 EMT Connectors shall be steel set screw type as manufactured by:
 - .1 Thomas & Betts Ltd. – Steel City TC 121E Series
 - .2 Efcor of Canada Ltd. – Series 720B
 - .3 Commander / Iberville
- .4 Ground Bushing shall be as manufactured by:
 - .1 Thomas & Betts – Blackjack or 1220 Series
 - .2 Efcor of Canada Ltd.
 - .3 Commander / Iberville
- .5 Flexible conduit connectors shall be as manufactured by:
 - .1 Thomas & Betts Ltd. – Series 3110
 - .2 Efcor of Canada Ltd. – Series 1001B
 - .3 Commander / Iberville
- .6 Conduit fittings shall be as manufactured by:
 - .1 Crouse-Hinds of Canada Ltd.

- .2 Kondu Mfg. Co. Limited
- .3 Thomas & Betts Ltd.
- .4 Killark of Canada
- .5 Efcor of Canada Ltd.
- .6 Commander / Iberville

- .7 Steel conduit shall be as manufactured by:
 - .1 Conduits National Co. Ltd.
 - .2 MBF Industries

- .8 Aluminum conduits shall be as manufactured by:
 - .1 Alcan Canada Products Ltd.

- .9 Terminate rigid conduit entering boxes or enclosures with nylon insulated steel threaded bushings.
 - .1 Thomas & Betts – 8125 Series

- .10 Terminate EMT entering boxes or enclosures with nylon insulated steel threaded bushings.

- .11 Terminate flexible conduit entering boxes or enclosures with nylon insulated steel connectors.
 - .1 Thomas & Betts – 5332 Series

- .12 Install wall entrance seals where conduits pass through exterior walls below grade.

- .13 Provide expansion coupling in conduit runs at building expansion joints and in long runs subject to thermal expansion, all in accordance with manufacturer recommendations.

- .14 All cabling shall be run in EMT conduit unless otherwise approved.

- .15 BX cable may also be used for short drops to light fixtures to a maximum length of 1500mm. Any installations exceeding 1500mm shall be removed and replaced at the Contractor's expense. All installations of BX cable shall be complete with anti-short bushings at all stripped ends as per OEC #12-608(1)(a). Connectors for BX cable shall be Crouse Hinds #L16ST.

- .16 Rigid PVC (unplasticized) conduit shall be CSA approved according to CSA Standard C22.2 No. 136.

- .17 Pull Cords/Strings
 - .1 Nylon twine

2.4 Conductors, Wires and Cables

- .1 Wiring installed in conduit, unless otherwise noted, shall be copper 600 volt RW75XLPE, RWU75XLPE or TWH (75 degrees C) nylon jacket as per the requirements on the plans. Lighting and power wiring shall be copper, minimum No. 12 gauge. Size wires for 2% maximum voltage drop to farthest outlet on a maximum 80% loaded circuit.
- .2 Conductors shall be colour coded. Conductors No. 10 gauge and smaller shall have colour impregnated into insulation at time of manufacture. Conductors size No. 8 gauge and larger may be colour coded with adhesive colour coding tape but only black insulated conductors shall be employed in this case, except for neutrals which shall be white wherever possible.
- .3 Colour Coding shall be as follows:
 - .1 Phase "A" – Red
 - .2 Phase "B" – Black
 - .3 Phase "C" – Blue
 - .4 Control – Orange
 - .5 Ground – Green
 - .6 Neutral – White
- .4 Wire shall be as manufactured by:
 - .1 Canada Wire and Cable Co. Ltd.
 - .2 Industrial Wire and Cable (1970) Ltd.
 - .3 Phillips Cables Ltd.
 - .4 Pirelli Cables Ltd.
- .5 Neatly train circuit wiring in cabinets, panels, pull boxes and junction boxes and hold with nylon cable ties.
- .6 Splice wire, up to and including No. 6 gauge, with nylon insulated expandable spring type connectors.
 - .1 Thomas & Betts – Marr Max Series
- .7 Splice large conductors using compression type connections insulated with heat shrink sleeves.
 - .1 Thomas & Betts – 5400 Series lugs and heat shrink type #s series
- .8 Where colour coding tape is utilized, it shall be applied for a minimum of 2" at terminations, junction and pull boxes and conduit fittings. Do not paint conductors under any condition. Colour coding shall also apply to bussing in panels and, switchgear, disconnects, and metering cabinets.

2.5 Breakers

- .1 Branch Breakers: Shall be of the heavy duty, bolt-on type, single, two or three pole as shown on the drawings and of the ampere ratings indicated. They shall be thermal magnetic, non interchangeable, moulded, case type with toggle mechanism, and be designed for use as switches. Two and three pole breakers shall be common trip type with single handle. Handle ties will not be permitted. Each breaker to be quick-make, quick break type. Shall be approved for use with CU/AL cables. Breaker manufacturer to match panel manufacturer identified on drawings.

2.6 Junction Boxes and Pull Boxes

- .1 Junction and pull boxes must conform to CSA C22.2 No. 40 (latest edition).
- .2 Welded steel construction with screw-on flat covers for surface mounting.
- .3 Covers with 25 mm (1") minimum extension all around, for flush-mounted pull and junction boxes.

2.7 Receptacles

- .1 Receptacles shall conform to CSA 22.2 No. 42 (latest edition).
- .2 Receptacles shall be specification grade of amperage and voltage indicated on the drawings.
- .3 Manually operated general purpose with the following features:
 - .1 Terminal holes approved for No. 10 AWG wire.
 - .2 Break-off links for use as split receptacles
 - .3 Urea or melamine molding for parts subject to carbon tracking
 - .4 Suitable for back and side wiring (eight back wired entrances, four side wiring screws)
 - .5 Triple wipe contacts and riveted grounding contacts
 - .6 Tamper resistant where noted.
- .4 Switches and receptacles shall be of the same manufacturer throughout except where a specified item is not made by that manufacturer.
- .5 Provide white colour (to be confirmed at shop drawing review).
- .6 Receptacles shall be as listed below:
 - .1 15 ampere, 120V, single phase grounded duplex receptacle shall be NEMA-U-ground type CSA Configuration 5-15R.
 - .2 20 ampere, 120V, single phase grounded duplex receptacle shall be NEMA-U-ground type CSA Configuration 5-20RA.

- .7 Other types of receptacles shall be provided as shown on Drawings.
- .8 Catalogue numbers listed below have been used to indicate quality standards.
 - .1 Standard Duplex Hubbell BR15WHITR
 - .2 GFI T-Slot Hubbell GFTR20WLA
 - .3 GFI Hubbell GFTR15WLA
 - .4 T-Slot Hubbell BR20WHITR
 - .5 USB Duplex Hubbell USB15X2W
 - .6 Weatherproof Duplex Hubbell GFTR20W + Hubbell RW57300
- .9 Weatherproof receptacles shall be equal to 20A GFI and mounted in weatherproof enclosure complete with locking key. Enclosure shall be equivalent to Hubbell WPFS26 with locking device HBLWLC.
- .10 Acceptable Manufacturers:
 - .1 Hubbell of Canada
 - .2 Pass & Seymour
 - .3 Leviton

2.8 Cover Plates

- .1 Switch, receptacle, telephone and other plates shall be stainless steel 18-8 chrome metal alloy, Type 302, non-metallic in finished areas and pressed steel in unfinished areas. Finish brush marks shall be run in a vertical direction.
- .2 Cover plates shall be of the same manufacturer throughout.
- .3 Cover plates shall be as manufactured by:
 - .1 Leviton
 - .2 Harvey Hubbell of Canada Ltd.
 - .3 Pass & Seymour Inc.

2.9 Motor Starters

- .1 Starts shall conform to CSA C22.2 No. 14 (latest edition) and EEMAC E14-1.
- .2 Single Phase motor starters shall be/have:
 - .1 Used for single phase motors up to 1HP
 - .2 Franklin Control System BAS-1P Building Automation Starter
 - .3 On/Off Disconnect switch with recessed Hand/Auto Modes
 - .4 Single phase; 110V, 1/10HP – 1HP; 240V, 1/10HP – 1HP
 - .5 120~240VAC, 1-Phase, 60Hz, across the line, full-voltage non-reversing (1HP)
 - .6 Adjustable 1-16A Class 10 electronic overload
 - .7 NEMA Type 1 General Purpose Enclosure, surface mounting

- .8 On/Off Switch, concealed Hand/Off/Auto switch
- .9 Run Status Verification
- .10 Voltage & Dry inputs for Auto Run Command
- .11 System override mode
- .12 Manual Overload Trip Reset

2.10 Fuses

- .1 Fuses: Shall be RK5 or HRC-I, Class J or L unless otherwise specified. Fuses in combination starters shall be HRC time delay type where specified.
- .2 Motor fuses shall be sized according to the Drawings for the specified motor and starting cycle.
- .3 Fuses shall be as manufactured by Buss, Gould, Little Fuse or approved equal.
- .4 Provide three spare fuses of each type and size installed for maintenance.

2.11 Hangers and Supports

- .1 Provide and correctly locate all hangers and inserts required for the installation of all work under this Contract.
- .2 Hangers for electrical conduit shall be galvanized after fabrication.
- .3 Conduit hangers shall be as manufactured by:
 - .1 Burndy Canada Ltd.
 - .2 Canadian Strut Products Ltd.
 - .3 E. Myatt & Co. Ltd.
 - .4 Steel City Electric Co.
 - .5 Pilgrim
 - .6 Thomas & Betts
 - .7 B-line
- .4 Do not use perforated strapping (grappler bars).

2.12 Finishes and Painting

- .1 All factory supplied equipment shall have finish coating factory applied whether finish be painted, galvanized or other, as required and as specified.
- .2 Repair dents and touch up all damaged finishes with matching finish, or if required by the Consultant or Owner, completely repaint or replace damaged surface at no extra cost to the Contract.

PART 3 - EXECUTION

3.1 General

- .1 All wiring to meet Ontario Electrical Safety Code and local authorities.
- .2 All power, interlock and control wiring over 50V, and disconnects shall be supplied and installed by the Electrical Contractor. Coordinate with Division 15.
- .3 Division 15 shall install all control and low voltage interlock wiring less 50V or less.
- .4 All outdoor wiring to be run in liquidtight. All indoor wiring to be run in conduit. Last 1.5m (5') at final connection to equipment shall be run in flexible conduit only.
- .5 Where wire size is not indicated, ampacity must match or exceed rating of protective device.
- .6 All circuits shall be balanced. All neutrals shall be sized to meet the requirements of Section 4-022 of the Ontario Electrical Safety code and in no case smaller than 12 awg.
- .7 Feeders, sub-feeders, circuit wiring and ancillary items shall be colour coded for phase identification. Neutral conductors shall be full capacity with white covering and be continuous throughout the system without fuses, switches or breakers of any kind. All neutrals shall be sized to meet the requirements of Section 4-022 of the Ontario Electrical Safety code.
- .8 Install wiring continuously within raceways, splices will be permitted only at outlets and junction boxes. Sufficient slack wire shall be left at these points to permit proper connection of fixtures, devices, equipment, etc.
- .9 Any exposed conduits or cables shall be run parallel to or at right angles to building lines and in a neat manner. Conduits shall be thoroughly reamed and each threaded termination shall be provided with two lock nuts. Running threads for rigid conduit will not be accepted.
- .10 Internal raceways in the building
 - .1 Securely cap or plug all openings in conduit and ducts during the execution of the Work to prevent dust and debris from entering the openings.
 - .2 At completion of the installation, the service entry ducts and the conduit system in the building shall be fished to clear all blocks.
- .11 Outlet and pull boxes shall be cleaned out and the system left free from water and moisture.
- .12 Provide all conduit, wire, fittings, disconnect switches, line voltage, starters,

disconnects, controls and auxiliary materials as previously defined to wire into service all 3 phase motors, single phase motors and equipment included in other Sections unless specified otherwise.

- .13 Install pull boxes through conduit run where required to facilitate the pulling in of cable, and locate in inconspicuous accessible spaces.
- .14 Provide flexible connections to mechanical equipment for vibration isolation. Connections to equipment roof mounted or in other damp or wet locations shall be liquid tight.
- .15 Conduits and cables shall not be attached to mechanical units for support.
- .16 All devices in Mechanical and/or Electrical rooms and all exterior mounted devices shall have wire guards for protection from mechanical damage. Provide wire guards elsewhere as noted on drawings.

3.2 Wiring Methods

- .1 Install wiring in conduit unless otherwise specified. Final connections (1500mm maximum) to equipment shall be liquidtight.
- .2 Flexible conduit and armoured cable will be accepted for a maximum length of 1500 mm for final connection to lighting fixtures. Do not connect from fixture to fixture.
- .3 Use thin wall conduit (EMT), up to and including 53 mm conduit size, for branch circuit and feeder wiring in ceilings, furred spaces, and in hollow walls and partitions. Use rigid galvanized steel conduit for wiring in poured concrete, where exposed, and for conduit 65 mm or larger. Use rigid PVC conduit for wiring in slabs on grade and wiring below grade.
- .4 Aluminum conduit may be used, in lieu of rigid steel conduit, in clean and dry locations, but shall not be used in poured concrete, or for signal and intercommunication systems wiring.
- .5 Conduit manufacturer's touch-up enamel shall be used to repair all scratches and gouges on epoxy-coated conduit.

3.3 Outlet Boxes

- .1 Where 103 mm square outlet boxes are installed in exposed concrete or cinder block finished areas, blocks will be cut under Masonry Division as instructed under this Section. Opening shall be cut to provide a close fit to boxes and covers so that edges of openings are not visible after installation of plates. Mortar shall not be used to patch up openings that are cut too large or to patch ragged edges.
- .2 Ceiling boxes shall be 103 mm octagon or square, complete with fittings, where

required to support fixtures.

- .3 Provide a suitable outlet box for each light, switch, receptacle or other outlet, approved for the particular area it is to be installed.
- .4 Support outlet boxes independently of conduit and cable.
- .5 Locate outlet boxes, mounted in hung ceiling space, so they do not obstruct or interfere with the removal of lay-in ceiling tiles.
- .6 Offset outlet boxes, shown back to back in partitions, horizontally a min. 150mm to minimize noise transmission between adjacent rooms.
- .7 Use gang boxes at locations where more than one device, of the same system only, is to be mounted. Each system shall utilize separate boxes.
- .8 Use tile wall covers where 103 mm square outlet boxes are installed in exposed concrete or cinder block in finished areas.
- .9 Flush mount boxes, panels, cabinets and electrical devices, which are installed in finished areas, shall be provided with suitable flush trims and doors or covers, unless specifically noted otherwise.
- .10 Provide pre-formed polyethylene vapour barriers for all boxes located in walls with internal vapour barriers.

3.5 Conduit Accessories, Condulets and Fittings

- .1 Terminate rigid conduit entering boxes or enclosures with nylon insulated steel threaded bushings.
 - .1 Thomas & Betts – 8125 Series
- .2 Terminate EMT entering boxes or enclosures with nylon insulated steel threaded bushings.
- .3 Terminate flexible conduit entering boxes or enclosures with nylon insulated steel connectors.
 - .1 Thomas & Betts – 5332 Series
- .4 Install wall entrance seals where conduits pass through exterior walls below grade.
- .5 Provide expansion coupling in conduit runs at building expansion joints and in long runs subject to thermal expansion, all in accordance with manufacturer recommendations.
- .6 BX cable may also be used for short drops to light fixtures to a maximum length

of 1500mm. Any installations exceeding 1500mm shall be removed and replaced at the Contractor's expense. All installations of BX cable shall be complete with anti-short bushings at all stripped ends as per OEC #12-608(1)(a). Connectors for BX cable shall be Crouse Hinds #L16ST.

3.6 Conductors, Wires and Cables

- .1 Conductors shall be colour coded. Conductors No. 10 gauge and smaller shall have colour impregnated into insulation at time of manufacture. Conductors size No. 8 gauge and larger may be colour coded with adhesive colour coding tape but only black insulated conductors shall be employed in this case, except for neutrals which shall be white wherever possible.
- .2 Neatly train circuit wiring in cabinets, panels, pull boxes and junction boxes and hold with nylon cable ties.
- .3 Splice wire, up to and including No. 6 gauge, with nylon insulated expandable spring type connectors.
 - .1 Thomas & Betts – Marr Max Series
- .4 Splice large conductors using compression type connections insulated with heat shrink sleeves.
 - .1 Thomas & Betts – 5400 Series lugs and heat shrink type #s series
- .5 Where colour coding tape is utilized, it shall be applied for a minimum of 2" at terminations, junction and pull boxes and conduit fittings. Do not paint conductors under any condition. Colour coding shall also apply to bussing in panels and, switchgear, disconnects, and metering cabinets.

3.7 Junction Boxes and Pull Boxes

- .1 Install pull boxes in inconspicuous but accessible locations. Provide access doors in all drywall areas.
- .2 Install junction boxes and pull boxes so as not to exceed 30m (100') of conduit run between pull boxes and in conformance with the Electrical Safety Authority.
- .3 Provide equipment identification in conformance with Section 16010.
- .4 Label all junction boxes with panel and circuit number.

3.8 Switches

- .1 Install single throw switches with handle in the "up" position when switch is closed.
- .2 Install switches in gang type outlet box when more than one switch is required in

one location.

- .3 Confirm colour prior to ordering.
- .4 Refer to Section 16010 for mounting heights.

3.9 Receptacles

- .1 Mount receptacles so long dimension is in the vertical.
- .2 Exact locations shall be verified to suit furniture layout.
- .3 Connect receptacle grounding terminal to the outlet box with an insulated green ground strap.
- .4 Install receptacles in gang type outlet box when more than one switch is required in one location.
- .5 Where split receptacle has one portion switched mount vertically and switch upper portion.
- .6 Confirm colour prior to ordering.

3.10 Cover Plates

- .1 Do not install plates until final painting of room or area is completed. Remove protective covering.

3.11 Hangers and Supports

- .1 Provide and correctly locate all hangers and inserts required for the installation of all work under this Contract.
- .2 Support outlet boxes, junction boxes, conduit and all electrical equipment independently with hangers and fastenings to building structural members.
- .3 Hangers in general shall be supported from inserts in concrete construction or from building structure using beam clamps for steel structures. Provide all additional angle or channel steel members required between beams for support of conduits, cables, luminaires, etc.
- .4 Use coach screws, lag screws or wood screws as appropriate in any wood construction.
- .5 Feeders, conduits and power ducts running vertically in a building shall be supported at each floor and between each floor if necessary.

3.12 Mounting Heights

- .1 Refer to Section 16010.

3.13 Conduit Sleeves and Curbs

- .1 Provide conduit sleeves of galvanized steel for conduit and cable runs passing through concrete walls, beams, slabs and floor. Include for all power, communications and control wiring.
- .2 Extend galvanized conduit sleeves for conduit rising through slabs 4" minimum above finished floors. Provide sleeves, passing through floors having a waterproof membrane, with an integral flashing clamp.

3.14 Supports and Bases

- .1 Switches or other electrical equipment shall be complete with suitable bases or mounting brackets.
2. Provide channel or other metal supports where necessary, to adequately support lighting fixtures. Do not use wood unless wood forms part of the building structure.
3. Support hangers, in general, from inserts in concrete construction or from building structural steel beams, using beam clamps. Provide additional angle or channel steel members, required between beams for supporting conduits and cables.
4. Provide any additional supports required from existing concrete construction for any piping or equipment, by drilling same and installing expansion bolt cinch anchors.
5. Do not use explosive drive pins in any section of work without obtaining prior approval.

3.15 Finishes and Painting

- .1 Primary and final painting for work, other than items specified as factory primed or finished, shall be performed by trades specializing in this type of work.
- .2 Repair and finish factory finished equipment, damaged or scratched during installation, in an approved manner.
- .3 Leave bare metal surfaces ready for painting by removing dirt, rust, grease or millscale to Consultant's approval.
- .4 All structural steel including hangers, brackets, supports and other ferrous metals shall be shop or factory prime painted wherever practicable. Wherever structural steel including hangers, brackets, supports, and other ferrous metals cannot be

shop or factory prime painted, wire brush to remove all traces of rust, clean of all traces of dirt, oil, and grease, and apply one coat of an approved rust inhibiting primer in accordance with CGSB-GB-40d and leave ready to receive finish paint.

3.16 Electrical Connections for Mechanical Equipment

- .1 Provide all required electrical connections to apparatus provided and/or supplied by Division 15, the Owner and as part of the work of other Divisions of the Specifications.
- .2 All power and control wiring over 50V, and disconnects shall be installed by the Electrical Contractor unless otherwise specified.
- .3 All control and low voltage wiring 50V and under shall be installed by the Mechanical Contractor. Coordinate all low voltage wiring with the Mechanical Contractor.

3.17 Equipment Identification

- .1 Refer to Section 16010.

3.18 Testing

- .1 Make tests of equipment and wiring at times requested.
- .2 Tests shall include meggered insulation values, voltage and current readings to determine balance of panels and feeders under full load, and operation of each piece of equipment for correct operation.
- .3 Supply meters, materials and personnel as required to carry out these tests.
- .4 Test electrical work to standards and function of Specification and applicable codes in an approved manner. Replace defective equipment and wiring with new material and leave entire system in complete first class operating condition.
- .5 Before energizing system, check all connections and set and calibrate all relays and instruments for proper operation, obtain necessary clearances, approval and instructions from utility company.
- .6 Connect single phase loads so that there is the least possible unbalance of the supply phases.
- .7 Submit all test results in report format.

END OF SECTION

PART 1 - GENERAL

1.1 Codes and Standards

- .1 Ontario Electrical Safety Code – Current Edition
- .2 CSA
- .3 ULC
- .4 Local Codes and Requirements

1.2 Submittals

- .1 Submit shop drawings to the Consultant for review prior to ordering or installation.
- .2 Shop drawings shall include manufacturer, model numbers, electrical data, wiring diagrams, and indicate conformance to above reference standards.

PART 2 - PRODUCTS

2.1 Fixtures

- .1 Luminaires including fixtures and lamps shall conform to the luminaire schedule.
- .2 Manufacturer:
 - .1 Acceptable Manufacturers: Refer to luminaire legend in drawings set for approved manufacturers.
 - .2 Alternate manufacturers must provide equal fixtures to the satisfaction of the Engineer. Any alternates that do not satisfy the specifications or the Engineer will be rejected.
 - .3 Alternate fixtures must be on approved DLC list if base specified fixtures are on approved list for applicable energy benefits.
 - .4 Where alternates alter functional or visual design, or change the space requirements or mounting details, all such information shall be clearly presented to the Consultant for consideration and any costs associated with same shall be the responsibility of the Contractor.
 - .5 Once shop drawings are approved, no substitutions will be considered except for special circumstances such as delivery. Delivery reasons shall only be considered if at no fault to the Contractor. Contractor's failure to order fixtures within the schedule will not be acceptable.
- .3 Similar luminaires shall be products of same manufacturer.
- .4 Luminaires shall be completely factory assembled and delivered in cartons or in palletized form.

- .5 All fixtures shall be recessed type in acoustic tile or drywall ceilings unless otherwise indicated. Provide drywall trim frame for recessed drywall applications.
- .6 Troffers in ceiling shall be equipped with adjustable mounting brackets.
- .7 All fixtures shall be provided with ballasts suitable for the fixture type and application. All ballasts shall be CSA approved and ULC listed and comply with CSA standard C22.2 No. 74. Ballasts shall be suitable for 120 volt application as noted.
- .8 Protective wire guards shall be provided for all fixtures where indicated on the drawings and where subject to damage.

2.2 Lenses

- .1 In general, lenses shall be K12 distribution acrylic 0.125" (32mm) thick, shall have a recessed prismatic pattern of 3/16" (5mm) square based female cones running 45 degrees to the parallel and perpendicular axis to the panel. Provide vandal lenses where specified.
- .2 Panel shall be made of ultraviolet inhibited injection moulded clear virgin acrylic.
- .3 Panels shall be strain free and uniform in production. There shall be no fade-outs or streaks to detract from job performance.
- .4 Lenses shall be low brightness, sparkling crystal panel that provides maximum efficiency and good brightness control in the direct glare zone.

2.3 Ballast

- .1 LED lamp ballasts shall be instant start or program start electronic types, designed to provide full light output of all 4' LED dimmable lamps, and as per the following specifications:
 - .1 Ballast must be on the LED lamp manufacturer's approved ballast compatibility list. No additional cost will be incurred for using non-approved ballast/lamp configurations.
 - .2 CSA approved and ULC listed and labeled;
 - .3 Comply with FCC Rules and Regulations, and ANSI Spec C62.41-1980/C62.45-1987;
 - .4 In accordance with ANSI Spec C82.11;
 - .5 Class A sound rating;
 - .6 Capable of starting lamps down to 0 degrees C;
 - .7 Total harmonic distortion less than 20%;
 - .8 Minimum power factor of 0.90 and ballast factor of at least 0.88;
 - .9 Lamp current crest factor not greater than 1.7;
 - .10 Frequency of operation between 20kHz minimum to 60kHz, but not between 30kHz and 42kHz; lamps shall operate without visible flicker;
 - .11 FI/EMI filtering;

.12 Five (5) years full replacement parts and labour included warranty.

.2 Acceptable manufacturers are Philips Advance, Universal Technologies, and Osram Sylvania.

2.4 Lamps

.1 LED lamps shall be energy saving, instant start, T-8 diameter bulb meeting the following specification:

- .1 All lamps must be of glass construction;
- .2 Lamps must have minimum 220 degree beam angle;
- .3 Lumen output must be a minimum 2000 lumens;
- .4 Lamps must be able to be installed in luminaire housing without any modifications required to be made to the housing;
- .5 Maximum lamp wattage to be 16 watts;
- .6 Colour temperature to be 4100°K;
- .7 Medium bi-pin base;
- .8 Lamps must be rated for 50,000 hour life space based on L70;
- .9 Lamps must be DLC listed for applicable energy grants;
- .10 Warranty must be a minimum of 5 years;
- .11 Only 4'-0" long lamps shall be used. No other lamp lengths will be accepted;
- .12 Acceptable manufacturers are Osram Sylvania, LED13T8/L48/DIM/841/SUB/G6

PART 3 – EXECUTION

3.1 General

- .1 Luminaires shall be stored in a dry and protected area. Confirm acceptable storage area prior to luminaire being delivered to site.
- .2 Lenses for fixtures shall be stored on site and installed separately from the fixtures at a time to be directed by the Consultant.

3.2 Installation of Lighting Fixtures

- .1 Provide all lighting fixtures and lamps as shown on the drawings and schedules.
- .2 Include for assembly, and mounting of all fixtures, complete with all wiring, connections, fittings, hangers, aligners, box covers and accessories which may be required for any fixture to provide a complete, safe, fully operational assembly.
- .3 Install fixtures in accordance with applicable reflected ceiling plans and/or as directed by the Consultant.

- .4 In Equipment Rooms, shafts and similar secondary areas, install fixtures after the mechanical and other major work is roughed-in and adjust fixture locations as required at no cost to the Owner. Fixtures in these areas shall be installed at the same height unless otherwise directed.
- .5 At the discretion of the Consultant, site test and demonstrate the operation of special application fixtures and adjust their locations within a reasonable distance to obtain the effects desired. Assist in the aligning and positioning of all adjustable fixtures and ensure that fixtures with adjustable lamp holders are properly positioned to correspond with the lamps specified.
- .6 Thoroughly review all ceiling types, construction details and mounting arrangements before placing fixture orders and ensure that all mounting assemblies, frames, rings and similar features are included for and match the required installation.
- .7 Mount luminaires perfectly level and plumb. Luminaires shall fit tightly to ceiling without showing a space or light leak between frame and ceiling. Re-install improperly installed fixtures at no expense to the Owner.
- .8 All fixtures and fixture assemblies shall be properly secured and supported. Support fixtures independent of the ceiling construction complete with all fasteners, framing and hangers as required. Do not secure fixtures to mechanical ductwork or other vibration producing apparatus.
- .9 Where fixtures are suspended from the structure they shall utilize self-aligning box covers with an additional ground wire from the outlet through the hanger for continuity of ground.
- .10 Carefully co-ordinate the fixture installation with the work of other trades ensuring that the necessary depths and mounting spaces are provided. Do not alter fixture locations unless approved by the Consultant.
- .11 All lamps shall be new and intact when the project is complete, and ready for acceptance. Replace lamps used for testing fixture assemblies at the discretion of the Consultant. Include a full lamp listing in the Operating and Maintenance Instructions.
- .12 Provide safety chains on all surface mounted, T-bar mounted or suspended light fixtures. Light fixtures shall have two chains, each supporting two corners of the luminaire (all four corners supported). Chain shall be #10 tensile jack chain, bright inc coated, with a strength of 400 lbs (180 kg). Attachments shall be made using a No. 10 "S" hook. Caddy fasteners may be used where applicable. "S" hooks must be closed after installation.
- .13 Industrial luminaires, where suspended, shall have ½" (12mm) conduit hangers and ARB cylinder ball aligners. Length and location shall clear equipment, ducts and pipes. Metal strut (Flexibar or equal) may be used for mounting of luminaires in mechanical areas or electrical rooms.

END OF SECTION

PART 1 - GENERAL

1.1 References

- .1 CAN/ULC-S524 (latest edition), Installation of Fire Alarm Systems.
- .2 ULC-S525 (latest edition), Audible Signal Appliances for Fire Alarm Systems.
- .3 CAN/ULC-S526 (latest edition), Visual Signal Appliances, Fire Alarm.
- .4 CAN/ULC-S527 (latest edition), Control Units, Fire Alarm.
- .5 CAN/ULC-S528 (latest edition), Manual Pull Stations.
- .6 CAN/ULC-S529 (latest edition), Smoke Detectors.
- .7 CAN/ULC-S530 (latest edition), Heated Actuated Fire Detectors, Fire Alarm.
- .8 CAN/ULC-S531 (latest edition), Smoke Alarms.
- .9 CAN/ULC-S536 (latest edition), Inspection and Testing of Fire Alarm Systems.
- .10 CAN/ULC-S537 (latest edition), Verification of Fire Alarm Systems.
- .11 OBC (latest edition), Ontario Building Code.

1.2 Description of System

- .1 Existing system includes:
 - .1 Control panel to carry out fire alarm and protection functions including receiving alarm signals, initiating general alarm, supervising system continuously, actuating zone annunciators, and initiating trouble signals.
 - .2 Trouble signal devices.
 - .3 Power supply facilities.
 - .4 Addressable manual alarm stations.
 - .5 Addressable automatic alarm initiating devices.
 - .6 Audible and visual signal devices.
 - .7 End-of-line devices.
 - .8 Annunciators.
 - .9 Ancillary devices.
 - .10 Interface and zone modules.

1.3 Requirements of Regulatory Agencies

- .1 This system is subject to review by local building department officials, local fire department officials. **Therefore, submission of verification certificate and field technical device verification sheets is required prior to inspection by these officials. Schedule accordingly.**

1.4 Shop Drawings

- .1 Submit shop drawings in accordance with Section 16010.
- .2 Include:
 - .1 Layout of equipment
 - .2 Zoning

1.5 Operation and Maintenance Data

- .1 Provide operation and maintenance data for Fire Alarm System for incorporation into manual specified in Section 16010.
- .2 Include:
 - .1 Technical data – illustrated parts list with parts catalogue numbers.
 - .2 Copy of approved shop drawings.

1.6 Demonstration

- .1 Arrange for on-site demonstrations by fire alarm equipment manufacturer to operational personnel.

1.7 System Operation

- .1 Operation of any alarm initiating device to:
 - .1 Cause audible and visual signal devices to sound throughout building.
 - .2 Transmit signal to fire department via monitoring station.
 - .3 Cause zone of alarm device to be indicated on control panel and remote annunciator(s).
 - .4 Cause air conditioning and ventilating fans to shut down and to function so as to provide required control of smoke movement.
 - .5 Cause fire doors and smoke control doors of normally held open, to close automatically.
 - .6 Log the alarm in the historical alarm log file.
- .2 System Trouble Operation
 - .1 Any system trouble shall cause the following to occur:
 - .1 An audible and visual trouble signal shall sound at the main control panel LCD Display Only until acknowledged by an operator.
 - .2 Log the trouble condition in the separate Historical Trouble Log File.

1.8 Performance Criteria

- .1 These specifications describe the minimum functional requirements for an electronically supervised, microprocessor based, fully integrated system. The initial installation shall include all the necessary electronic hardware, software and memory for a completely operable system in accordance with these specifications.

1.9 Quality Assurance

- .1 Each and all items of the fire alarm system shall be listed as the products of a single manufacturer under the appropriate category by the Underwriter's Laboratories of Canada and shall bear the "ULC" label.
- .2 Each and all items of the fire alarm system shall be covered by a one-year parts and labour warranty covering defects resulting from faulty workmanship and materials. The warranty shall be deemed to begin on the date the system is accepted by the Project Manager on issuance of the substantial performance certificate for the project.
- .3 All control equipment must have Transient Protection Devices to comply with ULC requirements.

PART 2 – PRODUCTS

2.1 Existing Fire Alarm System

- .1 Existing fire alarm system is Simplex 4100ES.

2.2 Devices

- .1 Provide all new materials, devices and wiring required for contract work in conformance with all codes.
- .2 All new devices shall be compatible with existing system.
- .3 Each and all items of the Fire Alarm System shall be compatible with the existing system and listed as a product of a SINGLE fire alarm system manufacturer under the appropriate category by the Underwriters' Laboratories of Canada Inc. (ULC) and listed as Underwriters' Laboratories of Canada Inc. (ULC), and shall bear the "ULC" label.

2.3 Conduit and Wire

- .1 Wiring shall be in accordance with local, provincial and national codes, and as recommended by the manufacturer of the fire alarm system.

- .2 Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG (1.02 mm) for initiating device circuits and signaling line circuits, and 14 AWG (1.63 mm) for notification appliance circuits.
 - .3 All wire and cable shall be listed and/or approved by recognized testing agency for use with protective signaling system.
 - .4 All field wiring shall be electrically supervised for open circuit and ground fault.
 - .5 All wire shall be installed in conduit. Provide wiremold for all wiring in exposed areas. All surface mounted conduit must be approved by Owner or Consultant prior to installation.
 - .6 Wire and cable not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in MFPA 70 (e.g. RPLF) and as per OBC.
 - .7 All junction boxes shall be painted 'red' and identified as signal or initiating.
- 2.4 End-of-Line Devices:
- .1 Reuse existing or provide new end-of-line devices mounted within outlet boxes.
 - .2 Provide on the cover plate for each such device on approved nameplate, engraved "END-OF-LINE RESISTOR" or with an approved symbol. Provide red lamacoid plate with white 6mm letters identifying zone.
- 2.5 Fan Shut Down
- .1 All new air handling equipment shall be tied into fire alarm system for fan shut down (including indoor air handling units, supply fans and return fans).

PART 3 - EXECUTION

3.1 Installation

- .1 The entire system shall be installed in accordance with CAN/ULC-S524 (latest edition) and approved manufacturers manuals and wiring diagrams. The contractor shall furnish all conduit, wiring, outlet boxes, junction boxes, cabinets and similar devices necessary for the complete installation. All wiring shall be of the type recommended by the Electrical Safety Code, approved by local authorities having jurisdiction for the purpose, and shall be installed in dedicated conduit throughout.
- .2 Locate and install detectors and connect to alarm circuit wiring.
- .3 Fire detectors shall not be located closer than 1000mm horizontally from tip of a ceiling suspended (paddle) fan or ceiling mounted unit heater measured to the edge of the detector.

- .4 Fire detectors shall not be located closer than 450mm from any supply or exhaust air outlet as measured to the edge of the detector.
- .5 Locate duct type detectors in straight portions of ducts.
- .6 Locate and install remote relay units to control fan shut down.
- .7 All junction boxes shall be painted 'red' and identified as signal or initiating.

3.2 Mounting Heights

- .1 Wall mounted audible signals: minimum 150mm (6") below ceiling and no less than 2300mm (90") A.F.F. to top of device.
- .2 Visual signals (strobes): entire lens 2000-2400mm (78"-94") A.F.F.
- .3 Combination horn/strobes: conform to .2 and .3 above.

3.3 Field Quality Control

- .1 The system shall be installed and fully tested under the supervision of trained manufacturer's representative. The system shall be demonstrated to perform all the functions as specified.

3.4 Acceptable Installer

- .1 The fire alarm/life safety system specified herein shall be installed by an Authorized Electrical Contractor who is CFAA Certified.

3.5 Examination

- .1 Prior to the commencement of any of the work detailed herein, an examination and analysis of the area(s) where the Fire Alarm/Life Safety System and all associated components are to be installed shall be made.
- .2 Any of these area(s) which are found to be outside the manufacturer's recommended environments for the particular specified products shall be noted on a Site Examination Report which shall be given to the Building Owner's Representative, and the Consultant.
- .3 Any shorts, opens, or grounds found on existing wiring shall be corrected prior to the connection of these wires to any panel component or field device.

3.6 Demonstration

- .1 Arrange for on-site demonstrations by fire alarm equipment manufacturer to operational personnel, owner, consultant and building official as requested.

3.7 System Test and Verification

- .1 Perform tests in accordance with Section 16010 and CAN/ULC-S537 (latest edition) Standard for the Verification of Fire Alarm Systems.
- .2 Submit complete report and test letter to the Consultant.
- .3 Fire Alarm System:
 - .1 Test each device and alarm circuit to ensure noted devices transmit alarm to control panel and actuate general alarm ancillary devices.
 - .2 Check annunciator panels to ensure zones are show correctly.
 - .3 Simulate grounds and breaks on alarm circuits to ensure proper operation of system.
 - .4 Class A Circuits:
 - .1 Test each conductor on all circuits for capability of providing alarm signal on each side of single open-circuit fault condition imposed near middlemost point of circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.
 - .2 Test each conductor on all circuits for capability of proving alarm signals during ground-fault condition imposed near middlemost point of circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.
 - .5 Class B Circuits:
 - .1 Test each conductor on all circuits for capability of providing alarm signal on line side of single open-circuit fault condition imposed at electrically most remote device on circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.
- .4 Verify fan shut down for all air handling equipment and include in verification report.

3.8 Graphic

- .1 Provide new active fire alarm graphic to suit fire alarm upgrades including floor plan changes or zone changes, where indicated on the drawings.

END OF SECTION

Henry Street High School
Project Name: Ventilation Upgrades
Site Address: 600 Henry Street, Whitby, ON L1N 5C7

T22-13
Issued For: Bid
Date: January 14, 2022

16.0 DRAWINGS

CASH ALLOWANCES:

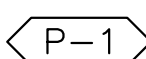
- INCLUDE IN THE CONTRACT PRICE, CASH ALLOWANCES STATED HEREIN.
- CASH ALLOWANCES SHALL BE CARRIED BY THE PRIME (GENERAL) CONTRACTOR, NOT BY INDIVIDUAL SUBCONTRACTORS.
- CASH ALLOWANCES COVER THE NET COST TO THE CONTRACTOR OF SERVICES, PRODUCTS, CONSTRUCTION MACHINERY AND EQUIPMENT, FREIGHT, UNLOADING, HANDLING, STORAGE, INSTALLATION AND OTHER AUTHORIZED EXPENSES INCURRED IN PERFORMING THE WORK STIPULATED UNDER THE INDIVIDUAL CASH ALLOWANCE.
- THE CONTRACT PRICE, AND NOT THE CASH ALLOWANCES, INCLUDES THE CONTRACTOR'S OVERHEAD AND PROFIT IN CONNECTION WITH SUCH CASH ALLOWANCES.
- WHERE AUTHORIZED EXPENDITURES UNDER CASH ALLOWANCES EXCEED THE AGGREGATE SUM OF ALL OF THE CASH ALLOWANCES THE CONTRACTOR SHALL BE ENTITLED TO COMPENSATION FOR THE OVERRUN PLUS AN AMOUNT FOR OVERHEAD AND PROFIT AS SPECIFIED IN THE CONTRACT DOCUMENTS.
- THE CONTRACT PRICE SHALL BE ADJUSTED BY WRITTEN ORDER TO PROVIDE FOR ANY INCREASE OR DECREASE TO THE AGGREGATE OF ALL THE CASH ALLOWANCES AS A CHANGE ORDER. NO REFUND OR MARK-UP WILL BE EXPECTED FROM THE CONTRACTOR IF ACTUAL EXPENDITURE AGAINST SPECIFIED PURPOSE CASH ALLOWANCES IS LESS THAN THE AGGREGATE TOTAL OF SUCH ALLOWANCES.
- PROGRESS PAYMENTS ON ACCOUNT OF WORK AUTHORIZED UNDER CASH ALLOWANCES SHALL BE INCLUDED AS SEPARATE AND INDIVIDUAL LINE ITEMS IN THE CONTRACTOR'S MONTHLY CERTIFICATE FOR PAYMENT.

No.1: UNFORESEEN CHANGES TO SITE = \$7,500
 No.2: CONTROLS (INSTALLING CONTRACTOR) = \$30,000
 No.3: P.A./COMMUNICATIONS = \$5,000
 No.4: DOOR WRAPS = \$2,500

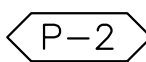
TOTAL ALLOWANCE = \$45,000



INDICATES 1800mm DIA. BARRIER FREE TURNING RADIUS (2130mm IN BARRIER FREE WASHROOMS) REQUIRED



Denotes 118mm FURRING W: 92mm METAL STUD, 13mm PLYWOOD, 13mm GYPSUM.

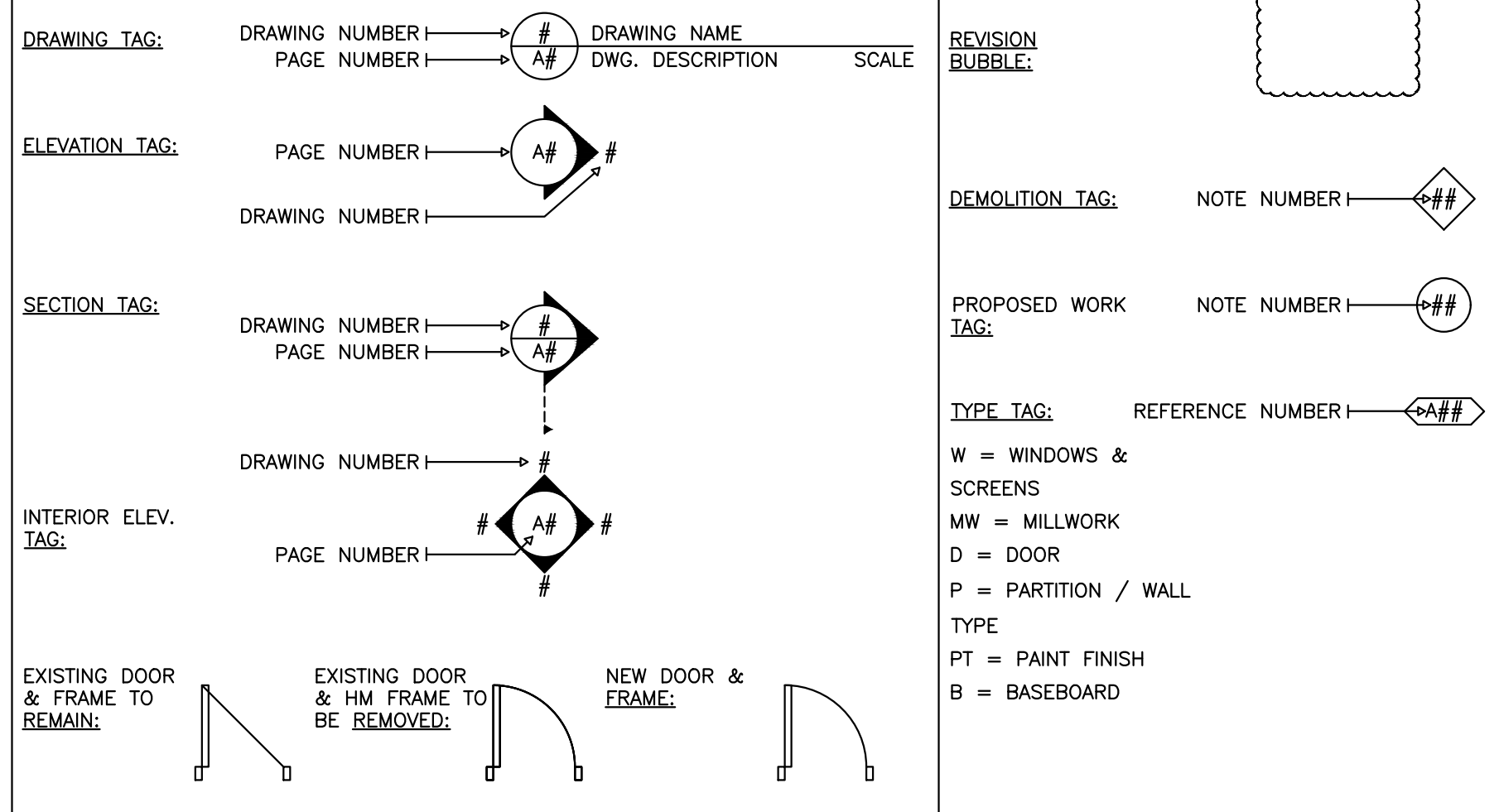


Denotes 13mm GYPSUM ON EXISTING CMU WALL, EXISTING CMU WALL, 13mm GYPSUM.

GENERAL NOTES:

- ALL WORK TO COMPLY WITH ALL APPLICABLE BUILDING CODES AS WELL AS CITY OF PICKERING BY-LAWS.
- THE CONTRACTOR SHALL ALLOW FOR DETAILED SITE INVESTIGATION, VERIFY ALL DIMENSIONS ON SITE, AND BRING ANY DISCREPANCIES FORWARD BEFORE TENDER OR SUBMITTING A QUOTE.
- THE CONTRACTOR IS TO BE RESPONSIBLE FOR REFINISHING ALL DAMAGED SURFACES TO ADJACENT AREAS AND NEW AREAS.
- THESE DRAWINGS SHALL NOT BE SCALED UNLESS OTHERWISE AND SPECIFICALLY NOTED. ACCURACY OF ANY SCALES PROVIDED ARE NOT GUARANTEED.
- INSTALL ALL PRODUCTS IN CONFORMANCE WITH MANUFACTURER'S SPECIFICATIONS.
- REMOVE ALL REDUNDANT EQUIPMENT AND MATERIALS FROM SITE AND DISPOSE OF IN AN APPROVED MANNER. REDUNDANT EQUIPMENT AND MATERIALS SHALL NOT BE ABANDONED IN PLACE.
- THE CONTRACTOR SHALL PRICE, SUPPLY, & INSTALL ALL PRODUCTS NOTED THROUGHOUT THIS DRAWING SET UNLESS OTHERWISE STATED AS: "SUPPLIED BY" AND/OR "INSTALLED BY," THE "OWNER," AND/OR "DDSB".
- ITEMS TO BE TURNED OVER TO OWNER (DDSB) ARE TO BE DELIVERED TO THE MAINTENANCE SHOP (710 BAYLY STREET, AJAX) IF TURN OVER AT THE EDUCATION CENTRE IS NOT ACCEPTABLE OR APPROPRIATE.
- AT NO TIME SHALL MASONRY DRY CUTTING TAKE PLACE. ALL MASONRY TO BE WET-CUT ONLY.
- UNLESS OTHERWISE PROVIDED BY THE MANUFACTURER, A MINIMUM OF 1 YEAR WARRANTY SHALL BE PROVIDED FOR ALL NEW INSTALLATIONS.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE TEMPORARY REMOVAL OF DOOR COMPONENTS IN ANY UNFORESEEN SITUATION(S) WHICH ARISE FROM MATERIAL / PRODUCT SIZE BEING INCOMPATIBLE WITH THE EXISTING, UNALTERED OPENING(S).
- THE CONTRACTOR SHALL SCAN FLOORS AND WALLS BEFORE CUTTING, CORING OR TRENCHING.
- PREPARE INTERFERENCE DRAWINGS AS REQUIRED.
- OBTAIN, ARRANGE AND PAY FOR ALL REQUIRED PERMITS AND INSPECTIONS AND NOTICE OF PROJECT.
- THE CONTRACTOR AND ITS SUB-TRADES SHALL ATTEND BI-WEEKLY SITE MEETINGS OR AS ARRANGED BY CONSULTANT OR OWNER.
- OBTAIN AND REVIEW THE DESIGNATED SUBSTANCE REPORT FROM THE CLIENT AND COORDINATE ANY DESIGNATED SUBSTANCE ISSUES WITH THE CLIENT PRIOR TO ANY WORK BEING DONE.
- PROVIDE SHOP DRAWINGS ELECTRONICALLY IN PDF FORMAT TO CONSULTANT FOR REVIEW. ALL SHOP DRAWINGS MUST BE REVIEWED, STAMPED AND SIGNED BY THE GENERAL CONTRACTOR OR APPLICABLE SUBTRADE PRIOR TO SUBMITTING TO THE CONSULTANT. REVIEW SHALL INCLUDE BUT NOT BE LIMITED TO: VERIFYING UNIT VOLTAGE WITH ELECTRICAL AND/OR SITE, EQUIPMENT PERFORMANCE, DIMENSIONS AND CLEARANCES. SUBMIT SHOP DRAWINGS ELECTRONICALLY TO INFO@DURHAMENERGY.COM.
- MAINTAIN RECORD DRAWINGS ON AN ON-GOING BASIS. DRAWINGS SHALL BE AVAILABLE FOR PERIODIC REVIEW BY THE CONSULTANT DURING CONSTRUCTION.
- DO NOT USE ANY EXISTING OR NEW AIR HANDLING EQUIPMENT FOR TEMPORARY USE DURING CONSTRUCTION WITHOUT WRITTEN APPROVAL. WHERE SYSTEMS ARE USED AND ARE CONTAMINATED BY DUST OR DIRT, THE CONTRACTOR SHALL CLEAN IN A MANNER ACCEPTABLE TO THE CONSULTANT.
- WELDING IS NOT PERMITTED DURING OCCUPIED SCHOOL HOURS (STUDENTS OR STAFF).
- ALL CUTTING AND CORING SHALL BE BY THE GENERAL CONTRACTOR OR APPLICABLE SUBTRADE AS PRE-DETERMINED AND COORDINATED. ALL PATCHING BY GENERAL CONTRACTOR. COORDINATE TRENCHING, EXCAVATION AND BACKFILL FOR UNDERGROUND PLUMBING WITH PLUMBING CONTRACTOR. ALL SAW CUTTING AND RESTORATION OF CONCRETE FLOOR BY GENERAL CONTRACTOR.
- ALL ROOFING AND PITCH POCKETS BY GENERAL CONTRACTOR.
- PITCH POCKETS SHALL BE GOOSENECK STYLE EQUAL TO THALER METAL MEF-2A OR DOGHOUSE. SIZE AS REQUIRED TO SUIT FEEDS. COORDINATE WITH SUBTRADES.
- THE CONTRACTOR SHALL ARRANGE FOR INSPECTIONS BY THE ENGINEER PRIOR TO CEILING AND WALLS BEING CLOSED IN. WHERE THIS HAS NOT BEEN ARRANGED IT IS THE CONTRACTOR'S RESPONSIBILITY TO REMOVE CEILING TILES OR ACCESS DOORS FOR INSPECTION AT THE DIRECTION OF THE ENGINEER.
- ARRANGE FOR INSTRUCTION AND DEMONSTRATION TO THE OWNER ON PROPER OPERATION OF THE SYSTEMS. RECORD AND SUBMIT A LOG DATED AND SIGNED BY ALL ATTENDEES.
- UPON COMPLETION OF THE PROJECT THE CONSULTANT WILL DO A FINAL REVIEW. UPON RECEIVING THE FINAL INSPECTION REPORT, THE CONTRACTOR MUST CORRECT AND SIGN BACK THE INSPECTION REPORT INDICATING ALL DEFICIENCIES ARE COMPLETED. A RE-INSPECTION WILL ONLY BE DONE ONCE THE CONSULTANT PERFORMS THIS RE-INSPECTION AND THE WORK IS NOT COMPLETE. THE CONTRACTOR IS RESPONSIBLE FOR REIMBURSING THE CONSULTANT FOR THE FIELD REVIEW. THE FEE FOR ADDITIONAL REVIEWS WILL BE AT THE CONSULTANT'S HOURLY RATES PLUS MILEAGE AND APPLICABLE TAXES TO BE PAID DIRECTLY TO THE CONSULTANT PRIOR TO PERFORMING THE NEXT FIELD REVIEW.
- PROVIDE ONE (1) YEAR WARRANTY ON ALL MATERIAL AND LABOUR FROM THE DATE OF SUBSTANTIAL COMPLETION.
- PROGRESS DRAWS SHALL INCLUDE MINIMUM \$2,500.00 FOR MANUALS AND AS-BUILT DRAWINGS PLUS AMOUNTS LISTED FOR EACH SUBTRADE. TOTAL AMOUNT SHALL REMAIN UNBILLED UNTIL MANUALS AND AS-BUILT DRAWINGS HAVE BEEN SUBMITTED AND APPROVED.
- PROVIDE ONE(1) ELECTRONIC COPY OF MAINTENANCE MANUALS ON USB. MANUAL SHALL INCLUDE TABLE OF CONTENTS, CONTRACTOR INFORMATION, WARRANTY LETTER, SHOP DRAWINGS, O&Ms, INSPECTION & TEST REPORTS, AND AS-BUILT DRAWINGS. AS-BUILT DRAWINGS SHALL INCLUDE COMPLETE DRAWING SET WITH ANY CHANGES MARKED CLEARLY AND NEATLY IN COLOUR. AS-BUILTS SHALL BE STAMPED ACCORDINGLY BY THE CONTRACTOR (ALL DRAWINGS). DRAWINGS SHALL BE SCANNED IN FULL SIZE BY THE CONTRACTOR AND SUBMITTED IN HARD COPY. SUBSTANTIAL COMPLETION WILL NOT BE AWARDED UNTIL THE MANUALS AND AS-BUILTS HAVE BEEN SUBMITTED TO THE CONSULTANT AND THE CONSULTANT HAS APPROVED.

SYMBOLS LEGEND

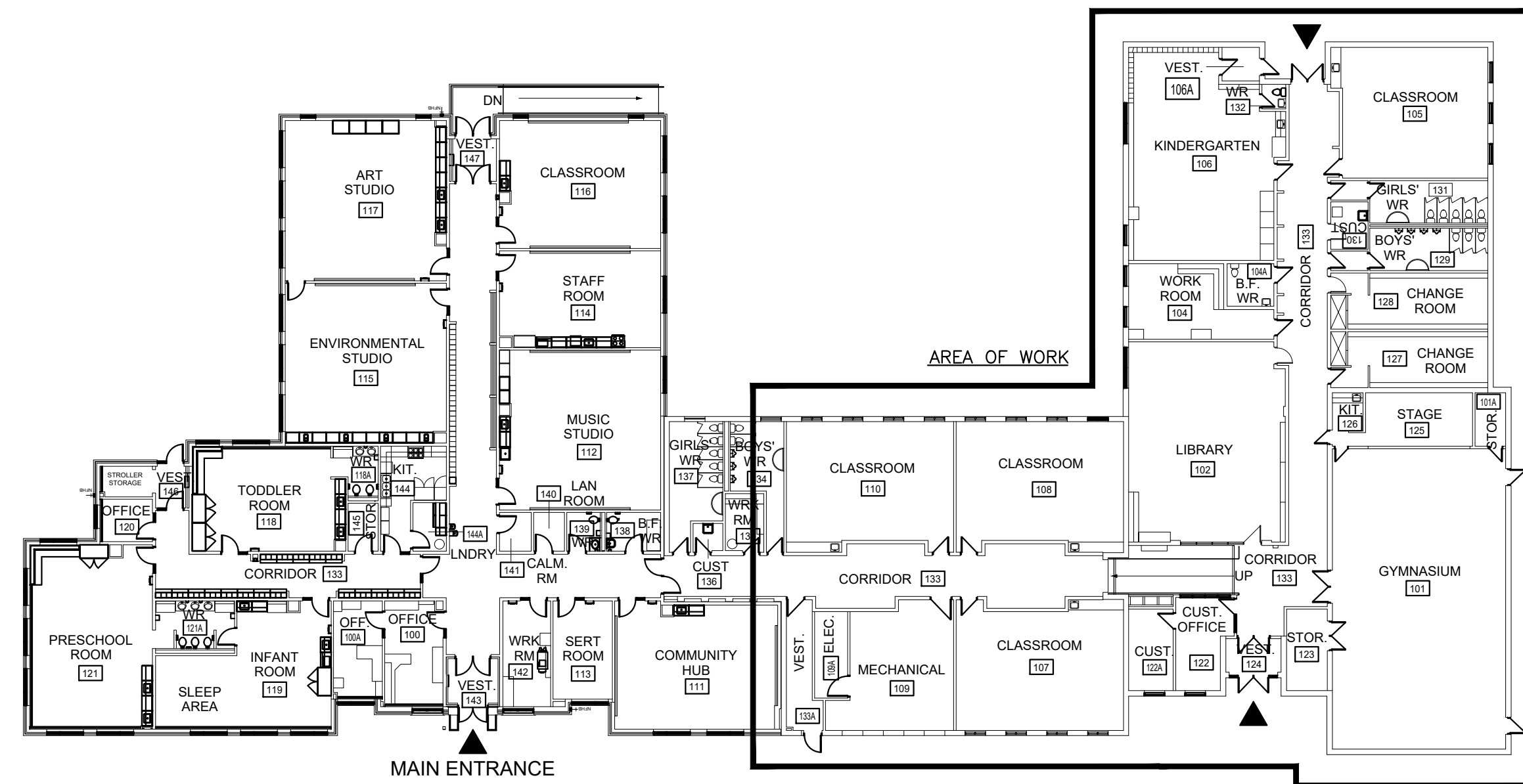


WALL TYPES

LABEL	DESCRIPTION	NOTES
P-1	NEW INTERIOR FURRING: • EXISTING CMU WALL • 3/8" METAL STUD LAYER • 1/2" PLYWOOD • 1/2" GYPSUM BOARD	<ul style="list-style-type: none"> STUDS: SUB-FLOOR TO UNDERSIDE OF ROOF DECK. PLYWOOD & GYPSUM: FINISH FLOOR TO 6" ABOVE CEILING GRID. TAPE, MUD, & SAND GYPSUM PRIOR TO APPLYING PRIMER / PAINT.
P-2	GYPSUM ON EXIST. CMU WALL: • EXISTING CMU WALL • 1/2" GYPSUM BOARD	<ul style="list-style-type: none"> FINISH FLOOR TO 6" ABOVE CEILING GRID. TAPE, MUD, & SAND GYPSUM PRIOR TO APPLYING PRIMER / PAINT.

KEY PLAN

NTS



ABBREVIATIONS / ACRONYMS:

- ACSTIC.** ACOUSTIC
ACT ACOUSTIC CEILING TILE
AKA ALSO KNOWN AS
AP ACCESS POINT
APPROX. APPROXIMATELY
BTTM. BOTTOM
CJ CONTROL JOINT
CP CONTROL PANEL
DDSB DURHAM DISTRICT SCHOOL BOARD
DIM(S) DIMENSION(S)
DWG. DRAWING
E.Q. EQUAL
EX. EXISTING
EXIST. EXISTING
FIN. FINISH
F.R.R. FIRE RESISTANCE
RATING SQUARE FEET
FT² HOLLOW METAL
HM INSULATION
INSUL. INSULATION
LIN. FT. LINEAR FEET
LVT LUXURY VINYL TILE
NA NOT APPLICABLE
PROP. PROPOSED
PT PAINT
RCP REFLECTED CEILING PLAN
RM ROOM
T.B.D. TO BE DETERMINED /DISCUSSED
VP VISION PANEL
W WITH

DRAWING LIST:

GENERAL TRADES	MECHANICAL
G001 - LEGENDS, DETAILS & KEY PLAN	M101 - 1972 ADDITION & CENTRAL CLASSROOMS DEMO HVAC LAYOUT
G201 - LIBRARY 102 DEMO & NEW LAYOUT	M201 - 1972 ADDITION & CENTRAL CLASSROOMS NEW HVAC LAYOUT
G202 - LIBRARY 102 DEMO & NEW RCP LAYOUT	M202 - ROOF PLAN NEW POWER LAYOUT
G203 - 1972 ADDITION & CENTRAL CLASSROOMS LAYOUT	M501 - CONTROLS
G204 - LIBRARY 102 FINISH PLAN	M801 - LEGENDS & NOTES
G205 - ELEVATIONS & MILLWORK DETAILS	M802 - SCHEDULES
G206 - ELECTRICAL LEGENDS & SYMBOLS	M901 - DETAILS
	M902 - DETAILS
STRUCTURAL	ELECTRICAL
S101 - GENERAL NOTES	E101 - LIBRARY 102 DEMO POWER & LIGHTING LAYOUTS
S201 - TYPICAL DETAILS	E201 - 1972 ADDITION & CENTRAL CLASSROOMS REVISED ELECTRICAL LAYOUT
S202 - PART ROOF FRAMING PLAN	E202 - ROOF NEW POWER LAYOUT
S401 - SECTIONS AND DETAILS	E203 - LIBRARY 102 NEW POWER LAYOUT
	E301 - LIBRARY 102 NEW LIGHTING LAYOUT
	E801 - LEGENDS & NOTES
	E901 - PANEL SCHEDULES & DETAILS

O.B.C. PART 11 COMPLIANCE DATA			APPLICABLE OBC SECTION
CLASSIFICATION OF EXISTING BUILDING:	EXISTING BUILDING USE: CHANGE OF MAJOR OCCUPANCY:	ELEMENTARY SCHOOL A-2 NONE (CONSTRUCTION INDEX & HAZARD INDEX NOT APPLICABLE)	11.2
PROPOSED CONSTRUCTION:	BASIC RENOVATION PER 11.3.3.1		11.3
PERFORMANCE LEVEL EVALUATION:	STRUCTURAL: BY INCREASE IN OCCUPANT LOAD: OCCUPANCY: PLUMBING: SEWAGE-SYSTEM:	NO REDUCTION IN PERFORMANCE LEVEL NO REDUCTION IN PERFORMANCE LEVEL NO REDUCTION IN PERFORMANCE LEVEL NO REDUCTION IN PERFORMANCE LEVEL	11.4
COMPENSATING CONSTRUCTION:	NONE REQUIRED		11.4.3
COMPLIANCE ALTERNATIVES:	NONE REQUIRED		11.5

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ISSUES/REVISIONS		
No.	DESCRIPTION	DATE
1	ISSUED FOR CLIENT REVIEW	FEB 11 2022
2	ISSUED FOR PERMIT & TENDER	FEB 15 2022

DES DURHAM ENERGY SPECIALIST LIMITED
 CONSULTING ENGINEERS
 PH: (905)430-7151 FAX: (905)430-7154
 106-209 DUNDAS STREET EAST, WHITBY ONTARIO
 info@durhamenergy.com / www.durhamenergy.com

PROFESSIONAL ENGINEER
 B. R. TIMSON
 10051098
 FEB 15/22
 PROVINCE OF ONTARIO

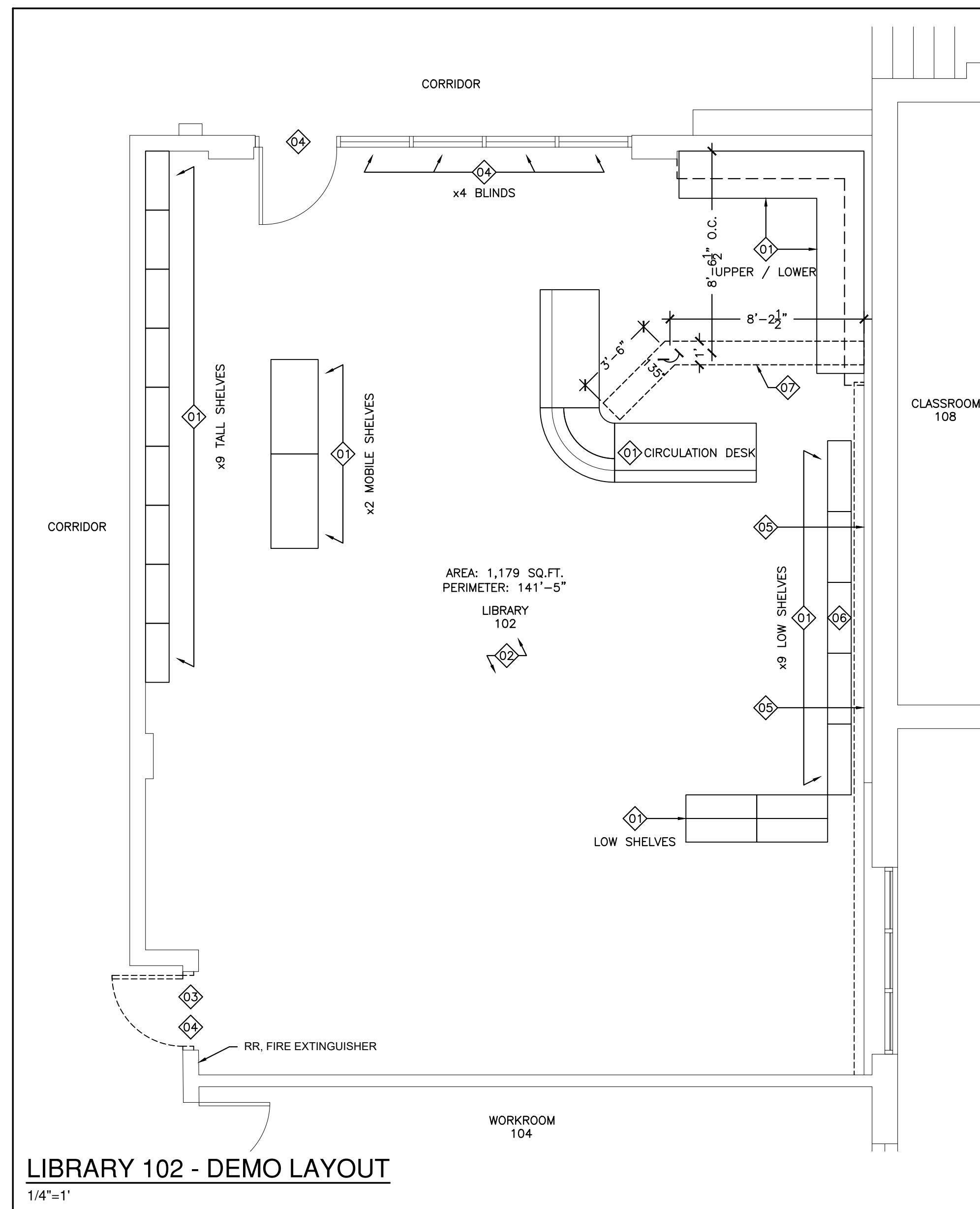
DURHAM DISTRICT SCHOOL BOARD
CLAREMONT PS VENTILATION UPGRADES
 1675 CENTRAL STREET
 CLAREMONT, ONTARIO

DATE: FEBRUARY 2022	SCALE: NTS
DRAWN BY: MRC	CHECKED BY: BRT
DES PROJECT NUMBER: 22-549	SHEET SIZE: D

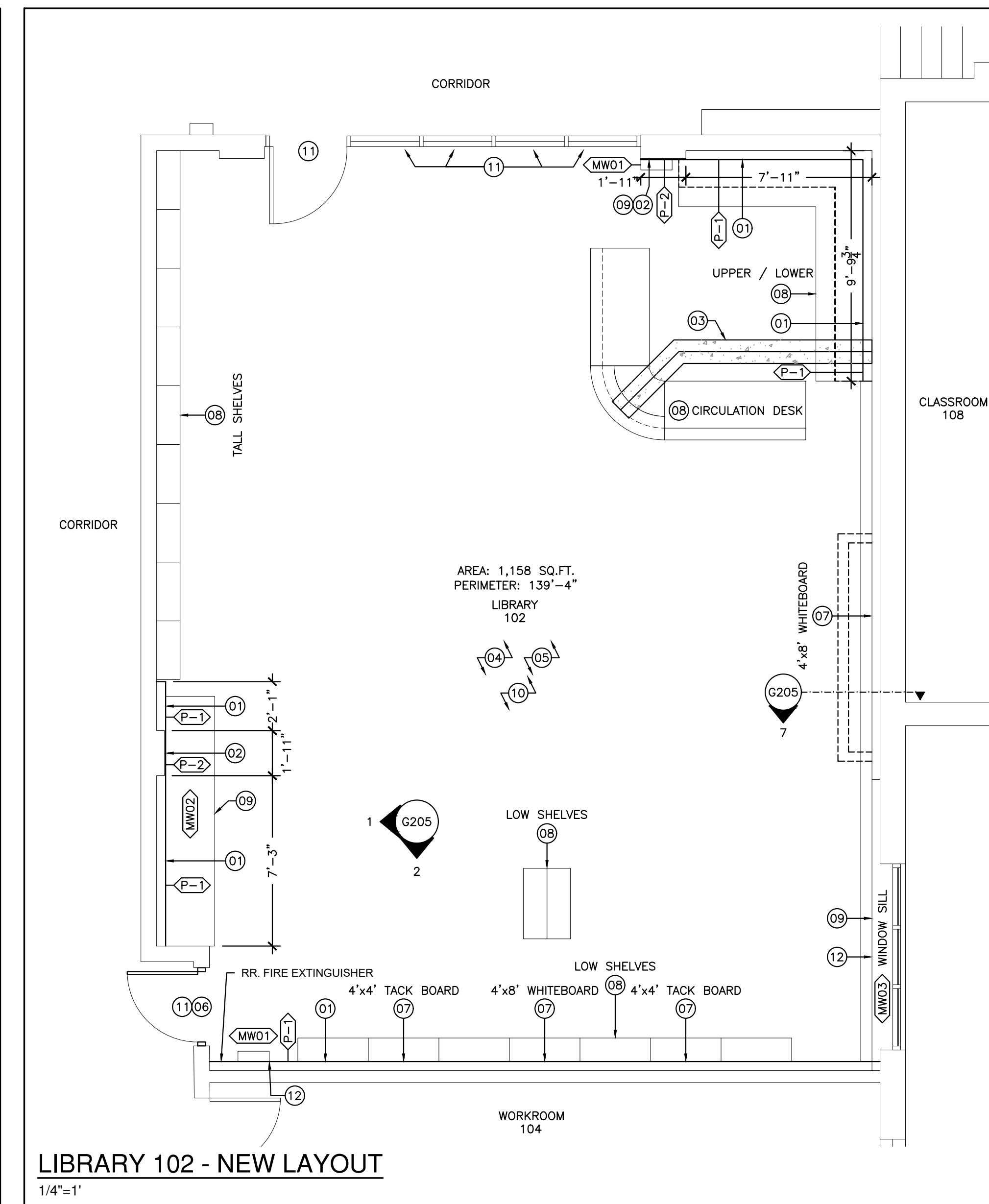
GENERAL TRADES LEGENDS, DETAILS & KEY PLAN

G001

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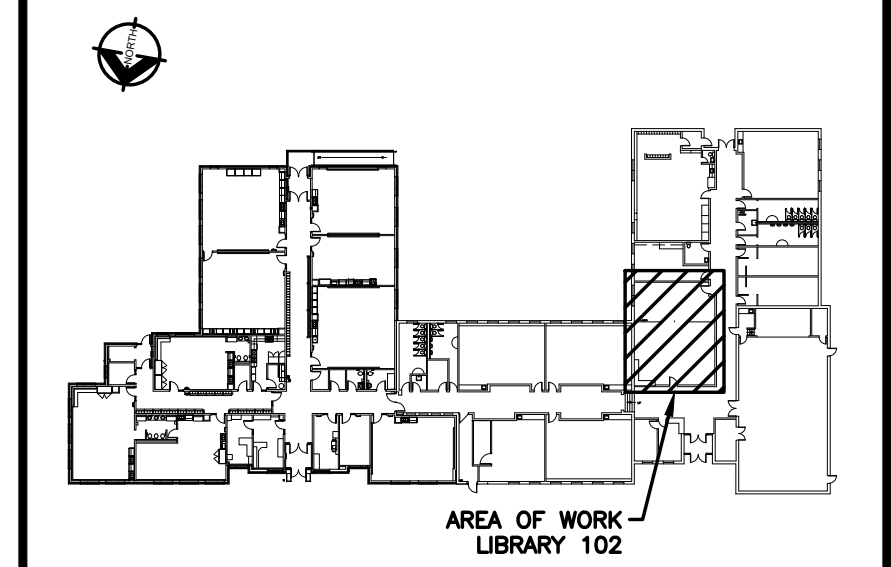


- DEMOLITION WORKING NOTES:**
- 01 EXISTING MILLWORK TO BE UNINSTALLED, RELOCATED, AND STORED WITHIN SCHOOL THROUGHOUT PROJECT. ITEMS TO BE PROTECTED FOR REINSTALLATION AS PART OF PROPOSED WORK. LOCATION OF STORAGE TO BE DISCUSSED, FINAL DECISION SHALL FALL UPON THE DDSB PROJECT SUPERVISOR.
 - 02 REMOVE AND DISPOSE OF FLOORING THROUGHOUT. INCLUDE RUBBER BASE ALONG PERIMETER OF WALLS.
 - 03 REMOVE AND DISPOSE OF EXISTING WOOD DOOR AND HARDWARE. FRAME TO REMAIN TO HOUSE NEW DOOR.
 - 04 TEMPORARILY UNINSTALL EXISTING ROLLER BLINDS. TO BE SAFELY STORED ON SITE UNTIL NEEDED FOR REINSTALLATION.
 - 05 REMOVE AND DISPOSE OF EXISTING TACK BOARDS.
 - 06 REMOVE & TURN OVER TO SCHOOL, EXISTING WALL-MOUNTED PROJECTOR SCREEN.
 - 07 TRENCH CONCRETE SLAB TO ACCOMMODATE NEW ELECTRICAL RUNS. SCAN FLOOR PRIOR TO ANY WORK BEING PERFORMED. COORDINATE WITH ELECTRICAL CONTRACTOR.



- NEW WORKING NOTES:**
- 01 PROVIDE AND INSTALL MATERIALS TO CONSTRUCT INTERIOR WALL FURRING AS PER WALL TYPE: [P-1].
 - 02 PROVIDE & INSTALL GYPSUM BOARD TO LAMINATE EXISTING CMU WALL AS PER WALL TYPE: [P-2].
 - 03 INFILL CONCRETE TRENCH UPON ELECTRICAL EMT INSTALL, COORDINATE WITH ELECTRICAL CONTRACTOR ON TIMING. PROVIDE 10mm DOWELS INTO EXISTING FLOOR SLAB AT 400mm O/C. CAST CONCRETE SLAB INFILL TO MATCH EXISTING THICKNESS. MAKE GOOD ON EXISTING CONCRETE SUB-FLOOR AS REQUIRED. ENSURE SURFACE IS LEVEL AND SMOOTH FOR FLOORING INSTALLATION.
 - 04 PROVIDE AND INSTALL NEW FLOORING THROUGHOUT. PRODUCT AND LOCATION TO BE GOVERNED AS PER (1/G204) FINISH PLAN.
 - 05 PROVIDE & INSTALL NEW RUBBER BASE ALONG PERIMETER OF ROOM, OR ON BOTTOM OF MILLWORK AS NOTED. TO BE: BLACK [40] 4" RUBBER BY JOHNSONITE.
 - 06 PROVIDE AND INSTALL NEW WOOD DOOR FOR EXISTING HM FRAME. REFER TO DOOR SCHEDULE FOR MORE INFORMATION.
 - 07 PROVIDE & INSTALL NEW WHITEBOARDS & TACK BOARDS AS SHOWN. COORDINATE LOCATION & HEIGHT WITH DDSB PROJECT SUPERVISOR PRIOR TO INSTALL.
 - 08 REINSTALL EXISTING MILLWORK AS SHOWN.
 - 09 PROVIDE AND INSTALL NEW MILLWORK.
 - 10 PATCH, PRIME, AND PAINT ALL WALLS, HM FRAMES (BOTH SIDES), AND BULKHEADS THROUGHOUT. FINISHES TO BE GOVERNED BY (1/G204) FINISH PLAN.
 - 11 RE-INSTALL EXISTING ROLLER BLINDS.
 - 12 PROVIDE AND INSTALL NEW DOUBLE-SHADE ROLLER BLINDS FOR EXTERIOR WINDOW. VERIFY SITE DIMENSIONS PRIOR TO ORDERING. TO BE: BLACKOUT & 3%. REFER TO (G204) FOR MORE INFORMATION.

ISSUES/REVISIONS		
No.	DESCRIPTION	DATE
1	ISSUED FOR CLIENT REVIEW	FEB 11 2022
2	ISSUED FOR PERMIT & TENDER	FEB 15 2022



KEY PLAN - GROUND FLOOR

DES DURHAM ENERGY SPECIALIST LIMITED
CONSULTING ENGINEERS
PH:(905)430-7151 FAX:(905)430-7154
106-209 DUNDAS STREET EAST, WHITBY ONTARIO
info@durhamenergy.com / www.durhamenergy.com

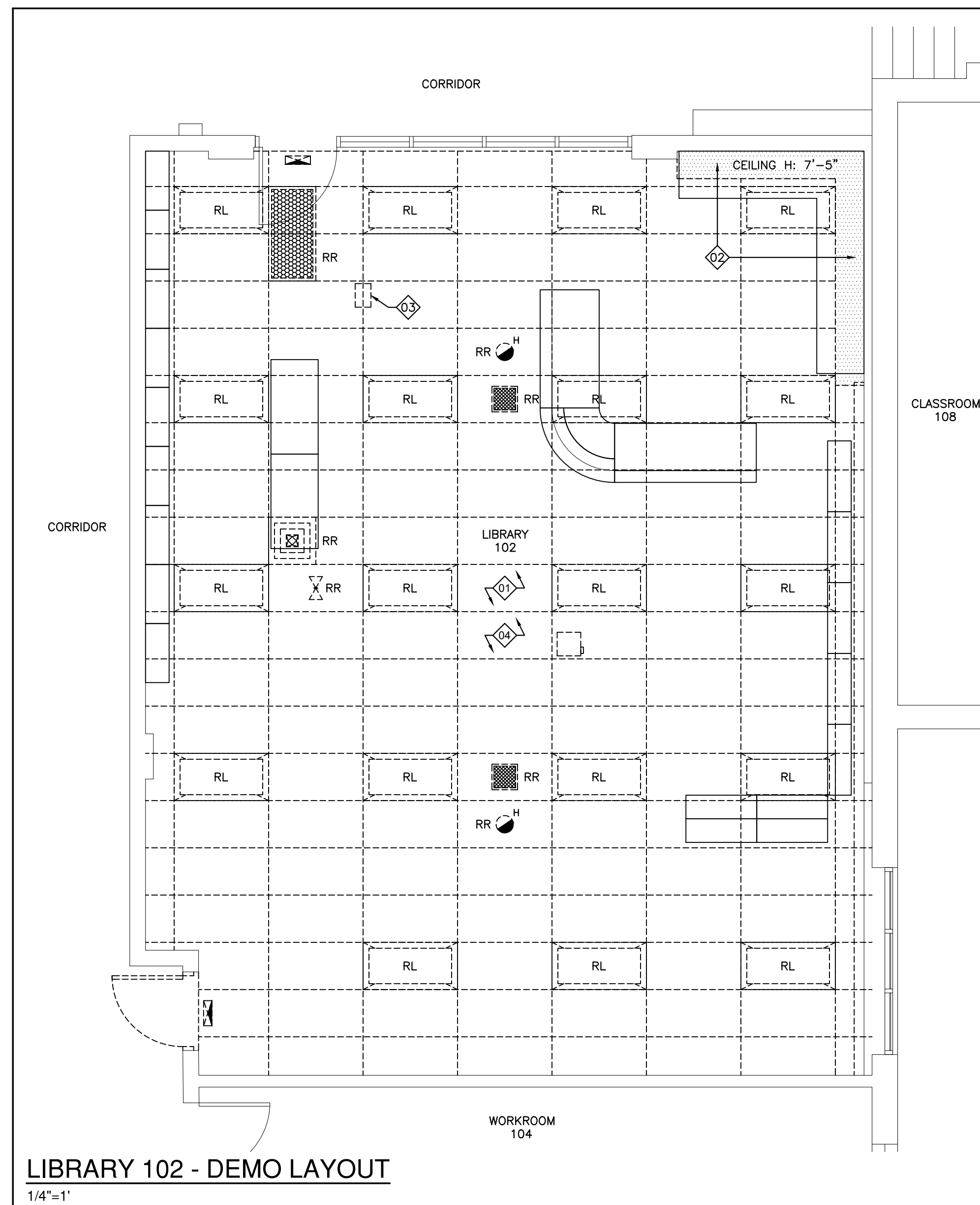
DURHAM DISTRICT SCHOOL BOARD
CLAREMONT PS VENTILATION UPGRADES
1675 CENTRAL STREET
CLAREMONT, ONTARIO

DATE: FEBRUARY 2022	SCALE: AS NOTED
DRAWN BY: MRC	CHECKED BY: BRT
DES PROJECT NUMBER: 22-549	SHEET SIZE: D

GENERAL TRADES
LIBRARY 102
DEMO & NEW LAYOUTS

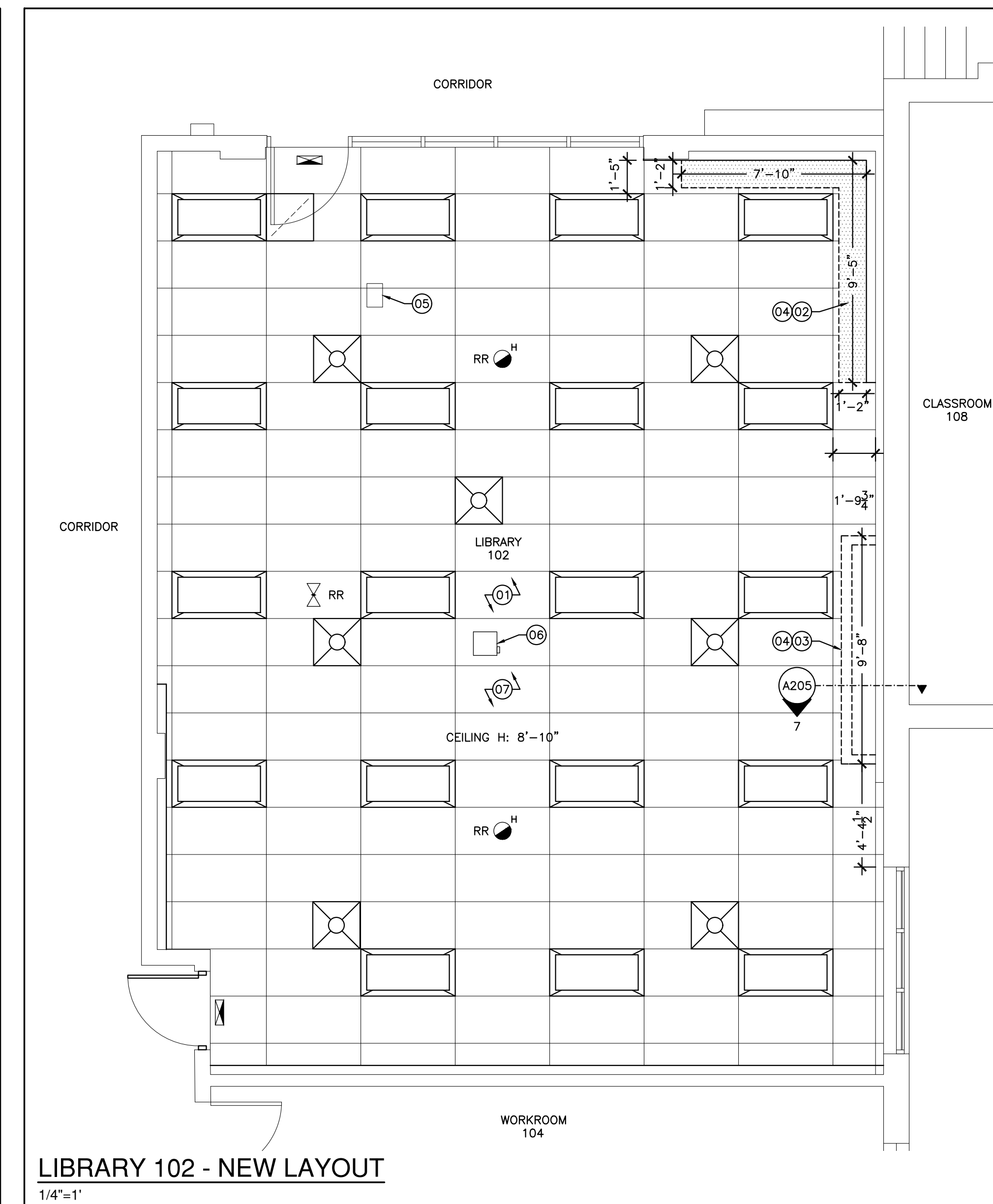
G201

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LIBRARY 102 - DEMO LAYOUT
1/4"=1'

- RCP DEMOLITION WORKING NOTES:**
- ① REMOVE, AND SAFELY STORE, EXISTING ACOUSTIC CEILING TILES. TO BE REINSTALLED AS PART OF PROPOSED CEILING WORK. REMOVE AND DISPOSE OF EXISTING T-BAR GRID SYSTEM.
 - ② REMOVE AND DISPOSE OF EXISTING GYPSUM BULKHEAD.
 - ③ WIRELESS ACCESS POINTS TO BE UNINSTALLED BY DDSB IT DEPARTMENT PRIOR TO START OF PROJECT.
 - ④ REFER TO MECHANICAL DRAWINGS FOR DIRECTION ON AIR DIFFUSERS AND FILTRATION.

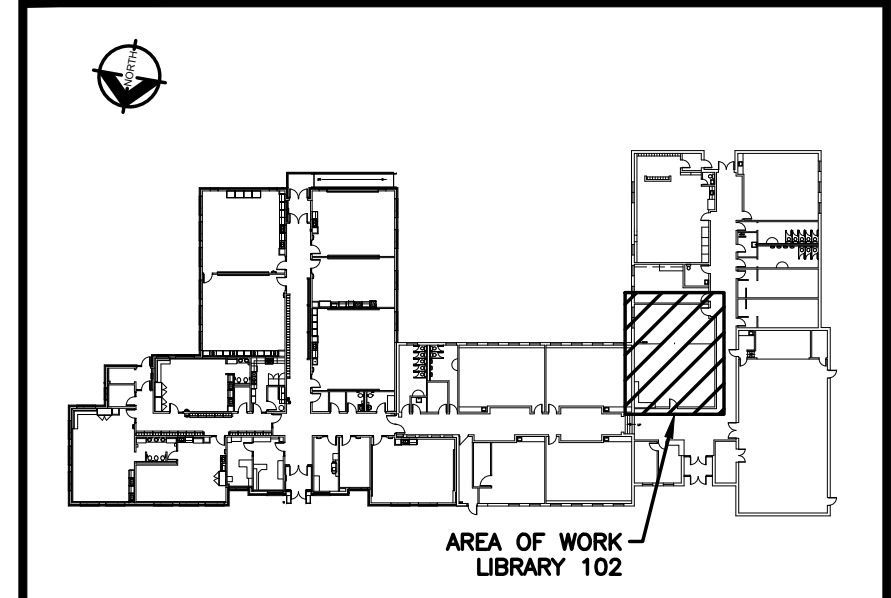


LIBRARY 102 - NEW LAYOUT
1/4"=1'

- RCP NEW WORKING NOTES:**
- ① PROVIDE AND INSTALL NEW T-BAR CEILING GRID. REINSTALL EXISTING ACOUSTIC CEILING TILES THROUGHOUT. PROVIDE AND INSTALL NEW TILES AS REQUIRED. CEILING TILES (EXISTING AND NEW) SHALL NOT HAVE STAINS, MARKS, OR DAMAGES. CONTRACTOR SHALL VIEW EXISTING CONDITIONS AND PRICE NEW TILES REQ.
 - ② PROVIDE & INSTALL MATERIALS TO CONSTRUCT NEW GYPSUM BULKHEAD AT CIRCULATION DESK TO CAP EXISTING UPPER MILLWORK CABINETS. REPLICATE EXISTING BULKHEAD TO MATCH EXISTING MILLWORK DIMENSIONS. 7'-5" ABOVE FINISH FLOOR.
 - ③ CONSTRUCT NEW GYPSUM BULKHEADS TO HOUSE NEW MOTORIZED PROJECTOR SCREEN (BY OTHERS).
 - ④ PAINT ALL GYPSUM BULKHEADS ACCORDINGLY. TO BE GOVERNED BY (G204) FINISH SCHEDULE.
 - ⑤ WIRELESS ACCESS POINTS TO BE REINSTALLED BY DDSB IT DEPARTMENT FOLLOWING COMPLETION OR IN TAIL END OF PROJECT.
 - ⑥ EXISTING CEILING PROJECTOR TO BE REINSTALLED. REFER TO ELECTRICAL DRAWINGS FOR MORE INFORMATION.
 - ⑦ REFER TO MECHANICAL DRAWINGS FOR DIRECTION ON AIR DIFFUSERS AND FILTRATION.

ELECTRICAL/HVAC NOTE:
ELECTRICAL AND HVAC DEVICES NOTED ON THIS DRAWING ARE FOR REFERENCE ONLY. REFER TO THE ASSOCIATED ELECTRICAL AND HVAC DRAWINGS FOR COMPLETE SCOPE OF WORK.

ISSUES/REVISIONS		
No.	DESCRIPTION	DATE
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2	ISSUED FOR PERMIT & TENDER	FEB 15 2022



KEY PLAN - GROUND FLOOR

DES DURHAM ENERGY SPECIALIST LIMITED
CONSULTING ENGINEERS
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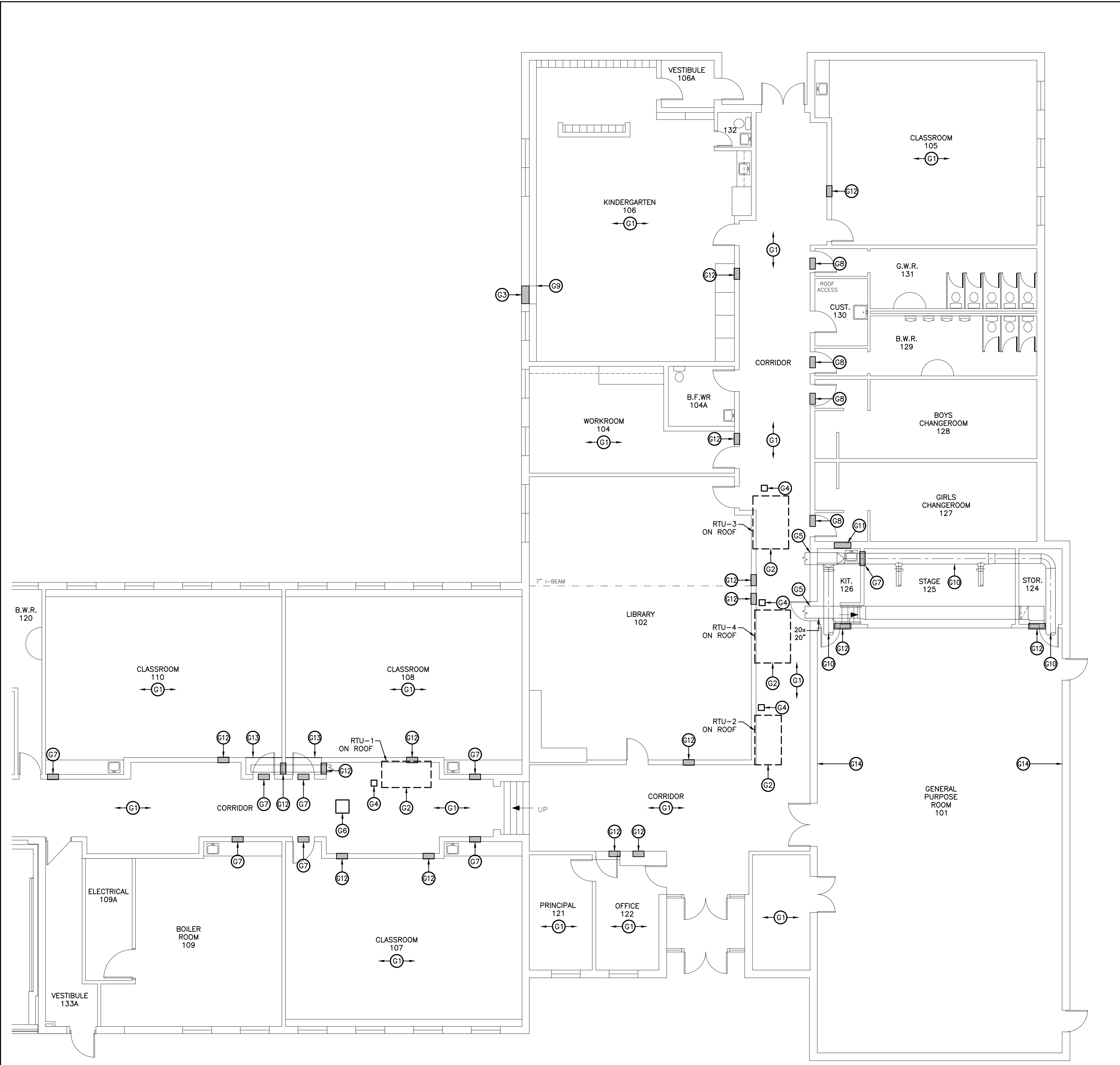
DURHAM DISTRICT SCHOOL BOARD
CLAREMONT PS VENTILATION UPGRADES
1675 CENTRAL STREET
CLAREMONT, ONTARIO

DATE: FEBRUARY 2022	SCALE: AS NOTED
DRAWN BY: MRC	CHECKED BY: BRT
DES PROJECT NUMBER: 22-549	SHEET SIZE: D

GENERAL TRADES
LIBRARY 102
DEMO & NEW RCP LAYOUTS

G202

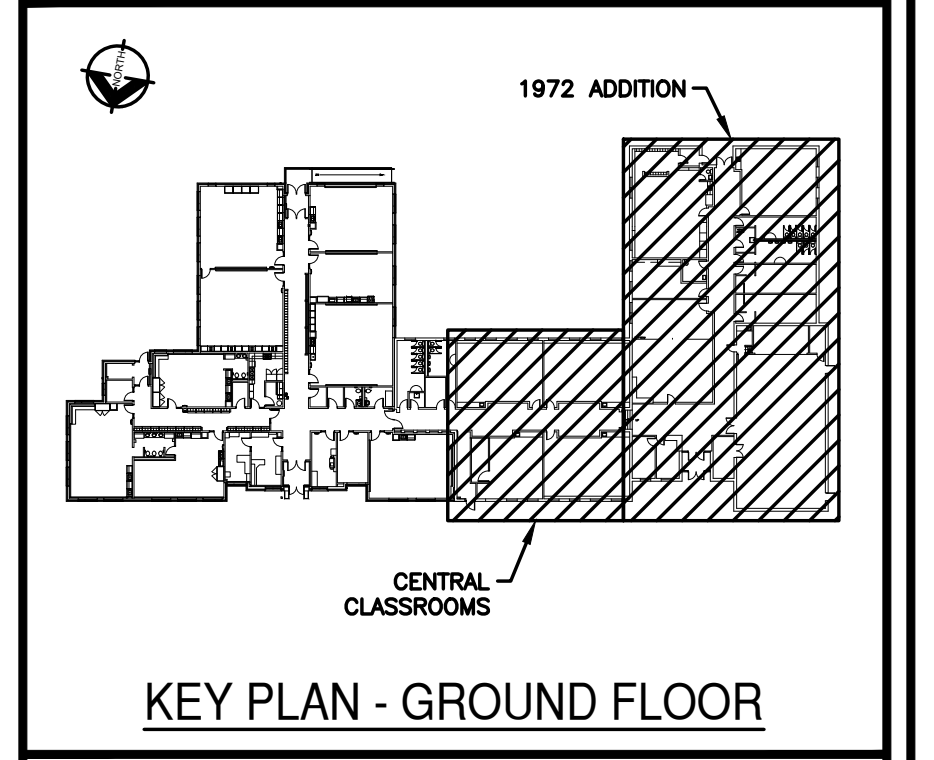
- GENERAL TRADES WORKING NOTES:**
- G1 REMOVE EXISTING T-BAR CEILING AND GRID AS REQUIRED TO SUIT INSTALLATION OF NEW DUCTWORK AND STRUCTURAL REINFORCING. REINSTALL TO NEAT AND LEVEL CONDITION AS PER EXISTING UPON COMPLETION OF MECHANICAL WORK. RE-USE OF EXISTING TILES IS ACCEPTABLE SUBJECT TO DDSB/CONSULTANT APPROVAL.
 - G2 PROVIDE ROOF OPENINGS AND STRUCTURAL REINFORCING FOR NEW ROOFTOP UNIT AS PER STRUCTURAL DRAWINGS. ALLOW FOR A WELDING INSPECTION FOLLOWING COMPLETION OF REINFORCING WORK. WELDING SHALL NOT BE DONE DURING SCHOOL HOURS.
 - G3 REMOVE DRYWALL BULKHEAD AT TOP OF UNIT VENTILATOR. PATCH FLOOR AND WALL AT LOCATION OF REMOVED UNIT TO MATCH EXISTING FLOOR TILE AND WALL FINISH. PATCH AND FILL WALL OPENING AT REMOVED WALL SLEEVE AND LOUVER TO MAINTAIN BUILDING ENVELOPE AND VAPOUR BARRIER. PROVIDE BRICK TO MATCH EXTERIOR WALL FINISH.
 - G4 PROVIDE NEW PITCH POCKET OR DOGHOUSE FOR WIRING TO NEW ROOFTOP UNIT. COORDINATE LOCATION WITH MECHANICAL AND ELECTRICAL.
 - G5 PATCH EXTERIOR WALL AND PROVIDE FLASHING AT LOCATION OF NEW DUCT PENETRATIONS THROUGH WALL TO MECHANICAL ROOM ABOVE (REFER TO DRAWING M201). PROVIDE LINTEL ABOVE DUCKWORK AS PER STRUCTURAL DRAWINGS.
 - G6 PATCH ROOF DECK AND PROVIDE ROOFING AT LOCATION OF REMOVED EXHAUST FAN AND CURB. REFER TO DRAWING M101.
 - G7 PATCH CORRIDOR WALL AT LOCATION OF REMOVED DUCT TO RESTORE WALL TO MINIMUM 1 HOUR FIRE RESISTANCE RATING. PAINT SIDE OF WALL THAT IS EXPOSED IN CLASSROOM TO MATCH EXISTING WALL FINISH.
 - G8 REMOVE A SECTION OF PLASTER CEILING TO ALLOW MECHANICAL CONTRACTOR TO INSTALL NEW FIRE DAMPER AND DUCT CONNECTIONS. PATCH CEILING UPON COMPLETION OF MECHANICAL INSTALLATION AND PAINT TO MATCH EXISTING CEILING FINISH.
 - G9 PAINT NEW WALLFIN ENCLOSURE END CAP TO MATCH EXISTING WALLFIN ENCLOSURE FINISH. END CAP PROVIDED BY MECHANICAL.
 - G10 PAINT ALL EXPOSED SHEET METAL DUCTWORK ABOVE STAGE AND IN GYMNASIUM. PAINT TO BE SUITABLE FOR USE ON GALVANIZED STEEL. REFER ALSO TO DRAWING M201. PAINT COLOUR TO BE SELECTED BY DDSB.
 - G11 PATCH EXISTING EXTERIOR WALL AT LOCATION OF REMOVED LOUVER AND SLEEVE. PROVIDE WALL BRICK TO MATCH EXTERIOR FINISH. FILL CAVITY WITH INSULATION AND VAPOR BARRIER TO MAINTAIN BUILDING ENVELOPE. REFER TO DRAWING M101 FAN ROOM LAYOUT.
 - G12 PROVIDE NEW WALL OPENING FOR DUCT PENETRATION. COORDINATE LOCATION ON SITE. PROVIDE LINTEL IF REQUIRED. REFER TO STRUCTURAL DRAWINGS.
 - G13 PROVIDE STUD AND DRYWALL BULKHEAD TO ENCLOSE DUCTWORK RUNNING BELOW T-BAR CEILING. MODIFY CEILING GRID AND TILE AS REQUIRED TO SUIT NEW BULKHEAD. PAINT BULKHEAD TO MATCH EXISTING WALL FINISH.
 - G14 LOWER EXISTING SCHOOL PENNANTS TO SUIT NEW FABRIC DUCTWORK.



PARTIAL FLOOR PLAN - LAYOUT
1/8"=1'

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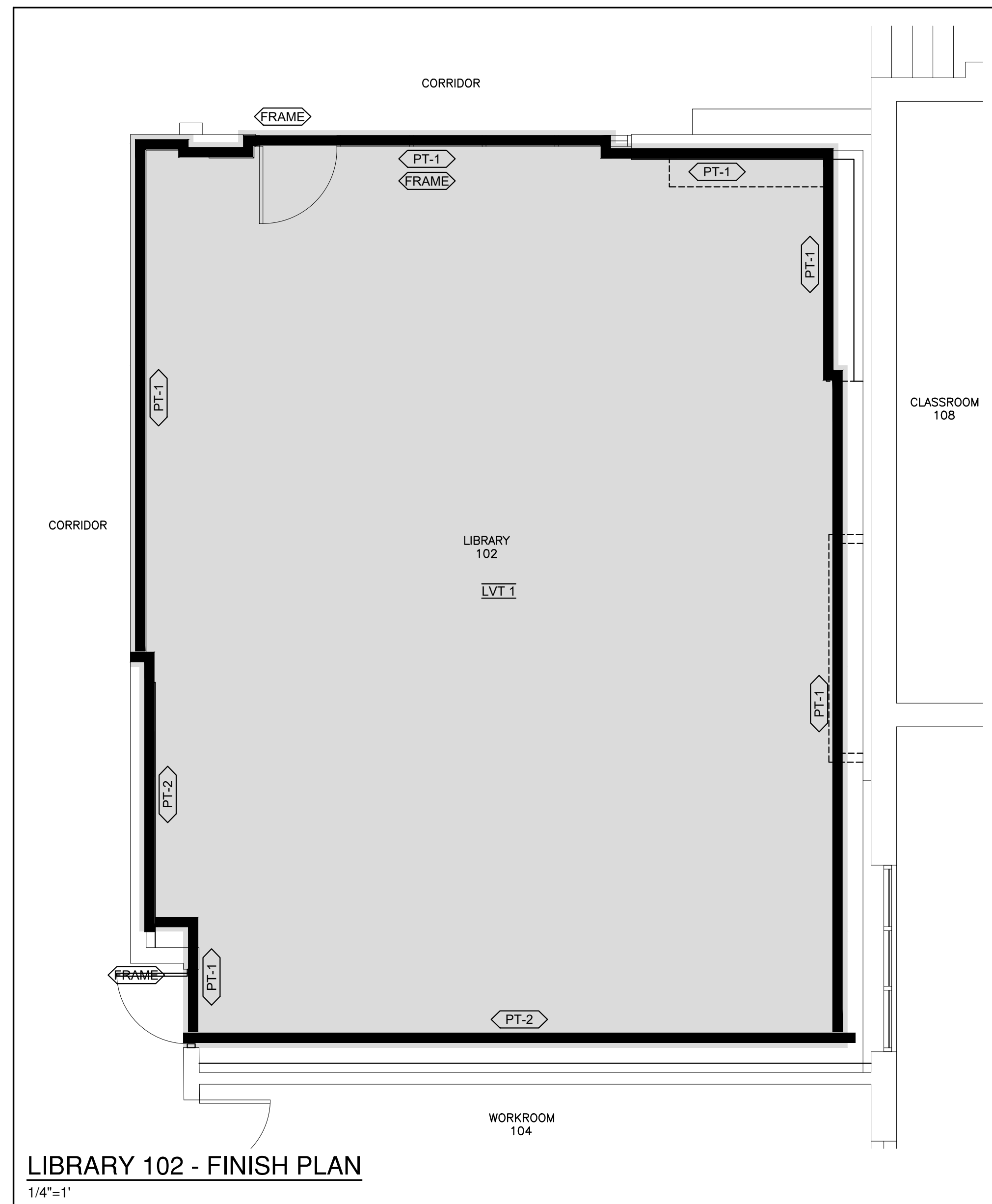


DURHAM DISTRICT SCHOOL BOARD
CLAREMONT PS VENTILATION UPGRADES
1675 CENTRAL STREET
CLAREMONT, ONTARIO

DATE: FEBRUARY 2022	SCALE: NTS
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**GENERAL TRADES
1972 ADDITION & CENTRAL
CLASSROOMS LAYOUT**

G203



MILLWORK SCHEDULE				
TAG #	DWG #	SHEET	QUANTITY	DESCRIPTION
MW001	3 - 5	G201	x2	MILLWORK CONTROL PANEL. [P-LAM 1] ON FACE PANEL, BORDER EDGING TO BE [P-LAM 2]. COORDINATE CUTOUTS WITH ELECTRICAL CONTRACTOR.
MW002	6	G201	10' - 7 1/2"	[P-LAM 2] UPPER & LOWER STORAGE W [P-LAM 3] COUNTER TOP. 3'-0" DOUBLE DOORS (1'-6" /EA) ON UPPIERS AND LOWER CABINETS. INCLUDE x1 ADJUSTABLE SHELF IN EACH UPPER CABINET AND x2 ON EACH LOWER CABINET, LESS UNDER ANY SINK.
MW003	7	G201	x1	[P-LAM 2] MILLWORK WINDOW SILL. SITE VERIFY DIMENSIONS. SILL SHALL HAVE A 1 1/2" VERTICAL BULLNOSE AT EDGE OF WALL. CAULK AROUND ALL EDGES AND SMOOTH FLAT.

- MILLWORK GENERAL NOTES:**
- MILLWORK TO BE 3/4" [19] (UNLESS OTHERWISE NOTED) PLYWOOD WITH PLASTIC LAMINATE FINISH ON ALL EXPOSED FACES AND EDGES {INSIDE AND OUTSIDE}.
 - THE "GRAIN" OR "PATTERN" SHALL RUN THE SAME DIRECTION TO SIMILAR, ADJACENT UNITS, PREFERING TO RUN LENGTH WISE.
 - NO SHARP EDGES SHALL BE ALLOWED, AND LAMINATE FINISH SHALL BE FREE OF CHIPS AND BREAKAGE.
 - ALL SURFACES TO BE CLEAN AND FREE OF MARKINGS.

MILLWORK FINISHES		
P-LAM 1	SEA SALT [SM] BY ARTOPEX	(AURA FINISH)
P-LAM 2	GALAXY [GX] BY ARTOPEX	(AURA FINISH)

MILLWORK HARDWARE & SPECIFICATIONS	
HANDLES (1)	CONTEMPORARY METAL PULL - BP8160128195 (BRUSHED NICKEL) FROM RICHELIEU CENTER TO CENTER 128mm, OVERALL LENGTH: 162mm
HINGES	BLUM 125 DEGREE SELF CLOSING
DRAWER SLIDERS	ACCURIDE - FULL EXTENSION

CEILING FINISHES	
ACT	<p>ACOUSTIC PANELS: NON FIRE RATED CEILINGS TO CAN/CGSB-92.1 TYPE: MINERAL COMPOSITION & SAG RESISTANT. PATTERN: NON-DIRECTIONAL FISSURES. FLAME SPREAD RATING OF 25 OF LESS. SMOKE DEVELOPMENT CLASS OF 50 OR LESS. NOISE REDUCTION COEFFICIENT (NRC) DESIGNATION OF .55 MINIMUM. EDGE TYPE: SQUARE. COLOUR: WHITE. SIZE: 16mm MINIMUM THICKNESS, 610mm X 1220mm. SHAPE: FLAT. ACCEPTABLE PRODUCTS*:</p> <ol style="list-style-type: none"> ARMSTRONG WORLD INDUSTRIES CANADA LTD.: FINE FISSURED 1729. CERTAINTED CEILINGS: VANTAGE 10, VAN-197. CGC INTERIORS: RADAR CLIMAPLUS 2410.
**GRID	TYPE 1 (T-BAR - 1) TWO DIRECTIONAL EXPOSED TEE-BAR GRID, DOUBLE WEB. ARMSTRONG WORLD INDUSTRIES CANADA LTD: PRELUDE XL EXPOSED TEE SYSTEM* REQUIRED **AS
*OR APPROVED ALTERNATE	

PAINT FINISHES	
PT 1	UNIVERSAL GREY [00NN 62/000] FROM DULUX*
PT 2	ASPHALT [CC-548] FROM BENJAMIN MOORE*
CEILING	CEILING WHITE [CC-548] FROM DULUX*
DOOR & FRAME	ASPHALT [CC-548] FROM BENJAMIN MOORE*
*OR APPROVED ALTERNATE	

FLOORING FINISHES	
LVT 1	GREY LIMED OAK [4082] FROM POLYFLOR* ADHESIVE: MAPEI: ECO 300* or UZIN: UZIN KE 2000 S*
EXIST.	EXISTING FLOORING TO REMAIN UNDISTURBED
*OR APPROVED ALTERNATE	

ROLLER BLINDS

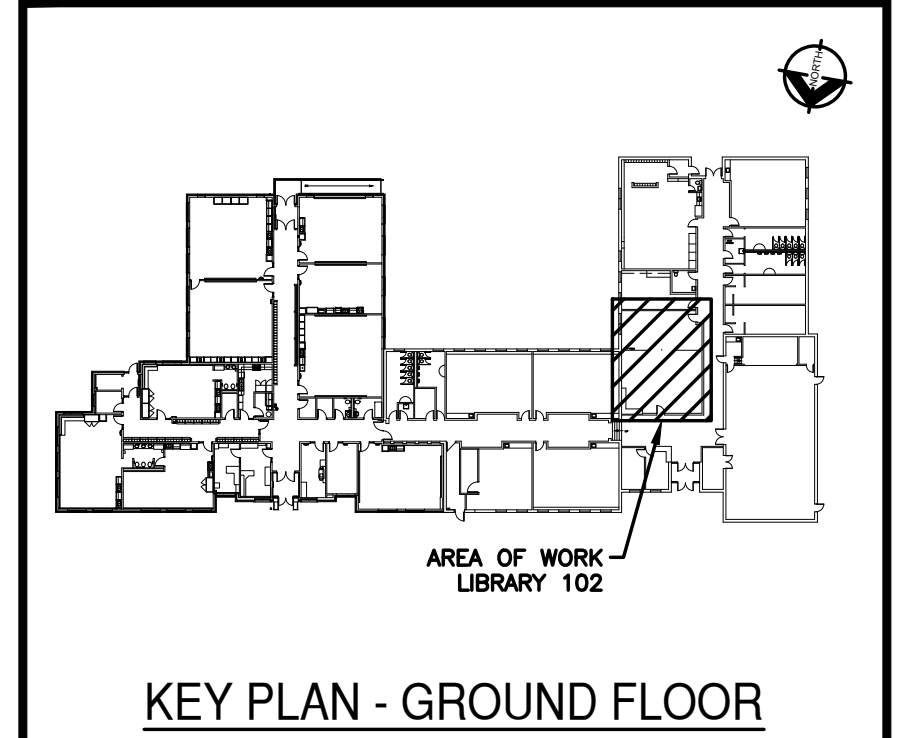
NEW ROLLER BLINDS FOR EXTERIOR WINDOWS SHALL BE DUAL CASSETTE BLACKOUT AND ROLLER BLINDS, "ALTEX SUNPROJECT TECHNO SERIES LIFT" COMPLETE WITH 70mm DOUBLE CASSETTE FINISH "BRONZE ANODIZED" CHAIN OPERATED OR EQUAL BY MECO SHADE / HUNTER DOUGLAS OR SOLARREFLECTIVE.

(SHADES ALTEX XT 3800 SERIES 3% OPEN - BLACKOUT ALTEX ECO SCREEN OR APPROVED EQUAL - COLOUR TO BE SELECTED BY DDSB PROJECT SUPERVISOR. BLINDS INTENDED FOR INTERIOR GLAZING TO BE 3% OPEN ONLY, NO BLACKOUT).

BASEBOARD FINISHES	
B - 1	BLACK [40] 4" RUBBER BY JOHNSONITE*
*OR APPROVED ALTERNATE	

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PROFESSIONAL ENGINEER
B. R. TIMSON
10051090
FEB 15/22
PROVINCE OF ONTARIO

DURHAM DISTRICT SCHOOL BOARD

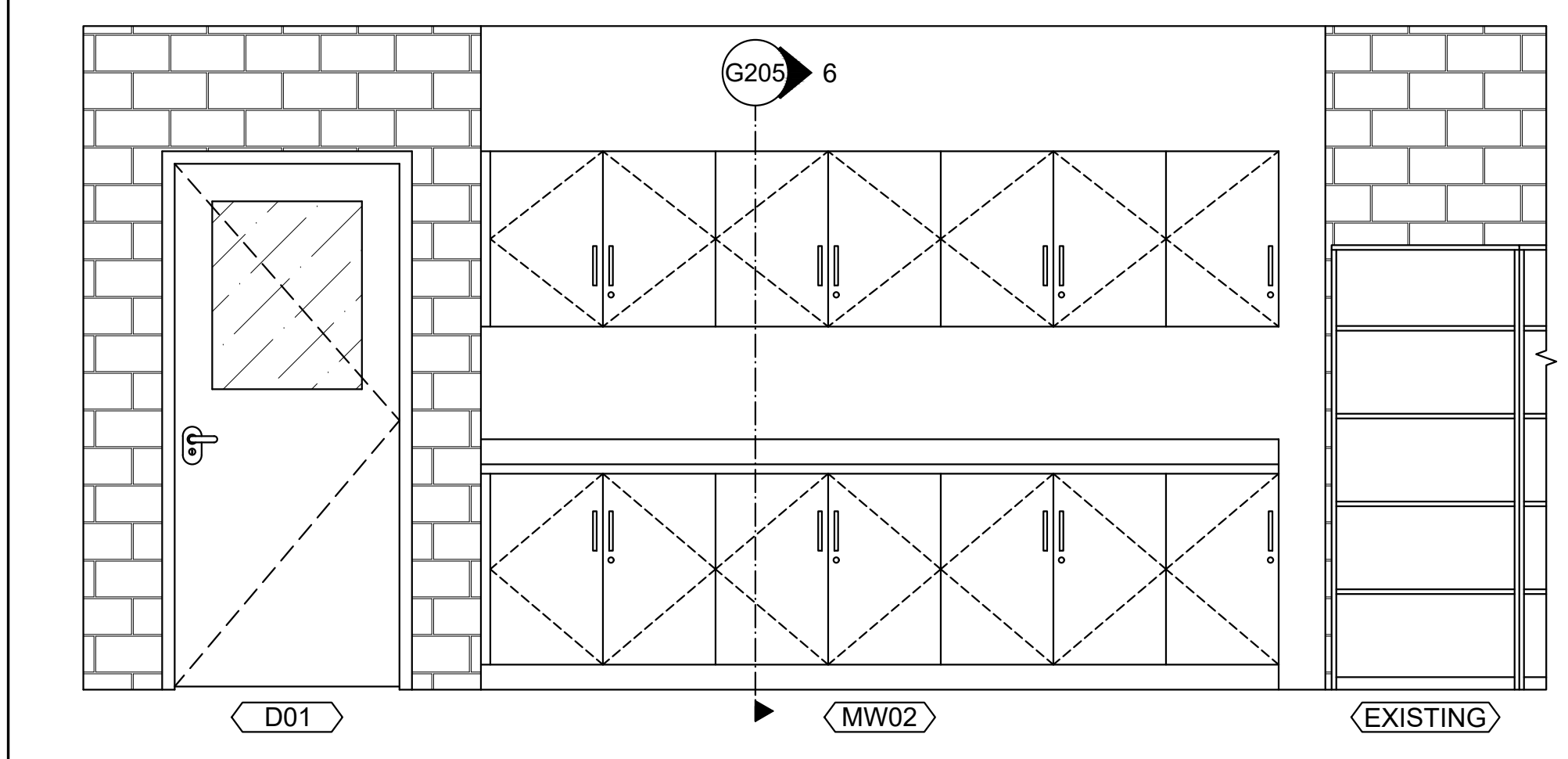
CLAREMONT PS VENTILATION UPGRADES

1675 CENTRAL STREET
CLAREMONT, ONTARIO

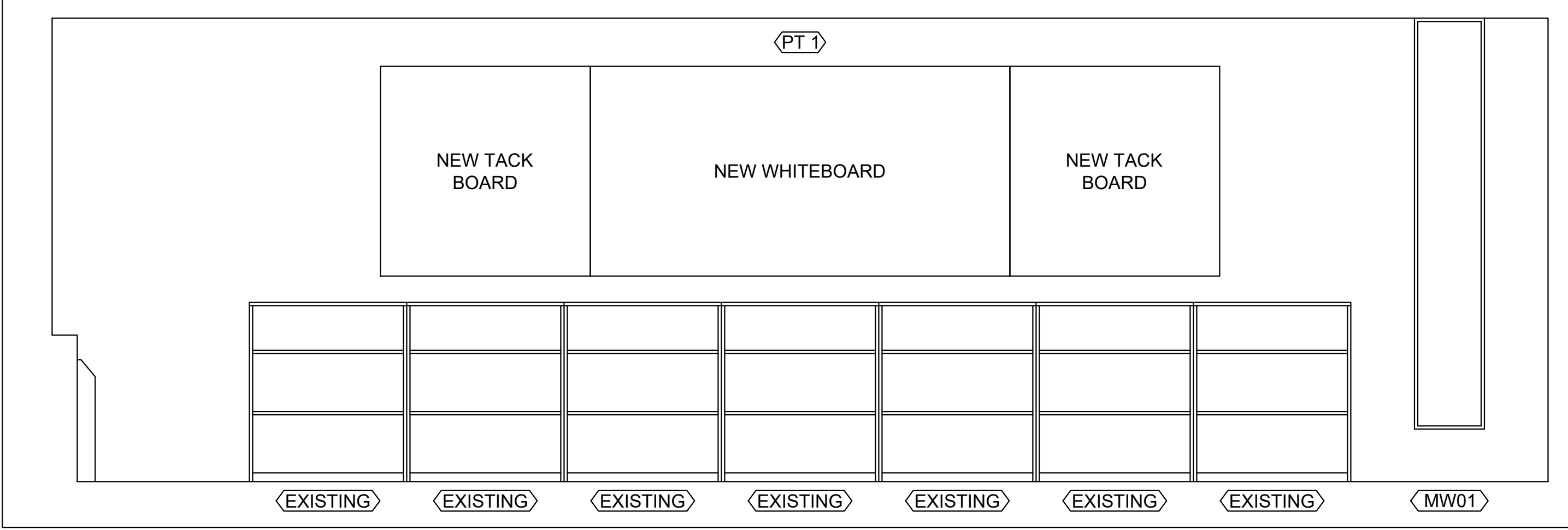
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GENERAL TRADES LIBRARY 102 FINISH PLAN

G204



1 WEST WALL - ELEVATION
G205 1/2"=1"

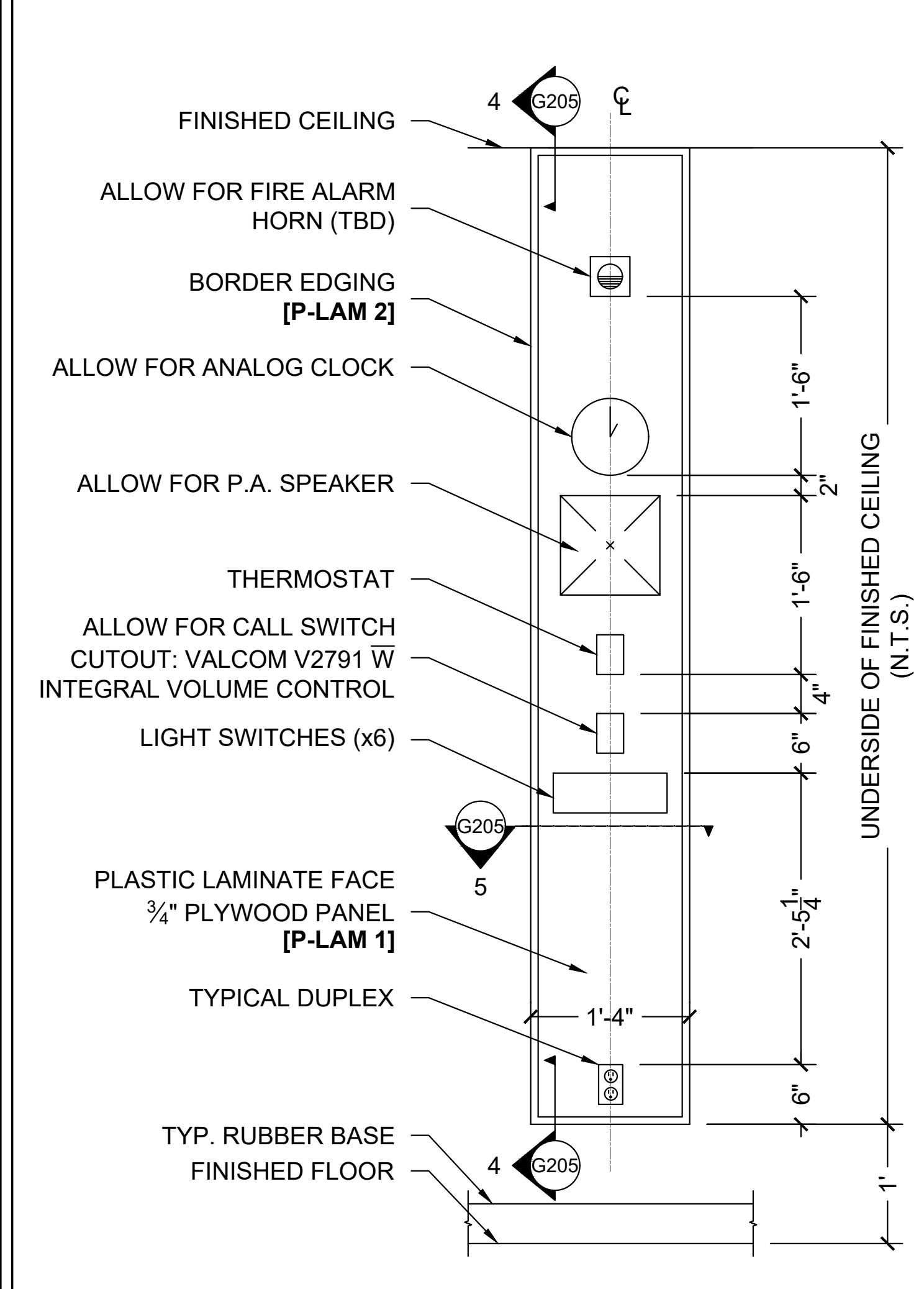


3 SOUTH WALL - ELEVATION
G205 1/2"=1"

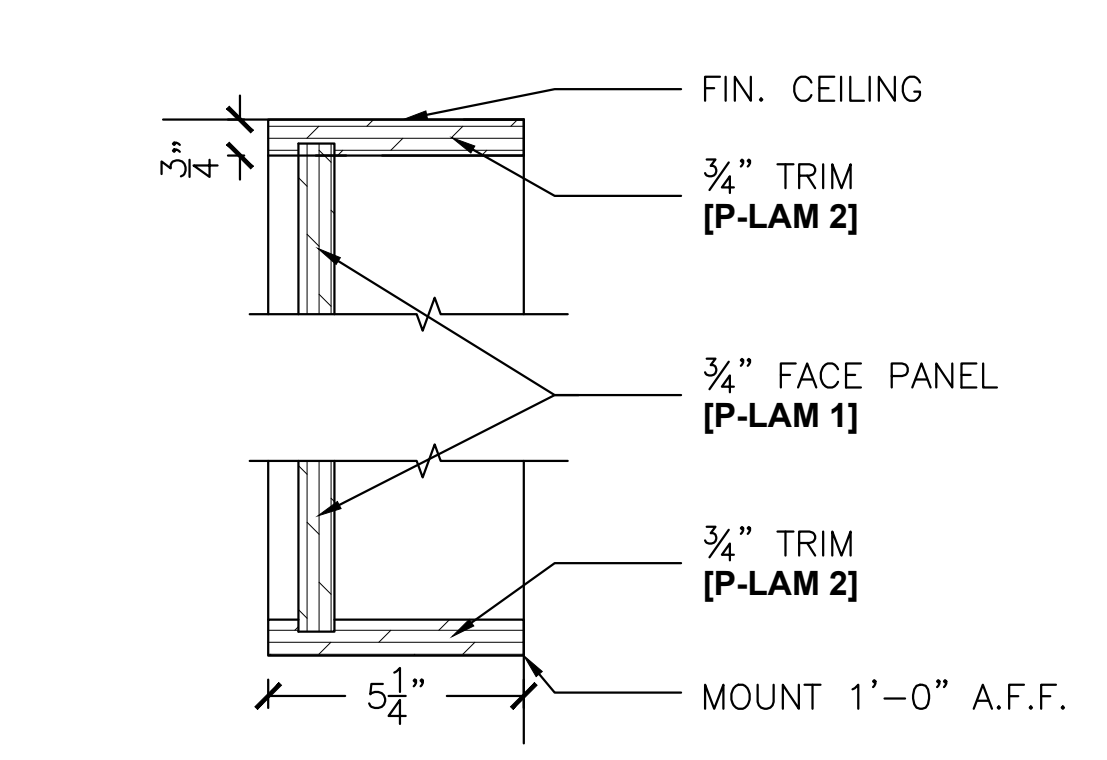
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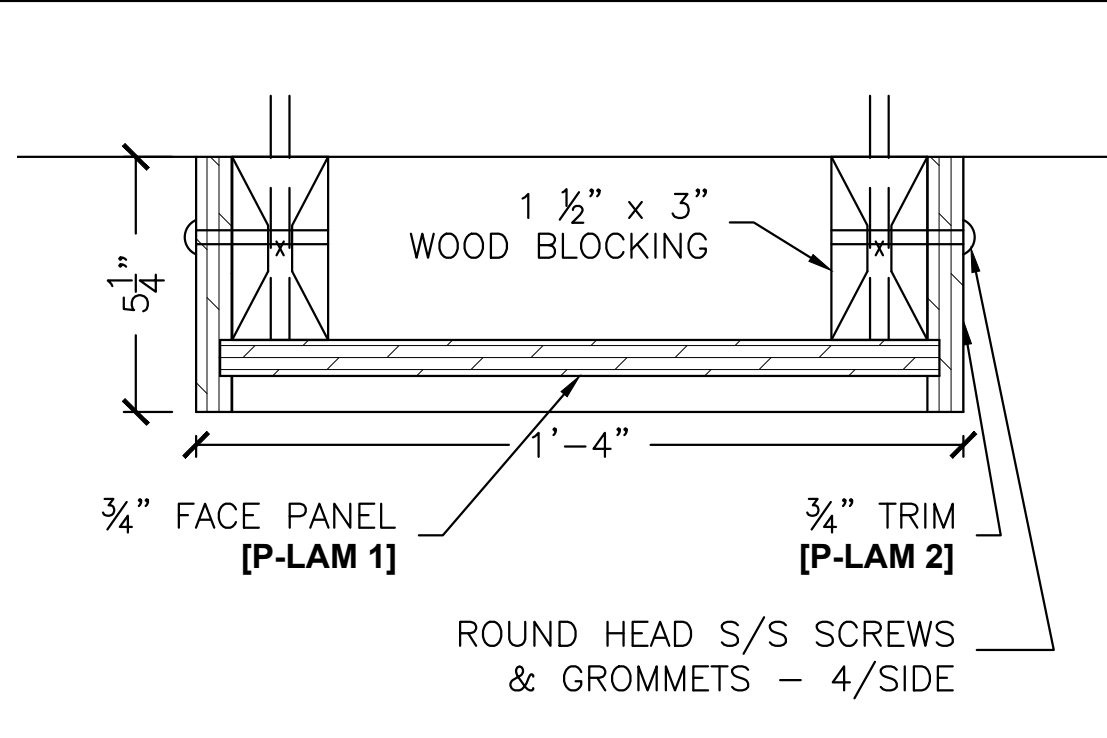
FACE PANEL: [P-LAM 1]
BORDER EDGING: [P-LAM 2]



3 CONTROL PANEL - ELEVATION (MW01)
G205 1"=1"

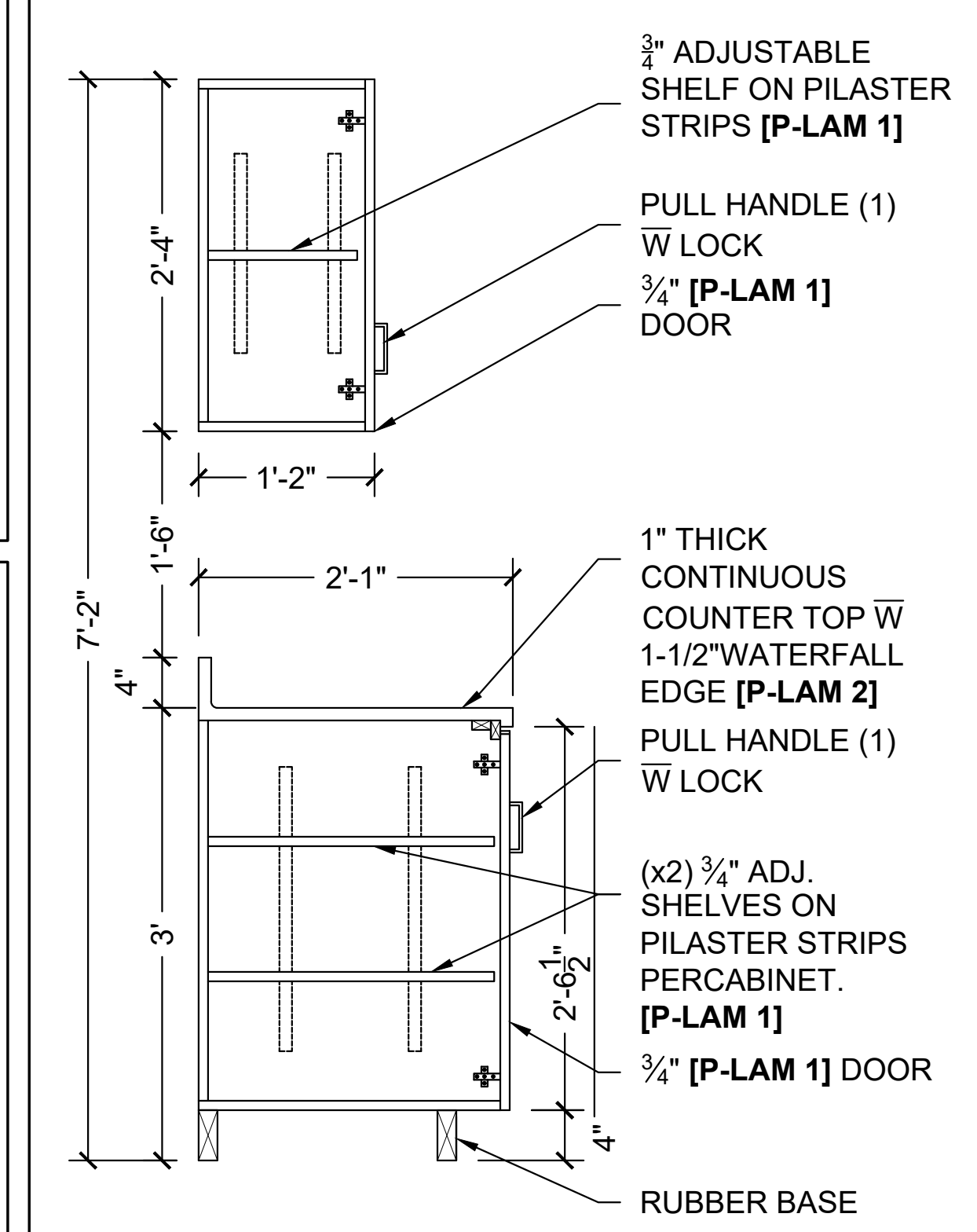


4 CONTROL PANEL - SECTION (MW01)
G205 3"=1"

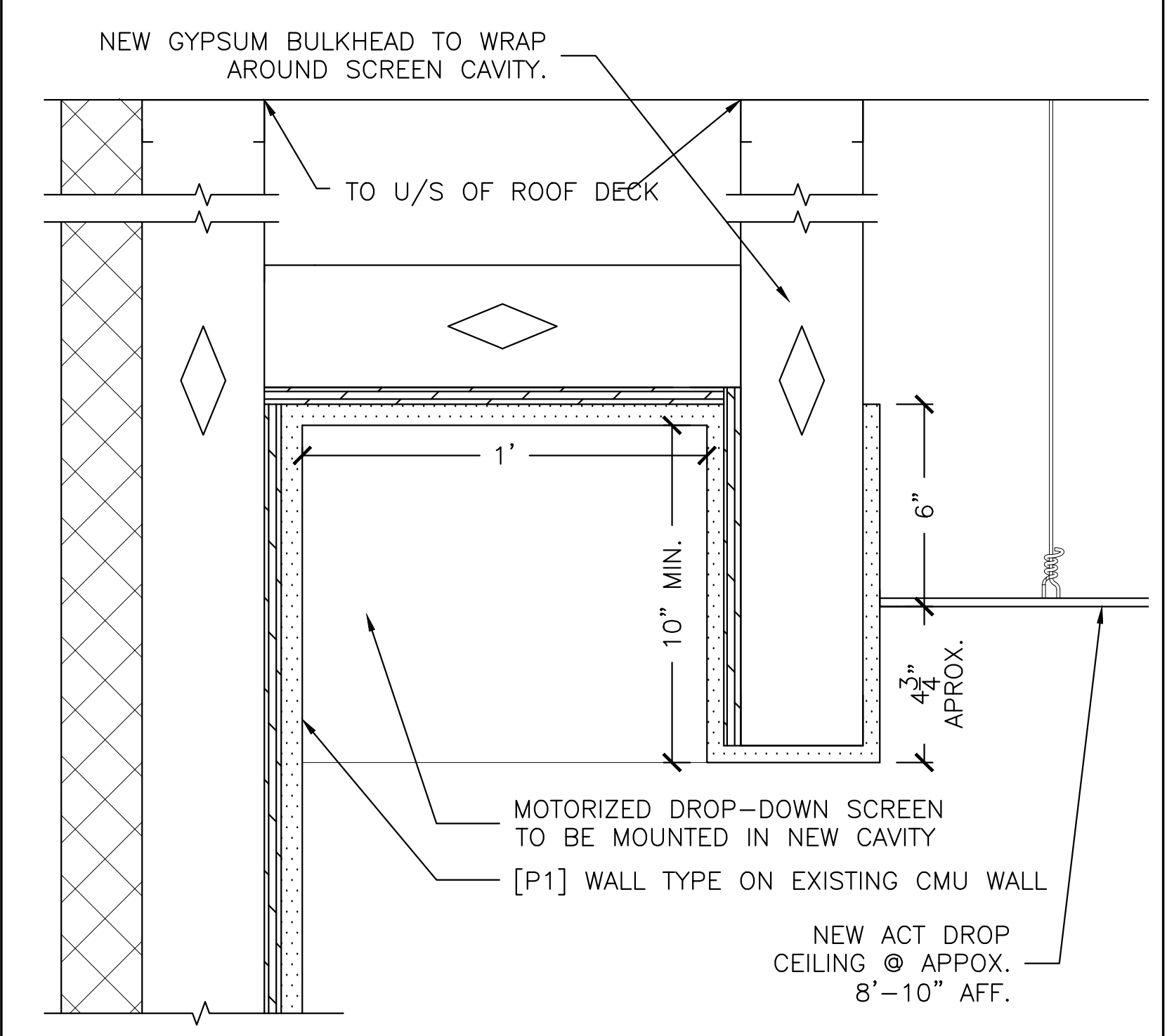


5 CONTROL PANEL - DETAIL (MW01)
G205 3"=1"

ALL FACES: [P-LAM 1]
COUNTER TOP: [P-LAM 2]
BASE: BLACK RUBBER BASE

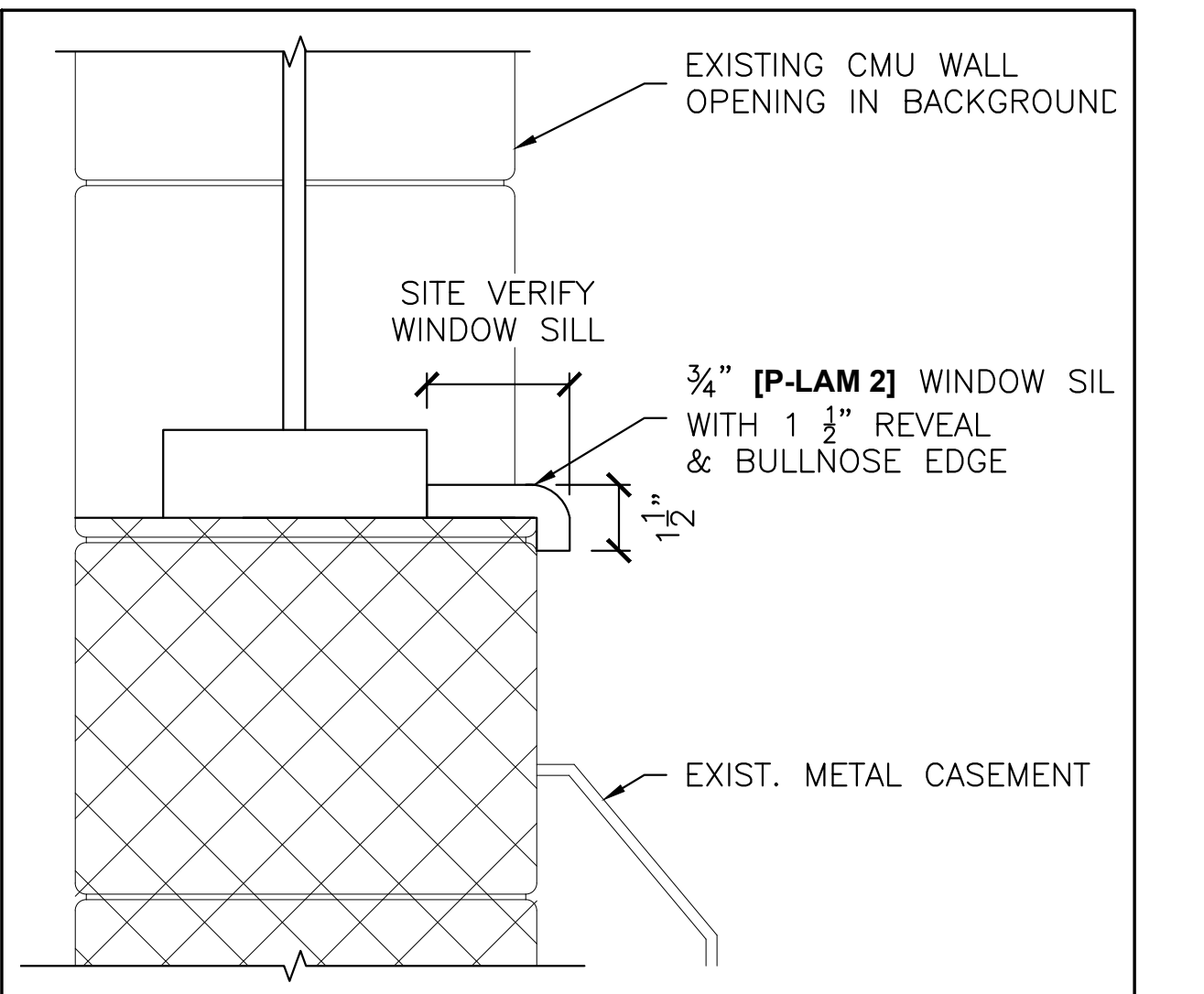


6 UPPER & LOWER STORAGE W/ COUNTER - DETAIL (MW02)
G205 1"=1"



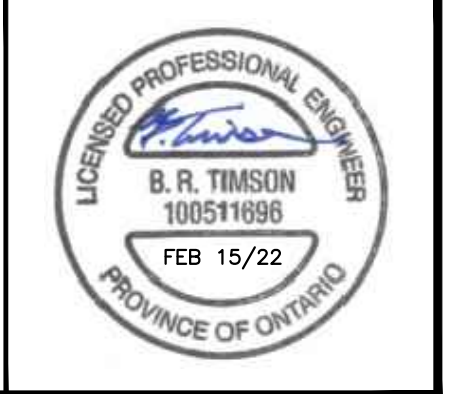
OPENING WIDTH = 1'-0"
DEPTH / HEIGHT = 0'-10"
OPENING LENGTH = 9'-0"

7 PROJECTOR SCREEN BULKHEAD - SECTION
G205 3"=1"



8 WINDOW SILL - SECTION (MW03)
G205 3"=1"

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DURHAM DISTRICT SCHOOL BOARD
CLAREMONT PS VENTILATION UPGRADES
1675 CENTRAL STREET
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GENERAL TRADES
ELEVATIONS & MILLWORK
DETAILS

G205

GENERAL ELECTRICAL NOTES:

1. REFER TO ELECTRICAL DRAWINGS FOR SCOPE. THIS DRAWING IS FOR REFERENCE ONLY.
2. NO SURFACE MOUNT BOXES TO BE INSTALLED AS PART OF NEW WORK.
3. GFCI RECEPTACLES TO BE USED IN PROXIMITY TO SINKS AND OTHER PLUMBING FIXTURES.
4. CUTOUTS TO BE COORDINATED BETWEEN ELECTRICAL & GENERAL CONTRACTORS.
5. ALL NEW POWER & DATA TO BE RUN IN ¾" EMT CONDUIT WHERE EVER POSSIBLE. CONSULT WITH DDSB PROJECT SUPERVISOR WHERE EVER NOT POSSIBLE.

ELECTRICAL LEGEND

TAG	DESCRIPTION	MAKE / MODEL
⊕	15A 120V 1PH GROUNDED DUPLEX RECEPTACLE • "USB" DENOTES ADDITION OF TWO(2) USB PORTS ON FACEPLATE	
⊕	20A 120V 1PH GROUNDED DUPLEX RECEPTACLE	
⊕	15A 120V 1PH GROUNDED FAULT CIRCUIT INTERRUPTING DUPLEX RECEPTACLE	
⊕	20A 120V 1PH GROUNDED FAULT CIRCUIT INTERRUPTING DUPLEX RECEPTACLE	
⊕	15A 120V 1PH GROUNDED QUAD RECEPTACLE	
⊕	240V 1PH GROUNDED RECEPTACLE	
▽	DATA ONLY OUTLET BOX	NEW TO BE: CAT 6 CABLE
▽	HDMI OUTLET BOX	NEW TO BE: FT-6 (US) / CMP (CANADA)
▽	VOICE ONLY OUTLET • "FAX" DENOTES A FAX LINE WITHIN BOX	NEW TO BE: CAT 6 CABLE
S	CEILING MOUNTED P.A. SPEAKER	
S	WALL MOUNTED P.A. SPEAKER	
MS	SECURITY MOTION SENSOR	
OS	OCCUPANCY SENSOR	
ES	SECURITY SYSTEM ELECTRIC STRIKE	
H	HEAT DETECTOR	
S	SMOKE DETECTOR	
P	FIRE ALARM PULL STATION WITH CLEAR, TAMPER-PROOF, POLYCARBONATE SHIELD THAT EMITS AN ALARM WHEN ACCESSED	
⊠	FIRE ALARM HORN AND/OR STROBE	
T	THERMOSTAT	
\$ ³	WALL-MOUNTED LIGHT SWITCH • "3" DENOTES 3-WAY LAMP	
CAM	SECURITY CAMERA	
⊕	BATTERY OPERATED CLOCK	
⊕	EMERGENCY EXIT SIGN • FILLED IN QUADRANT DENOTES FACING, ARROWS DENOTE DIRECTION	NEW: "RUNNING-MAN STYLE"

REFLECTED CEILING PLAN LEGEND

TAG	DESCRIPTION	MAKE / MODEL
⊕	EMERGENCY EXIT SIGN • FILLED IN QUADRANT DENOTES FACING, ARROWS DENOTE DIRECTION	NEW: "RUNNING-MAN STYLE"
⊕	2x4 CEILING-MOUNTED LED LIGHT FIXTURE, LETTER DENOTES SWITCHING • EXISTING: 2-BALLAST, 3-LAMP	
⊕	1x4 CEILING-MOUNTED LED LIGHT FIXTURE	
⊕	EMERGENCY LIGHT • DENOTED AS WALL OR CEILING MOUNTED	
⊕	2x2 AIR SUPPLY DIFFUSER	NEW: • PRICE INDUSTRIES SCD - 31 - 33, WHITE IN COLOUR
⊕	2x2 AIR RETURN "EGG CRATE" GRILLE	
⊕	OLD 1x1 CEILING-MOUNTED P.A. SPEAKER	
⊕	NEW 1x2 CEILING-MOUNTED P.A. SPEAKER	NEW: • VALCOM V9021 1'x2' LAY IN SPEAKER

ELECTRICAL ABBREVIATIONS

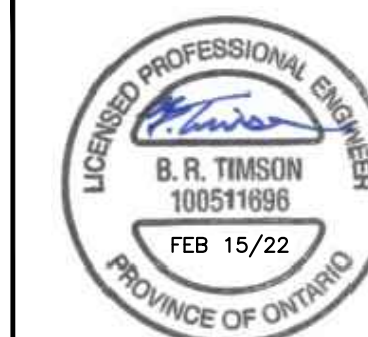
AFF	ABOVE FINISHED FLOOR
BFC	BELOW FINISHED CEILING
CP	EMPTY BACK BOX WITH COVER PLATE
C/W	COMPLETE WITH
D	EXISTING EQUIPMENT TO BE REMOVED
EMT	ELECTRICAL METALLIC TUBING
EX	EXISTING EQUIPMENT, TO REMAIN
H/L	HIGH LEVEL MOUNTING HEIGHT (COMPARED TO STANDARD)
N	NEW EQUIPMENT TO BE INSTALLED, REUSE EQUIP. FROM DEMO IF AVAILABLE
NL	INDICATES LIGHT FIXTURE TIED INTO NIGHT LIGHT
RL	EXISTING EQUIPMENT TO BE RELOCATED. EXTEND FEED AS REQUIRED
RR	EXISTING EQUIPMENT TO BE UNINSTALLED & REINSTALLED IN SAME LOCATION
SC	SEPARATE CIRCUIT
SM	SURFACE MOUNTED
TR	TAMPER RESISTANT
USB	UNIVERSAL SERIAL BUS (DENOTING SPECIFIC PORT)
WG	PROVIDE WIRE GUARD OR VANDAL COVER
WP	WEATHER PROOF
x #	QUANTITY OF DEVICES

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DURHAM DISTRICT SCHOOL BOARD

**CLAREMONT PS
VENTILATION UPGRADES**

1675 CENTRAL STREET
CLAREMONT, ONTARIO

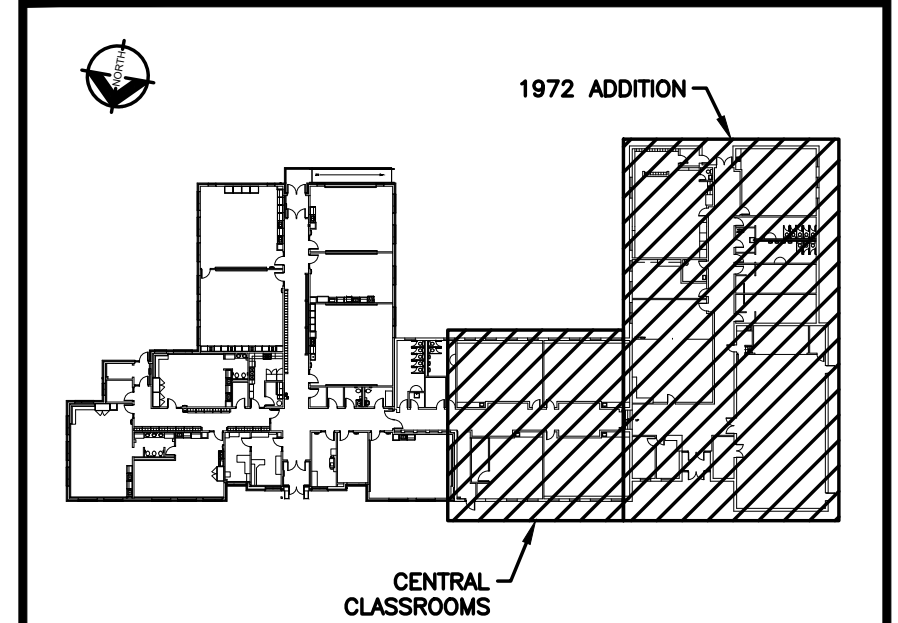
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**GENERAL TRADES
ELECTRICAL LEGENDS
& SYMBOLS**

G206

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KEY PLAN - GROUND FLOOR

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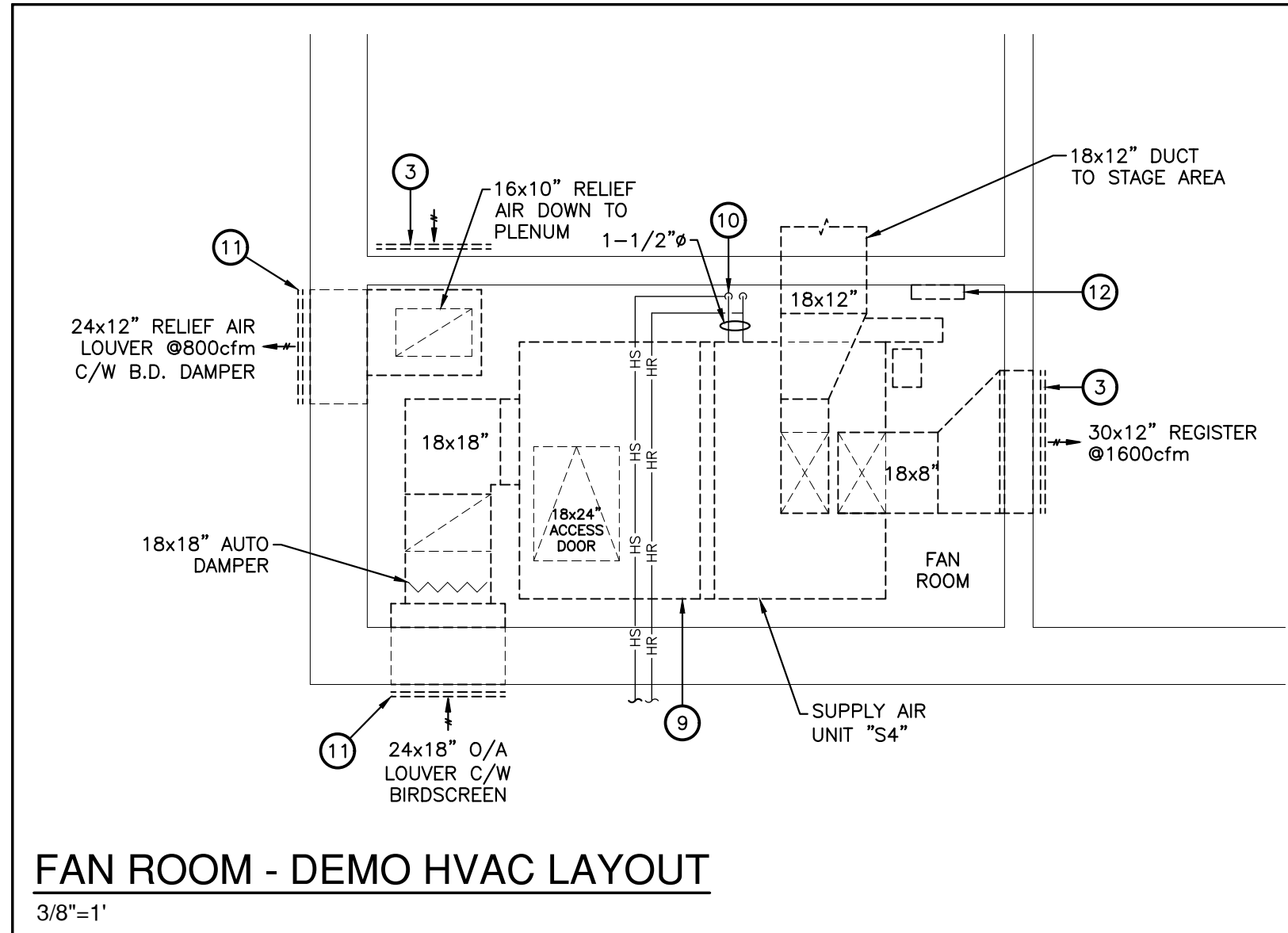
PROFESSIONAL ENGINEER
B. R. TIMSON
10051096
JAN 14/22
PROVINCE OF ONTARIO

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1972 ADDITION &
CENTRAL CLASSROOMS
DEMO HVAC LAYOUT

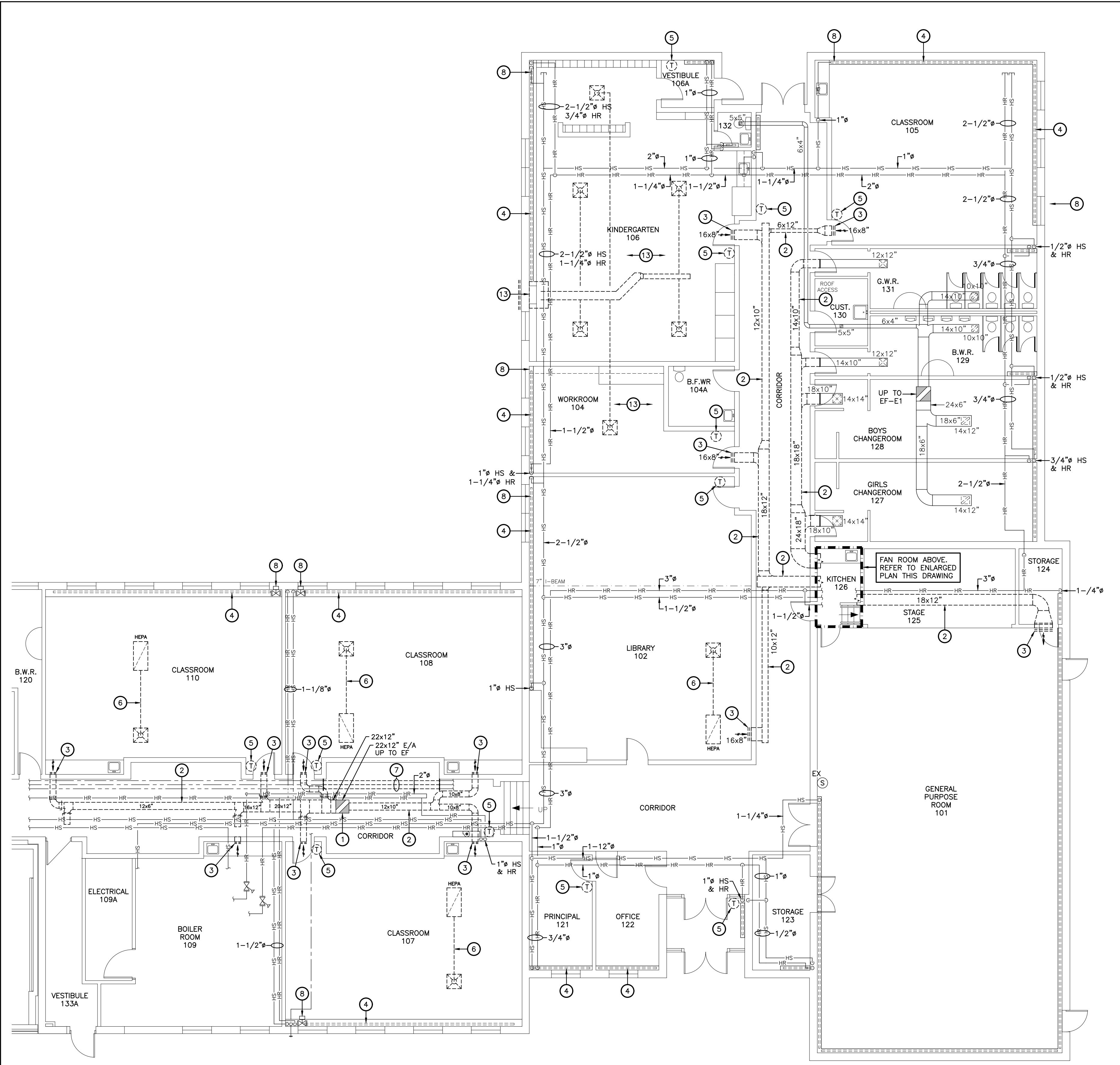
M101



FAN ROOM - DEMO HVAC LAYOUT
3/8"=1'

- GENERAL DEMOLITION NOTES:**
1. THE CONTRACTOR SHALL ALLOW FOR DETAILED SITE INVESTIGATION TO CONFIRM ALL SERVICES PRIOR TO CONSTRUCTION AND REPORT ANY DISCREPANCIES TO THE ENGINEER.
 2. DISCONNECT AND REMOVE ALL REDUNDANT EQUIPMENT, DUCTWORK, PIPING AND OTHER REDUNDANT SERVICES THROUGHOUT AREA OF WORK.
 3. REMOVE OBSOLETE ABOVEGROUND SERVICES BACK TO SOURCE/MAINS AND CAP.
 4. TEMPORARILY SEAL ALL OPEN DUCTS THROUGHOUT CONSTRUCTION TO PREVENT DUST AND DIRT FROM ENTERING THE SYSTEM. WHERE THE CONTRACTOR DOES NOT CONFORM THEY ARE RESPONSIBLE FOR CLEANING OF THE SYSTEMS IN A MANNER APPROVED BY THE CONSULTANT.
 5. ALL HEPA FILTER UNITS TO REMAIN. STORE IN SAFE CLEAN ROOM ON SITE OR PROTECT AND COVER DURING CONSTRUCTION.

- WORKING NOTES:**
- 1 REMOVE EXISTING EXHAUST FAN AND ASSOCIATED DAMPERS, ACCESSORIES, SLEEVE UP THROUGH ROOF AND CURB.
 - 2 REMOVE EXISTING S/A AND E/A DUCTWORK IN CORRIDOR CEILING AS SHOWN.
 - 3 REMOVE EXISTING GRILLE AND SLEEVE BACK THROUGH WALL.
 - 4 REMOVE EXISTING WALLFIN ENCLOSURE AND STORE ON SITE FOR REINSTALLATION. REMOVE EXISTING VALVES AND ACCESSORIES CONTAINED WITHIN WALLFIN ENCLOSURE.
 - 5 REMOVE EXISTING THERMOSTAT C/W ALL ASSOCIATED WIRING.
 - 6 RELOCATE EXISTING HEPA FILTER UNIT TO SUIT NEW DUCTWORK INSTALLATION. PROVIDE NEW FLEXIBLE DUCTWORK AS REQUIRED. STORE UNIT AND ASSOCIATED DIFFUSER IN CLEAN LOCATION ON SITE DURING CONSTRUCTION. COORDINATE EXACT NEW LOCATION ON SITE WITH DDSB/CONSULTANT.
 - 7 REMOVE SECTIONS OF DCW, DHW & DRW PIPING AS REQUIRED TO SUIT INSTALLATION OF NEW RTU FRAMING AND DUCTWORK.
 - 8 REMOVE EXISTING ELECTRIC CONTROL VALVE AND ALL ASSOCIATED WIRING.
 - 9 REMOVE EXISTING SUPPLY FAN AND RETURN FAN ALONG WITH ALL ASSOCIATED DUCTWORK, DAMPERS AND ACCESSORIES.
 - 10 REMOVE EXISTING HEATING COIL C/W ALL VALVES AND ACCESSORIES AND COIL CIRCULATION PUMP. CUT BACK HS & HR PIPING TO WALL AND PROVIDE ISOLATION VALVES AND CAPS.
 - 11 REMOVE EXISTING LOUVER AND SLEEVE THROUGH EXTERIOR WALL.
 - 12 REMOVE EXISTING ELECTRIC BAS CONTROL PANEL AND ALL ASSOCIATED WIRING AND DEVICES.
 - 13 REMOVE EXISTING VERTICAL UNIT VENTILATOR C/W ALL DUCTWORK, DAMPERS, WALL SLEEVE, LOUVER, VALVES AND ACCESSORIES. CUT BACK HS & HR AND CAP AT MAINS.



PARTIAL FLOOR PLAN - DEMO HVAC LAYOUT
1/8"=1'

GENERAL NOTES:

1. THE CONTRACTOR SHALL INVESTIGATE AND CONFIRM SERVICES ON SITE PRIOR TO CONSTRUCTION AND REPORT ANY DISCREPANCIES TO CONSULTANT.
2. ENSURE ALL SERVICES ARE CONCEALED WITHIN AVAILABLE CEILING SPACE. RUN ALL NEW SERVICES UP IN JOIST SPACE AND BETWEEN LIGHTS AS NOTED OR AS REQUIRED.
3. PREPARE INTERFERENCE DRAWINGS AND COORDINATE ALL SERVICES WITH ALL TRADES PRIOR TO INSTALLATION.
4. THERMALLY INSULATE ALL NEW S/A DUCTWORK.
5. ALLOW FOR THE SUPPLY AND INSTALLATION OF TWO(2) ADDITIONAL BALANCE DAMPERS FOLLOWING PRELIMINARY BALANCING RESULTS.
6. INSULATE AND LABEL ALL NEW PIPING WITHIN CEILING SPACE IN AREA OF WORK. RE-INSULATE AND LABEL EXISTING PIPING WHERE NOTED.
7. FIRE STOP ALL NEW PIPING THROUGH RATED WALLS IN AREA OF WORK. FIRE STOP EXISTING WHERE NOTED.
8. LABEL CEILING GRID AT ACCESS TO MECHANICAL EQUIPMENT AND DEVICES WITH LAMACOID NAMEPLATE.
9. ALL HEPA FILTER UNITS TO REMAIN. STORE IN SAFE CLEAN ROOM ON SITE OR PROTECT AND COVER DURING CONSTRUCTION.
10. PERFORM DUCT LEAKAGE TESTS (SUPPLY AND RETURN) FOR ALL NEW AIR HANDLING SYSTEMS. ARRANGE FOR ENGINEER TO WITNESS AND SUBMIT REPORT. REFER TO SPECIFICATIONS FOR DETAILS.

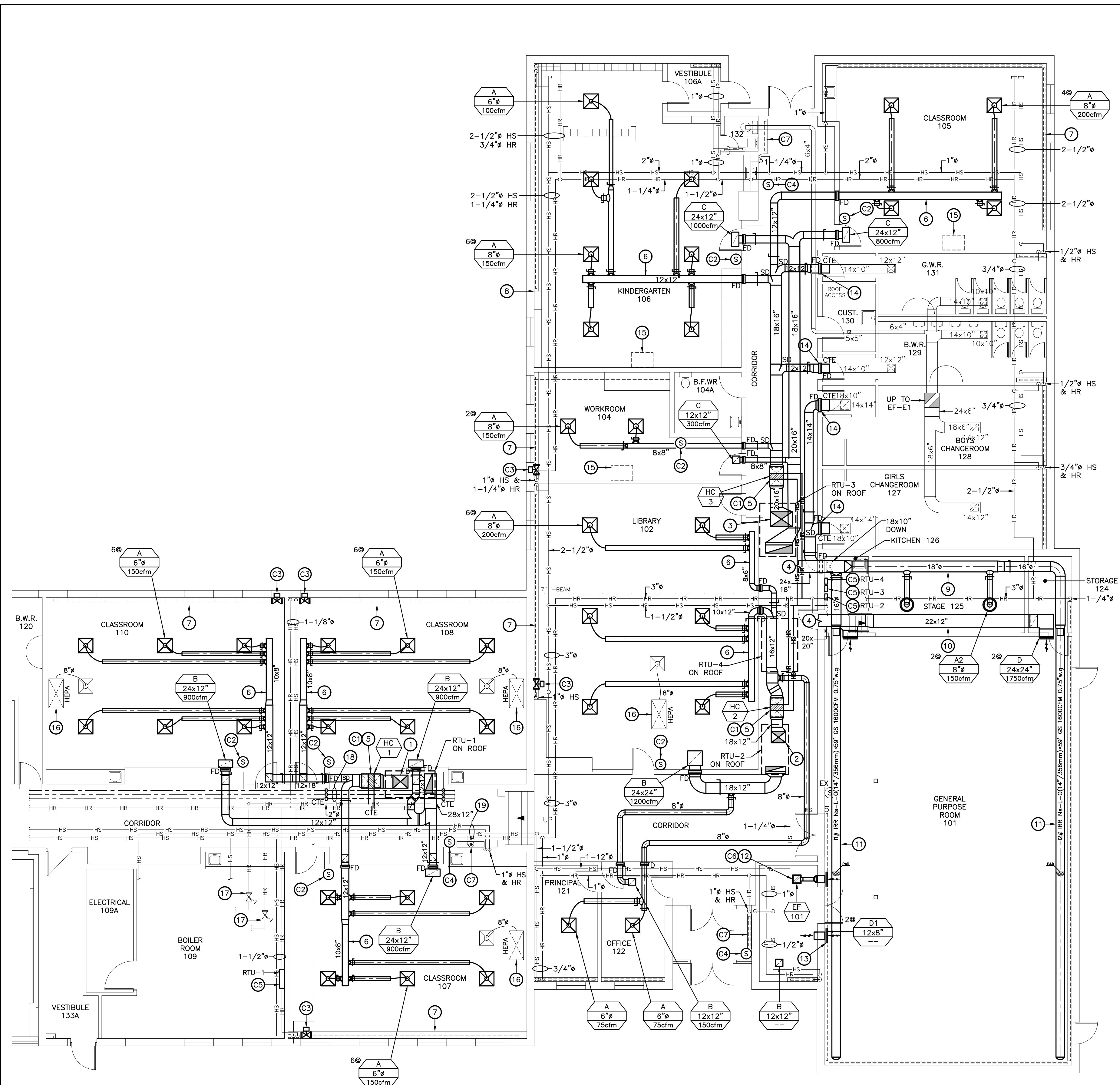
WORKING NOTES:

1. 20x24" S/A & 32x12" R/A DOWN FROM RTU-1 ON ROOF. ACOUSTICALLY LINE FIRST 5' OF S/A & R/A FROM UNIT.
2. 24x18" S/A & 32x8" R/A DOWN FROM RTU-2 ON ROOF. ACOUSTICALLY LINE FIRST 5' OF S/A & R/A FROM UNIT.
3. 36x24" S/A & 44x12" R/A DOWN FROM RTU-3 ON ROOF. ACOUSTICALLY LINE FIRST 5' OF S/A & R/A FROM UNIT.
4. 24x18" S/A & 20x20" R/A OUT THROUGH WALL TO RTU-4 ON ROOF. RUN S/A THROUGH EXISTING LOUVER OPENING. INSULATE AND WEATHERSEAL PENETRATIONS AROUND NEW DUCTS. ACOUSTICALLY LINE FIRST 5' OF S/A & R/A FROM UNIT.
5. PROVIDE NEW HEATING COIL C/W NEW VALVES AND ACCESSORIES IN CEILING SPACE. REFER TO DETAIL. PROVIDE DUCT ACCESS DOORS UPSTREAM AND DOWNSTREAM OF COIL. PROVIDE NEW HEATING PIPING FROM CORRIDOR MAINS.
6. RUN S/A MAIN BETWEEN JOISTS AND TAKEOFFS THROUGH OPEN WEBS OF JOISTS.
7. PROVIDE NEW VALVES AND ACCESSORIES FOR EXISTING WALLFIN AND INSTALL IN EXISTING ENCLOSURE. REFER TO DETAIL. VACUUM ELEMENT AND REINSTALL ENCLOSURE IN NEAT AND LEVEL CONDITION AS PER EXISTING.
8. PROVIDE NEW END CAP FOR EXISTING WALLFIN ENCLOSURE.
9. RUN S/A UP TIGHT AGAINST JOISTS ALONG BACK WALL OF STAGE.
10. RUN R/A UP THROUGH JOIST SPACE.
11. PROVIDE NEW FABRIC DUCT. INSTALL AS PER MANUFACTURER'S SPECIFICATIONS. HANGERS SHALL BE MOUNTED ON EXISTING STEEL JOIST AND BEAMS. REFER TO DETAIL. FABRIC DUCT COLOUR TO BE DETERMINED BY DDSB. TEAM NAME TO BE APPLIED TO EACH DUCT RUN BY FABRIC DUCT MANUFACTURER.
12. PROVIDE NEW EXHAUST FAN AND MOUNT IN EXISTING CEILING. RUN NEW E/A DUCT OUT THROUGH GRILLE TO GYM.
13. PROVIDE NEW TRANSFER GRILLE AND SLEEVE.
14. PROVIDE NEW FIRE DAMPER IN EXISTING WALL OPENING.
15. PROTECT EXISTING HEPA FILTER UNIT DURING CONSTRUCTION. STORE IN SAFE CLEAN ROOM ON SITE IF UNIT CANNOT BE PROTECTED IN PLACE.
16. REINSTALL EXISTING HEPA FILTER UNIT AND DIFFUSER. PROVIDE NEW FLEXIBLE DUCTWORK AS REQUIRED. COORDINATE EXACT LOCATION WITH DDSB ON SITE.
17. ALLOW FOR RE-BALANCING OF EXISTING BOILER ROOM CBVs TO SUIT REVISED FLOWS.
18. REINSTALL EXISTING CW, DHW & DRW PIPING. OFFSET AS REQUIRED TO SUIT NEW SERVICES AND PROVIDE NEW INSULATION AND LABELS.
19. THERMALLY INSULATE EXISTING PIPING WHERE REMOVED.

CONTROLS WORKING NOTES:

REFER TO CONTROLS SCOPE OF WORK ON DRAWING M501.

1. DDSB TO SUPPLY NEW 2-WAY CONTROL VALVE FOR NEW HEATING COIL. TURN OVER TO MECHANICAL CONTRACTOR FOR INSTALLATION. INSTALL ACTUATOR AND ALL REQUIRED CONTROL WIRING.
2. PROVIDE NEW BAS SPACE SENSOR FOR CONTROL OF EXISTING WALLFIN.
3. DDSB TO SUPPLY NEW 2-WAY CONTROL VALVE FOR EXISTING WALLFIN. TURN OVER TO MECHANICAL CONTRACTOR FOR INSTALLATION. INSTALL ACTUATOR AND ALL REQUIRED CONTROL WIRING.
4. PROVIDE NEW STAINLESS STEEL FLAT PLATE STYLE SPACE SENSOR FOR CONTROL OF FORCE FLOW HEATER.
5. INSTALL NEW BAS PANEL FOR NEW RTU (PANEL SUPPLIED BY DDSB). TOP OF PANEL TO BE INSTALLED ~60" AFF. CONFIRM EXACT PANEL LOCATION ON SITE WITH CONSULTANT, DDSB AND ELECTRICAL CONTRACTOR PRIOR TO INSTALLATION.
6. PROVIDE CONTROLS AND CONTROL WIRING TO TIE IN NEW EXHAUST FAN TO BAS.
7. PROVIDE CONTROLS AND CONTROL WIRING TO TIE IN EXISTING FORCE FLOW HEATER TO BAS.

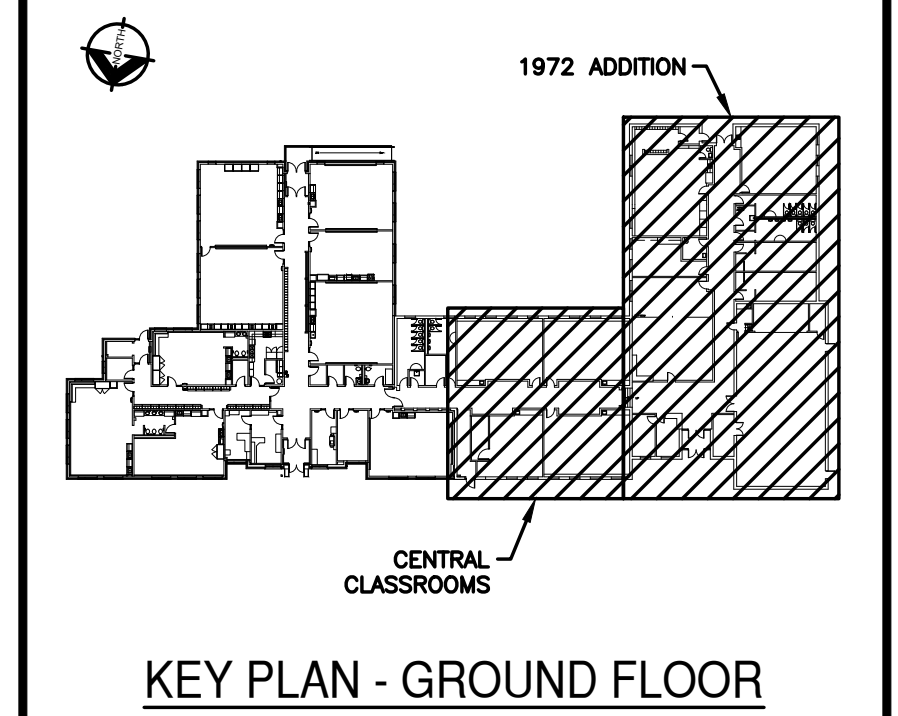


PARTIAL FLOOR PLAN - NEW HVAC LAYOUT

1/8"=1'

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ISSUES/REVISIONS		
No.	DESCRIPTION	DATE
1	ISSUED FOR CLIENT REVIEW	FEB 11 2022
2	ISSUED FOR PERMIT & TENDER	FEB 15 2022



KEY PLAN - GROUND FLOOR

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PROFESSIONAL ENGINEER
 B. R. TIMSON
 10051090
 JAN 14/22
 PROVINCE OF ONTARIO

DURHAM DISTRICT SCHOOL BOARD
CLAREMONT PS VENTILATION UPGRADES
 1675 CENTRAL STREET
 CLAREMONT, ONTARIO

DATE: FEBRUARY 2022	SCALE: AS NOTED
DRAWN BY: MRC	CHECKED BY: BRT
DES PROJECT NUMBER: 22-549	SHEET SIZE: D

1972 ADDITION & CENTRAL CLASSROOMS NEW HVAC LAYOUT

M201

MECHANICAL WORKING NOTES:

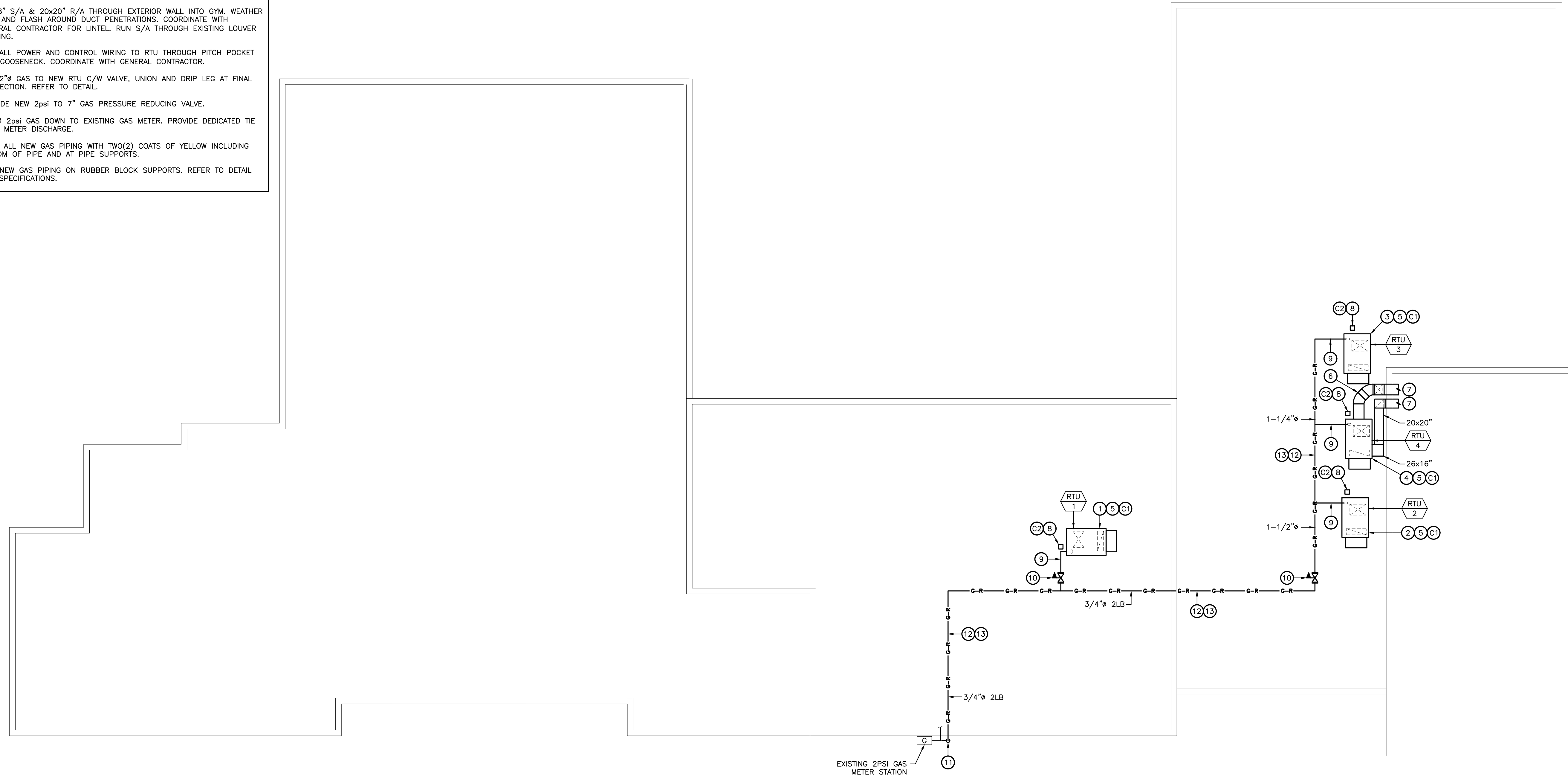
- ① PROVIDE NEW ROOFTOP UNIT C/W NEW ROOF CURB (DOWN DISCHARGE). RUN NEW 20x24" S/A & 32x12" R/A DOWN THROUGH ROOF C/W ALL REQUIRED CONNECTIONS AND TRANSITIONS.
- ② PROVIDE NEW ROOFTOP UNIT C/W NEW ROOF CURB (DOWN DISCHARGE). RUN NEW 36x24" S/A & 44x12" R/A DOWN THROUGH ROOF C/W ALL REQUIRED CONNECTIONS AND TRANSITIONS.
- ③ PROVIDE NEW ROOFTOP UNIT C/W NEW ROOF CURB (DOWN DISCHARGE). RUN NEW 38x32" S/A & 50x20" R/A DOWN THROUGH ROOF C/W ALL REQUIRED CONNECTIONS AND TRANSITIONS.
- ④ PROVIDE NEW ROOFTOP UNIT C/W NEW CUSTOM CURB TO ALLOW HORIZONTAL S/A & R/A DUCT TO RUN THROUGH SIDE OF CURB. PROVIDE DUCT ELBOWS OFF BOTTOM OF UNIT TO HORIZONTAL RUNS C/W TURNING VANES.
- ⑤ PROVIDE MINIMUM 4" OF ROXUL INSULATION ON TOP OF ROOF AND WITHIN ENTIRE ROOF CURB STRUCTURE FOR SOUND ATTENUATION. ARRANGE FOR INSPECTION BY CONSULTANT OR SEND PICTURES FOR APPROVAL PRIOR TO UNIT BEING PLACED.
- ⑥ ALL ROOFTOP DUCTWORK TO BE ACOUSTICALLY LINED, SEALED, THERMALLY INSULATED AND ALUMINUM JACKETED AS PER SPECIFICATIONS.
- ⑦ 24x18" S/A & 20x20" R/A THROUGH EXTERIOR WALL INTO GYM. WEATHER SEAL AND FLASH AROUND DUCT PENETRATIONS. COORDINATE WITH GENERAL CONTRACTOR FOR LINTEL. RUN S/A THROUGH EXISTING LOUVER OPENING.
- ⑧ RUN ALL POWER AND CONTROL WIRING TO RTU THROUGH PITCH POCKET C/W GOOSENECK. COORDINATE WITH GENERAL CONTRACTOR.
- ⑨ 1-1/2" GAS TO NEW RTU C/W VALVE, UNION AND DRIP LEG AT FINAL CONNECTION. REFER TO DETAIL.
- ⑩ PROVIDE NEW 2psi TO 7" GAS PRESSURE REDUCING VALVE.
- ⑪ 3/4" 2psi GAS DOWN TO EXISTING GAS METER. PROVIDE DEDICATED TIE IN AT METER DISCHARGE.
- ⑫ PAINT ALL NEW GAS PIPING WITH TWO(2) COATS OF YELLOW INCLUDING BOTTOM OF PIPE AND AT PIPE SUPPORTS.
- ⑬ RUN NEW GAS PIPING ON RUBBER BLOCK SUPPORTS. REFER TO DETAIL AND SPECIFICATIONS.

GENERAL NOTES:

1. THE CONTRACTOR SHALL INVESTIGATE AND CONFIRM SERVICES ON SITE PRIOR TO CONSTRUCTION AND REPORT ANY DISCREPANCIES TO CONSULTANT.
2. SCAN ROOF PRIOR TO CUTS THROUGH DECK. REFER TO STRUCTURAL DRAWINGS.
3. COORDINATE ALL SERVICES WITH ALL TRADES PRIOR TO INSTALLATION.

CONTROLS WORKING NOTES:

- REFER TO CONTROLS SCOPE OF WORK ON DRAWING M501.
- ⓐ PROVIDE NEW CONTROLS AND CONTROL WIRING FOR NEW RTU.
 - ⓑ RUN NEW CONTROL WIRING TO UNIT UP THROUGH NEW PITCHPOCKET OR DOGHOUSE.



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NORTH

DURHAM DISTRICT SCHOOL BOARD
CLAREMONT PS VENTILATION UPGRADES
 1675 CENTRAL STREET
 CLAREMONT, ONTARIO

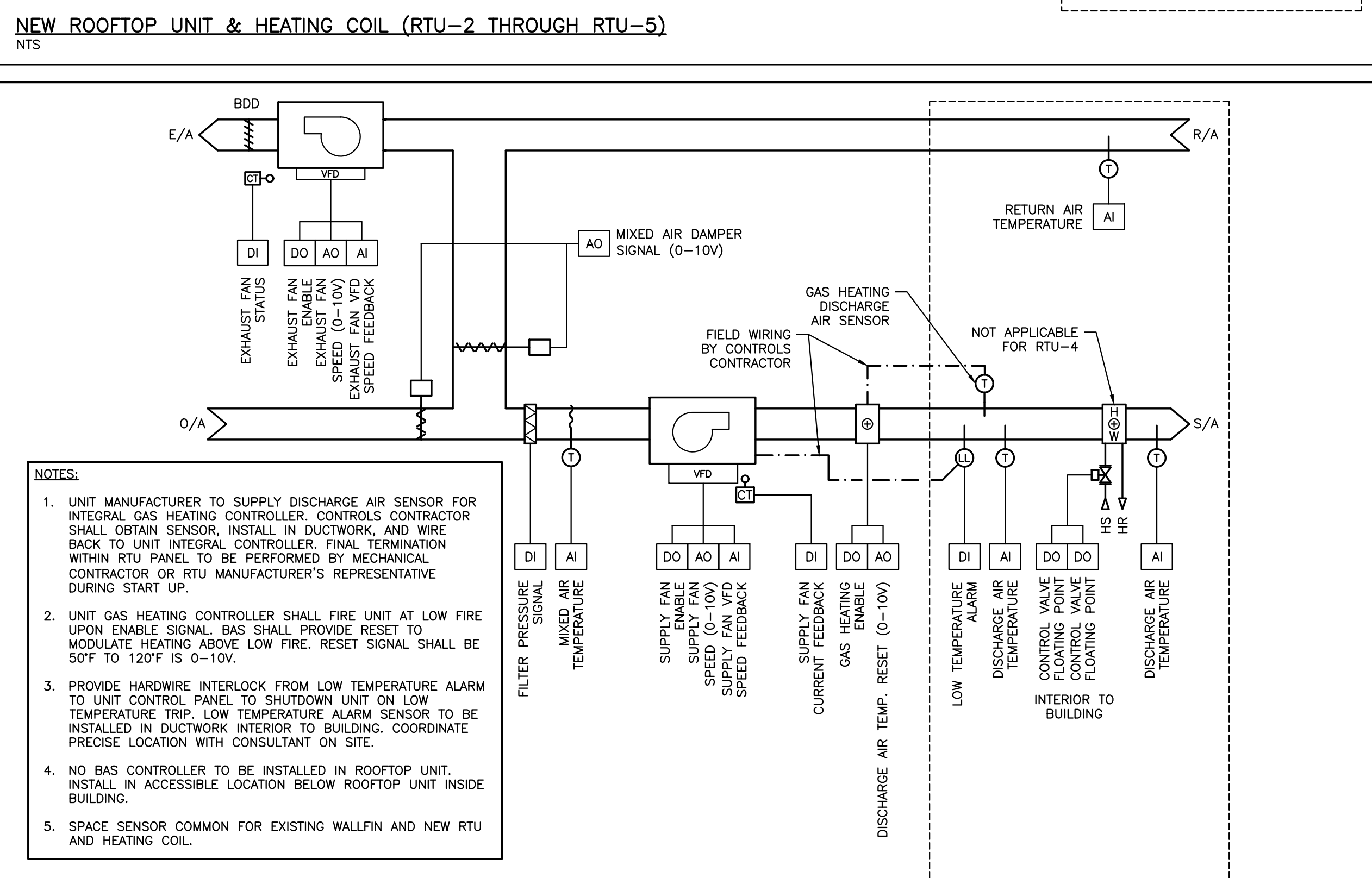
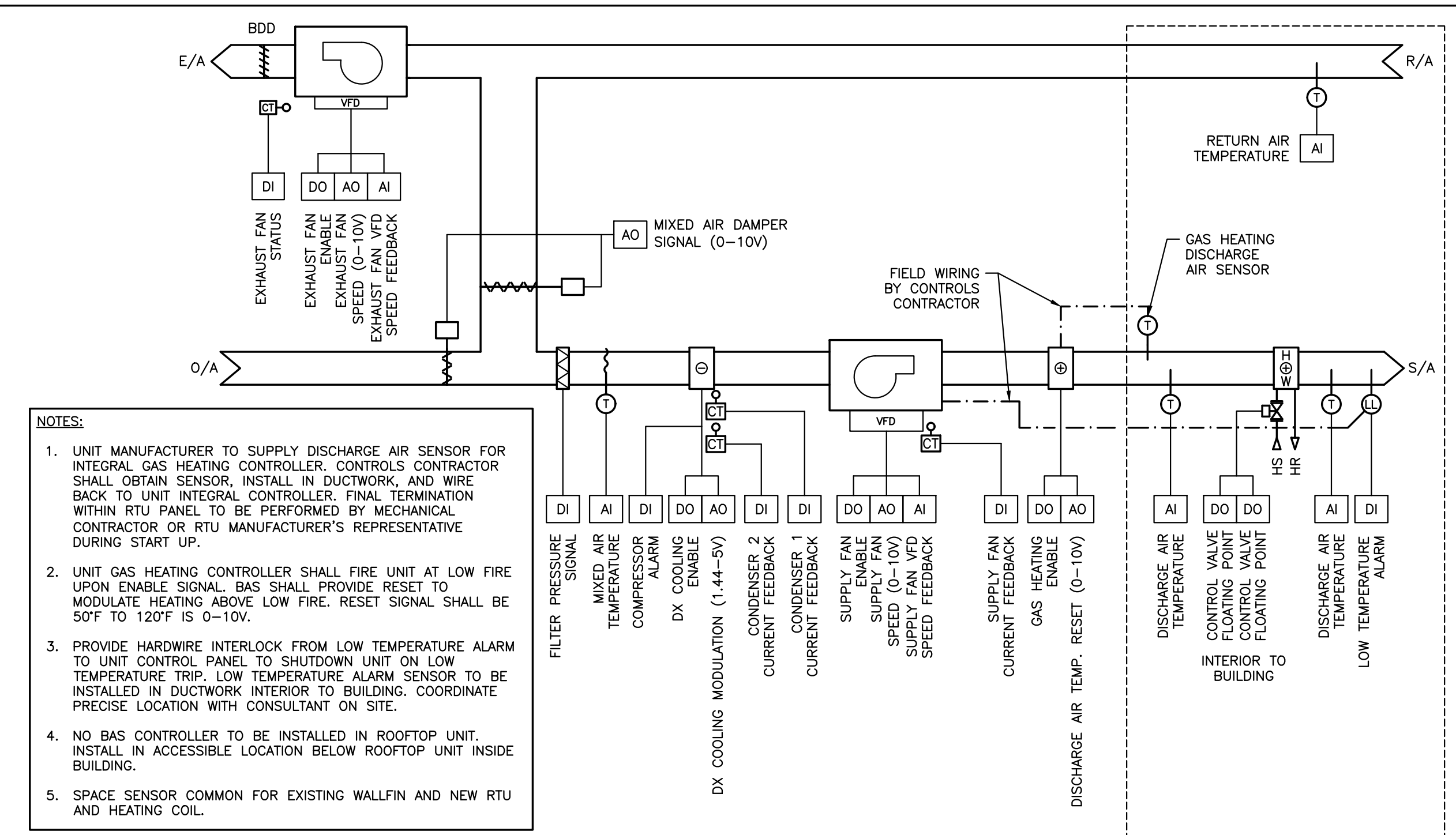
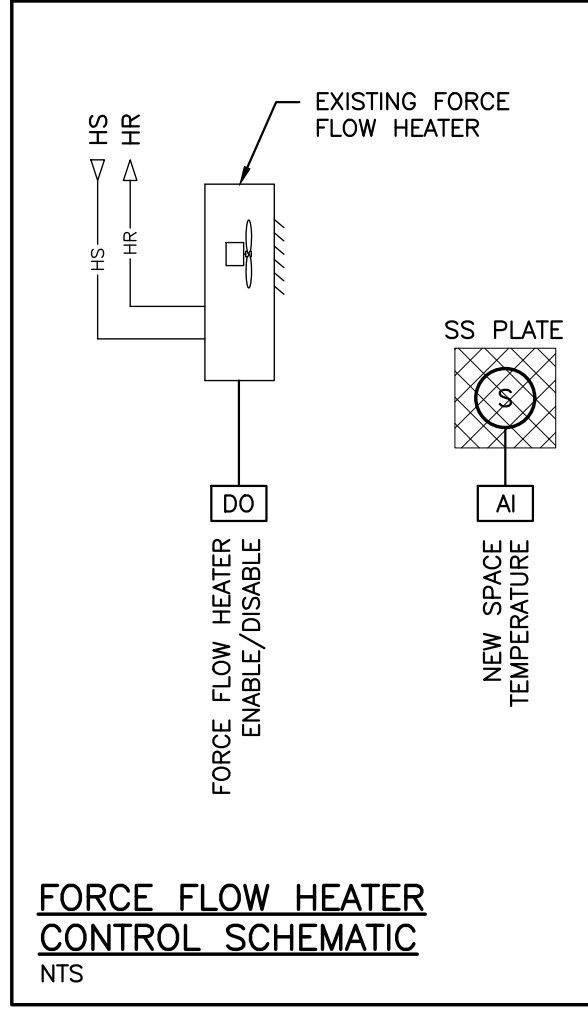
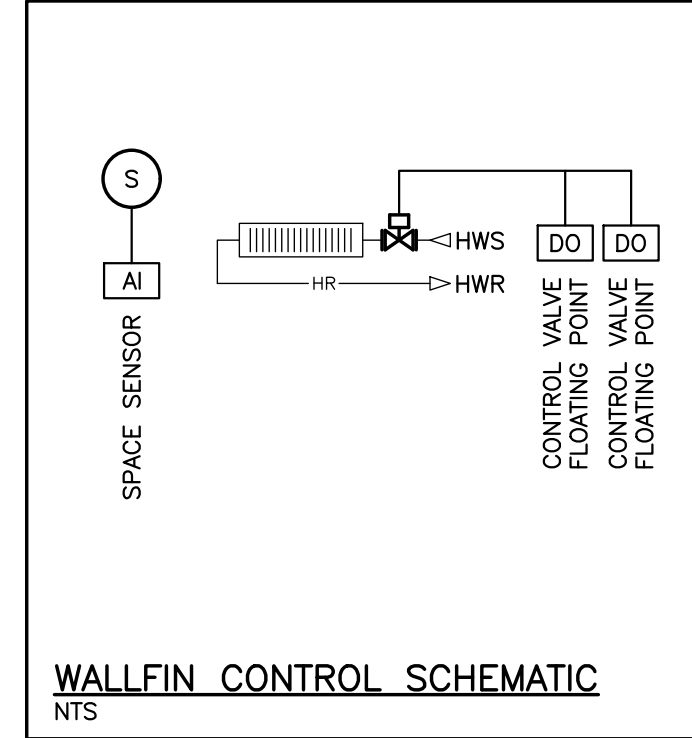
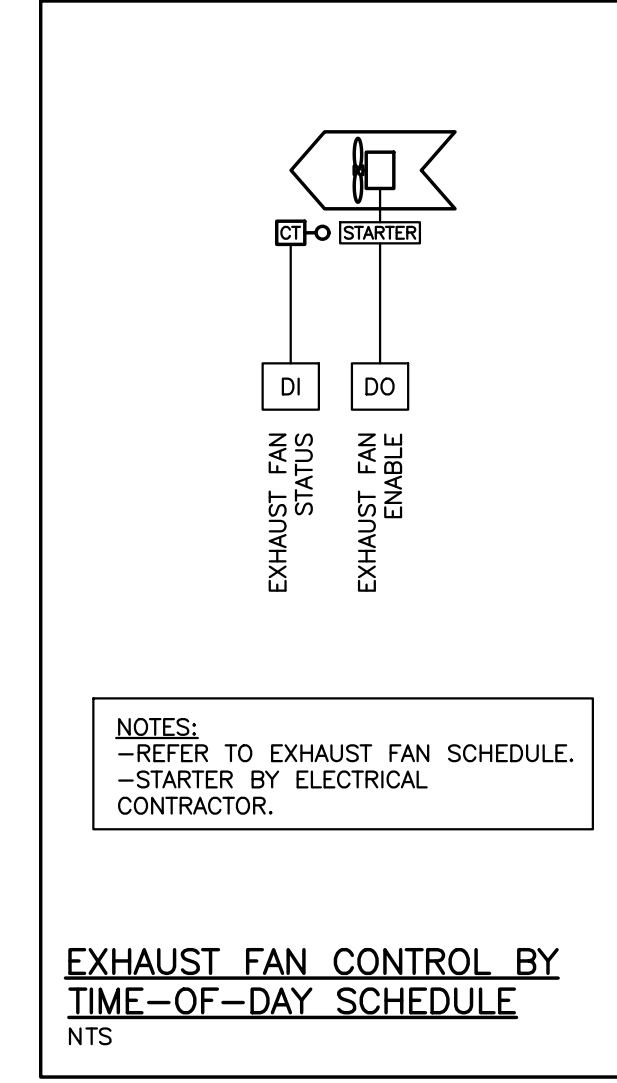
DATE: FEBRUARY 2022	SCALE: 3/32"=1'
DRAWN BY: MRC	CHECKED BY: BRT
DES PROJECT NUMBER: 22-549	SHEET SIZE: D

ROOF NEW HVAC LAYOUT

M202

NEW CONTROL VALVE SCHEDULE (SUPPLIED BY DDSB)					
SERVICE	HC-1	HC-2	HC-3	LIBRARY 122	WORK ROOM 216
APPLICATION	HEATING COIL	HEATING COIL	HEATING COIL	WALLFIN	WALLFIN
MANUFACTURER	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS
VALVE TYPE/SERIES	POWERMITE 599	POWERMITE 599	POWERMITE 599	POWERMITE 599	POWERMITE 599
ASSEMBLY PART NUMBER	366-02068	366-02067	366-02070	366-02044	366-02041
VALVE PART NUMBER	599-02068	599-02067	599-02070	599-02044	599-02041
ACTUATOR PART NUMBER	SAS81.33U	SAS81.33U	SAS81.33U	SAS81.33U	SAS81.33U
FLOW	gpm	3.3	1.5	5.0	6.4
MEDIUM	100% WATER	100% WATER	100% WATER	100% WATER	100% WATER
MAX DESIGN PRES DROP	psi	2.0	1.0	1.0	1.0
VALVE CV		2.5	1.6	6.3	4.0
ACTUAL PRES DROP	psi	1.44	0.88	0.63	1.03
VALVE SIZE	inches	1/2	1/2	1/2	1/2
PORTING		3-WAY	3-WAY	3-WAY	2-WAY
TRIM		BRONZE	BRONZE	BRONZE	BRONZE
CONNECTION		FxF NPT	FxF NPT	FxF NPT	FxF NPT
FAIL POSITION		N.O.	N.O.	N.O.	N.O.
ACTUATOR SIGNAL		FLOATING	FLOATING	FLOATING	FLOATING
NOTES	-VALVES AND ACTUATORS SUPPLIED BY DDSB. VALVES TURNED OVER TO MECHANICAL CONTRACTOR FOR INSTALLATION. ACTUATORS WIRED AND INSTALLED BY INSTALLING CONTROLS CONTRACTOR.				

NEW CONTROL VALVE SCHEDULE (SUPPLIED BY DDSB)					
SERVICE	CLASSROOM 102	KINDERGARTEN 101	CLASSROOM 210	CLASSROOM 211	CLASSROOM 212
APPLICATION	WALLFIN	WALLFIN	WALLFIN	WALLFIN	WALLFIN
MANUFACTURER	SIEMENS	SIEMENS	SIEMENS	SIEMENS	SIEMENS
VALVE TYPE/SERIES	POWERMITE 599	POWERMITE 599	POWERMITE 599	POWERMITE 599	POWERMITE 599
ASSEMBLY PART NUMBER	366-02044	366-02041	366-02044	366-02044	366-02044
VALVE PART NUMBER	599-02044	599-02041	599-02044	599-02044	599-02044
ACTUATOR PART NUMBER	SAS81.33U	SAS81.33U	SAS81.33U	SAS81.33U	SAS81.33U
FLOW	gpm	5.1	3.0	4.74	4.74
MEDIUM	100% WATER	100% WATER	100% WATER	100% WATER	100% WATER
MAX DESIGN PRES DROP	psi	1.0	1.0	1.0	1.0
VALVE CV		6.3	4.0	6.3	6.3
ACTUAL PRES DROP	psi	0.66	0.56	0.57	0.57
VALVE SIZE	inches	1/2	1/2	1/2	1/2
PORTING		2-WAY	2-WAY	2-WAY	2-WAY
TRIM		BRONZE	BRONZE	BRONZE	BRONZE
CONNECTION		FxF NPT	FxF NPT	FxF NPT	FxF NPT
FAIL POSITION		N.O.	N.O.	N.O.	N.O.
ACTUATOR SIGNAL		FLOATING	FLOATING	FLOATING	FLOATING
NOTES	-VALVES AND ACTUATORS SUPPLIED BY DDSB. VALVES TURNED OVER TO MECHANICAL CONTRACTOR FOR INSTALLATION. ACTUATORS WIRED AND INSTALLED BY INSTALLING CONTROLS CONTRACTOR.				



NEW ROOFTOP UNIT & HEATING COIL
NTS

- CONTROLS SCOPE OF WORK:**
- THE GENERAL CONTRACTOR SHALL RETAIN THE INSTALLING CONTROLS CONTRACTOR FOR ALL NEW BAS CONTROLS WORK UNDER A CASH ALLOWANCE. ONCE THE CONTRACT IS AWARDED, THE DDSB SHALL SELECT A PRE-QUALIFIED INSTALLING CONTROLS CONTRACTOR BASED ON THE SCOPE OF WORK OUTLINED ON THE DRAWINGS. THE GENERAL (PRIME) CONTRACTOR SHALL CARRY THE SUCCESSFUL INSTALLING CONTROLS CONTRACTOR AS A SUB-TRADE UNDER THE ALLOTTED CASH ALLOWANCE (REFER TO CASH ALLOWANCE SPECIFICATION).
 - THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DEMO ELECTRIC (120V) CONTROLS WORK.
 - THE INSTALLING CONTROLS CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DEMO AND NEW ELECTRONIC AND BAS CONTROLS WORK.
 - DDSB SHALL SUPPLY ALL REQUIRED SENSORS, RELAYS, CURRENT SWITCHES, CONTROL ENCLOSURES, AND ALL OTHER NECESSARY CONTROL DEVICES FOR A FULLY OPERATIONAL SYSTEM EXCEPT AS NOTED HEREIN AND TURN OVER TO INSTALLING CONTROLS CONTRACTOR FOR INSTALLATION. (THE EXISTING BAS SYSTEM IS SIEMENS CONTROLS).
 - DDSB SHALL SUPPLY ALL ELECTRIC (24V) AND NEW BAS CONTROL VALVES AND TURN OVER CONTROL VALVE BODIES TO MECHANICAL CONTRACTOR FOR INSTALLATION. MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR PICKING UP VALVES FROM DDSB OFFICE AND TRANSPORTING VALVES TO SITE. COORDINATE WITH DDSB.
 - DDSB SHALL SUPPLY ALL NEW TEMPERATURE SENSOR WELLS AND TURN OVER TO MECHANICAL CONTRACTOR FOR INSTALLATION. MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR PICKING UP WELLS FROM DDSB OFFICE AND TRANSPORTING WELLS TO SITE. COORDINATE WITH DDSB.
 - SCOPE OF WORK SHALL INCLUDE BUT IS NOT LIMITED TO:
 - REMOVAL OF REDUNDANT CONTROLS.
 - PROVIDE NEW SPACE SENSORS, RELOCATE EXISTING SENSORS, OR REWIRE EXISTING SENSORS TO SUIT NEW CONTROLS AS REQUIRED AND AS INDICATED ON DRAWINGS.
 - PROVIDE NEW OR UPGRADE EXISTING BAS CONTROLLERS AS INDICATED AND FOR COMPLETELY FUNCTIONAL SYSTEMS. TIE NEW CONTROLLERS INTO EXISTING BAS CONTROL NETWORK. RELOCATE EXISTING CONTROLLERS AS REQUIRED AND TIE BACK INTO EXISTING BAS CONTROL NETWORK.
 - PROVIDE CONTROL POINTS AS REQUIRED FOR COMPLETE CONTROL OF NEW ROOFTOP UNITS RTU-1, RTU-2, RTU-3 & RTU-4.
 - PROVIDE CONTROL POINTS AS REQUIRED FOR COMPLETE CONTROL OF NEW HOT WATER HEATING COILS.
 - PROVIDE CONTROL FOR NEW EXHAUST FAN.
 - PROVIDE CONTROL POINTS AS REQUIRED FOR COMPLETE CONTROL OF EXISTING WALLFIN AND FORCE FLOW HEATERS AS PER SCHEMATICS.
 - MECHANICAL CONTRACTOR AND INSTALLING CONTROLS CONTRACTOR SHALL TAKE PRECAUTIONS DURING DEMOLITION AND NEW WORK TO ENSURE BAS COMMUNICATIONS WIRING REMAINS FULLY FUNCTIONAL AND OPERATIONAL DURING RENOVATION. CONTROLS CONTRACTOR SHALL PROVIDE ANY TEMPORARY WIRING REQUIRED TO MAINTAIN SYSTEM UPTIME AND INTEGRITY.
 - GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR PATCHING, REPAIRING, AND SEALING ANY WALLS, CEILINGS, OR EQUIPMENT WHERE EXISTING CONTROLS DEVICES ARE REMOVED. COORDINATE LOCATION AND PATCHING FOR NEW CONTROLS WITH INSTALLING CONTROLS CONTRACTOR.

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DURHAM DISTRICT SCHOOL BOARD
CLAREMONT PS VENTILATION UPGRADES
1675 CENTRAL STREET
CLAREMONT, ONTARIO

DATE: FEBRUARY 2022	SCALE: NTS
DRAWN BY: MRC	CHECKED BY: BRT
DES PROJECT NUMBER: 22-549	SHEET SIZE: D

CONTROLS

M501

HVAC NOTES:

1. CONCEAL ALL SERVICES IN CEILING SPACES AND FURRED CONSTRUCTION UNLESS INSTALLED IN UNFINISHED OR EXPOSED AREAS OR IF SPECIFICALLY NOTED TO BE EXPOSED.
2. COORDINATE INSTALLATION WITH ALL OTHER TRADES.
3. COORDINATE WITH LIGHTING PLAN FOR EXACT LOCATIONS OF GRILLES AND DIFFUSERS. LIGHTING TAKES PRECEDENCE.
4. PROVIDE A CONTINUOUS ANTI-VIBRATION RUBBER GASKET BETWEEN ROOFCURBS AND EQUIPMENT UNIT RAILS.
5. PROVIDE 4" ROXUL INSULATION ON TOP OF ROOF WITHIN ENTIRE CURB STRUCTURE FOR SOUND ATTENUATION. ENSURE ALL EXPOSED ENDS ARE SEALED. ARRANGE FOR INSPECTION BY CONSULTANT PRIOR TO INSTALLING UNIT ON CURB.
6. ALL ROOFTOP EQUIPMENT SHALL BE PROVIDED WITH "LOCKING" ACCESS DOORS USING RECESSED SOCKET OPERATED HANDLES. KEYED PADLOCKS ARE NOT ACCEPTABLE. PROVIDE KEYED PAD LOCK FOR UNIT DISCONNECT.
7. PROVIDE 4" FLEXIBLE CONNECTIONS AT ALL DUCT CONNECTIONS TO AIR HANDLING EQUIPMENT.
8. PROVIDE ACOUSTIC INSULATION IN FIRST 5' (1.5m) OF SUPPLY AND RETURN DUCTS OFF AIR HANDLING UNITS, ALL TRANSFER DUCTS AND AS INDICATED ON DRAWINGS. SEAL ALL EXPOSED ENDS OF INSULATION.
9. PROVIDE TURNING VANES IN ALL SQUARE ELBOWS AND SHORT RADIUS ELBOWS FOR SUPPLY AIR DUCTS.
10. TEMPORARILY SEAL ALL OPEN DUCTS THROUGHOUT CONSTRUCTION TO PREVENT DUST AND DIRT FROM ENTERING THE SYSTEM, WHERE THE CONTRACTOR DOES NOT CONFORM THEY ARE RESPONSIBLE FOR CLEANING OF THE SYSTEMS IN A MANNER APPROVED BY THE CONSULTANT.
11. SEAL ALL JOINTS ON ALL SUPPLY & RETURN AIR DUCTS WITH DURODYNE DUCT SEALER IN CONFORMANCE TO CLASS 'C' ASHRAE 90.1 AND SMACNA STANDARDS. USE CLEAR DUCT SEALER OR SEAL BEHIND JOINTS FOR ALL EXPOSED DUCTWORK.
12. PERFORM DUCT LEAKAGE TEST. REFER TO SPECIFICATIONS.
13. BRANCH DUCTWORK TO DIFFUSERS TO BE SAME SIZE AS DIFFUSER NECK.
14. PROVIDE BALANCE DAMPERS ON ALL BRANCH DUCTS CLOSE TO MAIN TAKE-OFF. REVIEW WITH BALANCING CONTRACTOR TO CONFIRM LOCATIONS OF ALL BALANCE DAMPERS PRIOR TO CONSTRUCTION.
15. INCLUDE FOR THE SUPPLY AND INSTALLATION OF SIX(6) EXTRA BALANCE DAMPERS AFTER CONSTRUCTION AND BALANCING COMPLETION. (PENDING BALANCING RESULTS AND COMMENTS).
16. FLEXIBLE DUCT SHALL ONLY BE USED IN SUPPLY AIR APPLICATIONS FOR CONNECTIONS TO DIFFUSERS IN DROPPED CEILING. FLEXIBLE DUCT SHALL BE MAXIMUM 6' (1.8m) IN LENGTH AND SHALL BE SECURELY FASTENED TO DUCTS AND DIFFUSERS. PROVIDE HANGERS AND FLEXIBLE DUCTWORK WITHOUT SHARP 90's, SAGGING, OR CRUSHING OF DUCT. FLEXIBLE DUCT IS NOT ACCEPTABLE IN ANY OTHER APPLICATION.
17. PROVIDE EXTERNAL INSULATION ON ALL SUPPLY AIR DUCTS AND ON ALL EXHAUST DUCTS WITHIN 8' (2.4m) OF OUTSIDE WALL/ROOF INCLUDING RIGID AND FLEXIBLE DUCT.
18. CONFIRM EXACT LOCATIONS OF SENSORS WITH ENGINEER AND OWNER. MOUNT SENSORS AT 59" (1500mm) AFF. ENSURE THAT THERMOSTAT/SENSOR LOCATIONS WILL NOT BE AFFECTED BY DIRECT SUNLIGHT, COLD WALLS OR MILLWORK.
19. ALL INDOOR CONTROL WIRING SHALL BE RUN IN EMT CONDUIT OR FT6 (EMT SHALL BE USED IN EXPOSED AREAS). LAST 3' SHALL BE BX WHEN USING CONDUIT. ALL OUTDOOR CONTROL WIRING SHALL BE RUN IN LIQUIDTIGHT. ALL CONTROL WIRING SHALL RUN PARALLEL TO BUILDING LINES AND TIGHT TO ROOF DECK OR WALLS. ALL CONTROL WIRING PASSING THROUGH WALLS SHALL BE RUN IN EMT CONDUIT C/W BUSHINGS AT EACH END.
20. PROVIDE FIRE DAMPERS AT ALL FIRE SEPARATIONS. FIRE DAMPERS SHALL BE TYPE 'B' C/W LINKAGE OUT OF THE AIR STREAM. FIRE DAMPER RATING TO MATCH THE RATING OF THE SEPARATION CROSSED. PROVIDE COMBINATION SMOKE AND FIRE DAMPERS WHERE NOTED (WHERE OUTLETS FROM DUCTWORK SERVE MULTIPLE FIRE COMPARTMENTS).INSTALLATION MUST CONFORM TO LATEST NFPA/CSA 90A SPECIFICATIONS. ONLY USE ULC APPROVED EQUIPMENT. PROVIDE DUCT ACCESS DOORS AND BREAK AWAY FLANGES FOR ALL FIRE DAMPERS IN CONFORMANCE WITH CODE AND INSTALLATION INSTRUCTIONS. ACCESS DOORS SHALL BE TWIST LOCK TYPE - SCREWED PANELS ARE NOT ACCEPTABLE.
21. PROVIDE ACCESS DOOR IN DUCTWORK IMMEDIATELY UPSTREAM AND DOWNSTREAM OF REHEAT COILS. ACCESS DOORS SHALL BE TWIST LOCK TYPE - SCREWED PANELS ARE NOT ACCEPTABLE.
22. PROVIDE SLEEVES FOR PIPES THROUGH ALL BLOCK WALLS. FILL VOIDS AROUND PIPES. ENSURE NO CONTACT BETWEEN DISSIMILAR METALS.
23. PROVIDE DRYWALL ACCESS DOORS FOR CONCEALED FIRE AND BALANCE DAMPERS AND ANY OTHER CONCEALED DEVICES. DOORS TO BE GALVANIZED STEEL FOR FIELD PAINTING. DOORS SHALL BE RATED WHERE INSTALLED IN FIRE SEPARATIONS.
24. DRAIN HEATING SYSTEMS AS REQUIRED FOR NEW WORK. FILL, FLUSH, TEST AND TREAT (CHEMICAL TREATMENT) AFTER WORK IS COMPLETE. PROVIDE ALL PORTS, VALVES AND GAUGES AS REQUIRED. SUBMIT CHEMICAL TREATMENT REPORT TO ENGINEER. FREEZING OF PIPING TO ALLOW ISOLATION OF WORK AREA IS ACCEPTABLE IN LIEU OF DRAINING.
25. ALL CBVs SHALL BE MOUNTED WITH PORTS IN HORIZONTAL (90°) POSITION.
26. PROVIDE EXTERNAL INSULATION ON ALL HEATING PIPING.
27. PROVIDE FIRE STOPPING AROUND ALL NEW PIPING THROUGH FIRE SEPARATIONS.
28. LABEL ALL NEW HEATING PIPING COMPLETE WITH FLOW ARROWS. LABELS SHALL BE MAX 3m(10') SPACING AND ON EITHER SIDE OF WALLS. LABELING MUST BE COMPLETE PRIOR TO NEW CEILING BEING INSTALLED OTHERWISE IT IS THE CONTRACTORS RESPONSIBILITY TO REMOVE CEILING TILES FOR INSPECTION AT THE DIRECTION OF THE CONSULTANT.
29. LABEL CEILING TILE WITH PERMANENT ADHESIVE LABELS OR LAMACOID NAMEPLATES FOR ACCESS TO MECHANICAL ITEMS.
30. PROVIDE TRAP AT OUTLET OF DRAIN FOR ROOFTOP HVAC EQUIPMENT.
31. OBTAIN THE SERVICES OF A NEBB, CAABC OR NBCTA ACCREDITED BALANCING COMPANY TO BALANCE THE COMPLETE HVAC SYSTEM. PROVIDE REPORT TO ENGINEER FOR REVIEW. REFER TO SPECIFICATIONS FOR APPROVED AGENTS AND COMPLETE SCOPE OF WORK.
32. PROVIDE TESTING AND STARTUP OF ALL NEW EQUIPMENT AND PROVIDE REPORTS TO THE ENGINEER FOR REVIEW.

GENERAL NOTES:

1. OBTAIN, ARRANGE AND PAY FOR ALL REQUIRED PERMITS AND INSPECTIONS.
2. THE CONTRACTOR AND ITS SUB-TRADES SHALL ATTEND BI-WEEKLY SITE MEETINGS OR AS ARRANGED BY CONSULTANT OR OWNER.
3. OBTAIN AND REVIEW THE DESIGNATED SUBSTANCE REPORT FROM THE CLIENT AND COORDINATE ANY DESIGNATED SUBSTANCE ISSUES WITH THE CLIENT PRIOR TO ANY WORK BEING DONE.
4. PROVIDE SHOP DRAWINGS ELECTRONICALLY IN PDF FORMAT TO CONSULTANT FOR REVIEW. ALL SHOP DRAWINGS MUST BE REVIEWED, STAMPED AND SIGNED BY THE MECHANICAL CONTRACTOR PRIOR TO SUBMITTING TO THE CONSULTANT. REVIEW SHALL INCLUDE BUT NOT BE LIMITED TO: VERIFYING UNIT VOLTAGE WITH ELECTRICIAN AND/OR SITE, EQUIPMENT PERFORMANCE, DIMENSIONS AND CLEARANCES. SUBMIT SHOP DRAWINGS ELECTRONICALLY TO INFO@DURHAMENERGY.COM.
5. THOROUGHLY REVIEW AND COORDINATE WITH SITE CONDITIONS AND COMPLETE DRAWING SET PRIOR TO PRICING AND INSTALLATION.
6. INSTALL ALL WORK IN CONFORMANCE WITH MANUFACTURER'S REQUIREMENTS AND RECOMMENDATIONS.
7. DO NOT USE ANY NEW PERMANENT EQUIPMENT FOR TEMPORARY USE DURING CONSTRUCTION WITHOUT WRITTEN APPROVAL. WHERE SYSTEMS ARE USED AND ARE CONTAMINATED BY DUST OR DIRT, THE CONTRACTOR SHALL CLEAN IN A MANNER ACCEPTABLE TO THE CONSULTANT.
8. MAINTAIN AS-BUILT DRAWINGS ON AN ON-GOING BASIS. DRAWINGS SHALL BE AVAILABLE FOR PERIODIC REVIEW BY THE CONSULTANT DURING CONSTRUCTION.
9. ALL WORK SHALL COMPLY WITH APPLICABLE CODES.
10. REMOVE ALL REDUNDANT EQUIPMENT, MATERIALS AND GARBAGE FROM SITE AND DISPOSE OF IN AN APPROVED MANNER. REDUNDANT EQUIPMENT AND MATERIALS SHALL NOT BE ABANDONED IN PLACE.
11. ALL CUTTING AND CORING SHALL BE BY THIS CONTRACTOR. COORDINATE PATCHING WITH GENERAL CONTRACTOR. TRENCHING, EXCAVATION AND BACKFILL FOR UNDERGROUND PLUMBING SHALL BE BY THIS CONTRACTOR. ALL SAW CUTTING AND RESTORATION OF CONCRETE FLOOR BY GENERAL CONTRACTOR. COORDINATE WITH SAME
12. COORDINATE ROOFING FOR DUCT AND PIPE ROOF PENETRATIONS WITH GENERAL CONTRACTOR. PROVIDE PITCH POCKETS FOR ALL SERVICES THROUGH ROOF.
13. ANY FEED TO NEW ROOFTOP EQUIPMENT SHALL BE INSTALLED WITH GOOSENECK STYLE PITCH POCKET EQUAL TO THALER METAL MEF-2A OR DOGHOUSE. SIZE AS REQUIRED TO SUIT FEED.
14. MAINTAIN REQUIRED ACCESS AND CLEARANCE TO ALL EQUIPMENT AND SYSTEMS AS REQUIRED BY CODE AND AS PER MANUFACTURER'S REQUIREMENTS.
15. TAG ALL EQUIPMENT WITH LAMACOID NAMEPLATES. TAG ALL VALVES WITH LAMACOID NAMEPLATES OR BRASS TAGS ON CHAINS.
16. LABEL ALL NEW PIPING WITH SERVICE AND FLOW ARROWS EVERY 10'(3m) AND ON EITHER SIDE OF WALLS.
17. THE CONTRACTOR SHALL ARRANGE FOR INSPECTIONS BY THE CONSULTANT PRIOR TO CEILINGS AND WALLS BEING CLOSED IN. WHERE THIS HAS NOT BEEN ARRANGED IT IS THE CONTRACTOR'S RESPONSIBILITY TO REMOVE CEILING TILES OR ACCESS DOORS FOR INSPECTION AT THE DIRECTION OF THE CONSULTANT.
18. PERFORM TESTING AND START UP OF ALL SYSTEMS AS REQUIRED BY CODE, THE CONSULTANT, MANUFACTURER'S REQUIREMENTS, AND AUTHORITIES HAVING JURISDICTION. SUBMIT REPORTS TO THE CONSULTANT.
19. INSTRUCT AND DEMONSTRATE TO THE OWNER ON PROPER OPERATION OF THE SYSTEM. RECORD AND SUBMIT A LOG DATED AND SIGNED BY ALL ATTENDEES.
20. UPON COMPLETION OF THE PROJECT THE CONSULTANT WILL DO A FINAL REVIEW. UPON RECEIVING THE FINAL INSPECTION REPORT, THE CONTRACTOR MUST CORRECT AND SIGN BACK THE INSPECTION REPORT INDICATING ALL DEFICIENCIES ARE COMPLETED. A RE-INSPECTION WILL ONLY BE DONE ONCE THE CONSULTANT RECEIVES THIS IN WRITING. WHERE THE CONSULTANT PERFORMS THE RE-INSPECTION AND THE WORK IS NOT COMPLETE, THE CONTRACTOR IS RESPONSIBLE FOR REIMBURSING THE CONSULTANT FOR THE FIELD REVIEW. THE FEE FOR ADDITIONAL REVIEWS WILL BE AT THE CONSULTANT'S HOURLY RATES PLUS MILEAGE AND APPLICABLE TAXES TO BE PAID DIRECTLY TO THE CONSULTANT PRIOR TO PERFORMING THE NEXT FIELD REVIEW.
21. PROVIDE ONE (1) YEAR WARRANTY ON ALL MATERIAL AND LABOUR FROM THE DATE OF SUBSTANTIAL COMPLETION.
22. PROGRESS DRAWS SHALL INCLUDE MINIMUM \$2,500.00 FOR MANUALS AND AS-BUILT DRAWINGS. TOTAL AMOUNT SHALL REMAIN UNBILLED UNTIL MANUALS AND AS-BUILT DRAWINGS HAVE BEEN SUBMITTED AND APPROVED.
23. PROVIDE ONE(1) ELECTRONIC COPY OF MAINTENANCE MANUAL ON USB. MANUAL SHALL INCLUDE:
 - TABLE OF CONTENTS
 - CONTRACTOR INFORMATION
 - WARRANTY LETTER
 - SHOP DRAWINGS
 - O&Ms
 - INSPECTION & TEST REPORTS
 - AS-BUILT DRAWINGS.
 AS-BUILT DRAWINGS SHALL INCLUDE COMPLETE MECHANICAL DRAWING SET WITH ANY CHANGES MARKED CLEARLY AND NEATLY IN COLOUR. AS-BUILTS SHALL BE STAMPED ACCORDINGLY BY THE CONTRACTOR (ALL DRAWINGS). DRAWINGS SHALL BE SUBMITTED HARD COPY IN FULL SIZE OR SCANNED AND SUBMITTED ELECTRONICALLY IN FULL SIZE. SUBSTANTIAL COMPLETION WILL NOT BE AWARDED UNTIL THE MANUALS AND AS-BUILTS HAVE BEEN SUBMITTED TO THE CONSULTANT AND THE CONSULTANT HAS APPROVED.
24. REFER TO SPECIFICATIONS.

HVAC LEGEND

	NEW
	EXISTING
	DEMOLITION
	SUPPLY DUCTS (UP / DOWN)
	RETURN DUCTS (UP / DOWN)
	EXHAUST DUCTS (UP / DOWN)
	ROUND DUCTS (UP / DOWN)
	FLEXIBLE DUCT
	ACOUSTIC LINED DUCT
	FLEXIBLE DUCT CONNECTION
	TURNING VANES
	BALANCE DAMPER
	FIRE DAMPER
	SPLITTER DAMPER
	SUPPLY DIFFUSER (SQUARE / ROUND)
	RETURN/EXHAUST CEILING GRILLE
	SUPPLY SIDE WALL/DUCT GRILLE
	RETURN/EXHAUST SIDE WALL/DUCT GRILLE
	HOT WATER HEATING SUPPLY (HS)
	HOT WATER HEATING RETURN (HR)
	GAS PIPING
	GAS PIPING ON ROOF
	ELBOW RISING
	ELBOW DROPPING
	BRANCH RISING FROM TEE
	BRANCH DROPPING FROM TEE
	BALL SHUT-OFF VALVE
	UNION
	GLOBE VALVE
	BAS 2-WAY CONTROL VALVE
	CIRCUIT BALANCING VALVE (CBV)
	GAS PRESSURE REDUCING VALVE (PRV)
	CONCENTRIC REDUCER
	ECCENTRIC REDUCER
	STRAINER
	FLANGE
	AUTOMATIC AIR VENT C/W 1/4" BALL VALVE AND NIPPLE/COUPLING (MINI BALL VALVES NOT ACCEPTABLE)
	PIPE TEMPERATURE SENSOR C/W WELL
	DUCT TEMPERATURE SENSOR
	CONTROL/SENSING WIRING
	ELECTRIC THERMOSTAT
	BAS SPACE SENSOR
	EQUIPMENT TYPE OF EQUIPMENT SYMBOLS NUMBER DESIGNATION
	GRILLE TYPE SYMBOLS SIZE (in) AIR FLOW (cfm)

MECHANICAL ABBREVIATIONS

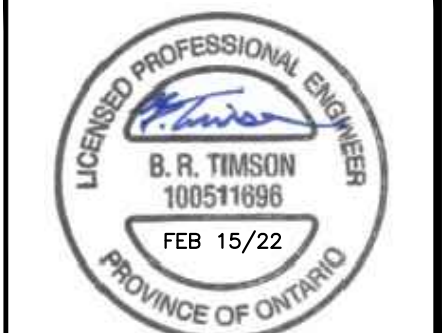
EX	EXISTING TO REMAIN
AFF	ABOVE FINISHED FLOOR
CTE	CONNECT TO EXISTING
C/W	COMPLETE WITH
U/S	UNDERSIDE
S/A	SUPPLY AIR
R/A	RETURN AIR
E/A	EXHAUST AIR
O/A	OUTSIDE AIR
RWL	RAIN WATER LEADER

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ISSUES/REVISIONS

No.	DESCRIPTION	DATE
1	ISSUED FOR CLIENT REVIEW	FEB 11 2022
2	ISSUED FOR PERMIT & TENDER	FEB 15 2022

DES DURHAM ENERGY SPECIALIST LIMITED
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 info@durhamenergy.com / www.durhamenergy.com



DURHAM DISTRICT SCHOOL BOARD

CLAREMONT PS VENTILATION UPGRADES

1675 CENTRAL STREET
CLAREMONT, ONTARIO

DATE: FEBRUARY 2022	SCALE: NTS
DRAWN BY: MRC	CHECKED BY: BRT
DES PROJECT NUMBER: 22-549	SHEET SIZE: D

LEGENDS & NOTES

M801

HOT WATER HEATING COIL SCHEDULE			
TAG	HC-1	HC-2	HC-3
SERVICE	RTU-1	RTU-2	RTU-3
MANUFACTURER	MCQUAY	MCQUAY	MCQUAY
MODEL	5BB0601B	5BB0701B	5W00601B
ROWS	1	1	1
FINNED HEIGHT	inches 21	15	24
FINNED LENGTH	inches 30	22	30
OVERALL HEIGHT	inches 21.69	15.69	26
OVERALL LENGTH	inches 35.69	27.69	41.5
CONNECTION SIZE	inches 0.5	0.5	1.5
FINS PER INCH	6	7	6
AIR FLOW	cfm 2,700	1,350	3,800
FACE VELOCITY	fpm 617	594	760
AIR PRESSURE DROP	in.wc. 0.10	0.11	0.20
HEATING CAPACITY	btuh 30,739	16,004	53,760
EWT/LWT	*F 160/140	160/140	160/140
EAT/LAT	*F 65/75	65/75	65/75
FLUID FLOW RATE	usgpm 3.0	1.5	5.0
FLUID PRESSURE DROP	ft 2.3	0.4	0.5
OPERATING WEIGHT	lbs 18	11	50
CBV SIZE	inches 3/4	1/2	1
MATERIALS	-COPPER TUBE -ALUMINUM FIN -CASE MATERIAL: GALVANIZED STEEL		
COMMENTS	-PROVIDE DUCT TRANSITIONS AT EACH COIL AS REQUIRED -PROVIDE ACCESS DOORS UPSTREAM AND DOWNSTREAM OF COIL		
ALTERNATE MANUFACTURERS	REFER TO SPECIFICATIONS		

EXHAUST FAN SCHEDULE		
TAG		EF-101
SERVICE		STORAGE 101A
TYPE		CEILING MOUNTED
MANUFACTURER		BROAN
MODEL		L200MG
AIR FLOW	cfm	200
EXTERNAL STATIC	in.wc.	0.3
SOUND		1.5 SONES
FAN MOTOR	hp	FRACTIONAL
FAN TYPE		DIRECT DRIVE
AMPS	amps	1.3
ELECTRICAL	volt/ph	120/1
DIMENSIONS	inches	12.25 SQ x 11.75 H
APPROX. WEIGHT	lbs	18
CONTROLS		-TIE INTO BAS TO RUN DURING OCCUPIED HOURS
ACCESSORIES		-METAL GRILLE
ALTERNATE MANUFACTURERS		GREENHECK, COOK

CBV SIZES & BALANCING VALUES			
TAG	ROOM NAME	WATER FLOW (gpm)	CBV SIZE (IN)
HC-1	NORTH CORRIDOR	3.3	3/4
HC-2	SOUTHWEST CORRIDOR	1.5	1/2
HC-3	SOUTHWEST CORRIDOR	5.0	1
WALLFIN	LIBRARY 102	6.4	1
WALLFIN	WORK ROOM 104	3.2	1
WALLFIN	CLASSROOM 105	5.1	1
WALLFIN	KINDERGARTEN 106	3.0	1/2
WALLFIN	CLASSROOM 107	4.74	1/2
WALLFIN	CLASSROOM 108	4.74	1/2
WALLFIN	CLASSROOM 110	4.74	3/4

NOTE: RECALIBRATE DIFFERENTIAL PRESSURE SENSOR TO SUIT REVISED SYSTEM FLOWS. REFER TO M201.

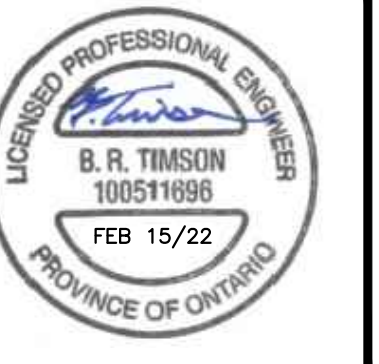
ROOFTOP UNIT SCHEDULE																
TAG	RTU-1				RTU-2				RTU-3				RTU-4			
LOCATION	ROOFTOP				ROOFTOP				ROOFTOP				ROOFTOP			
SERVICE	NORTH CLASSROOMS				LIBRARY				SOUTH CLASSROOMS				GYMNASIUM			
MANUFACTURER	AON				AON				AON				AON			
MODEL	RN-010-8-0-0000-3KB				RN-004-8-V-EA09-31B				RN-011-8-0-0000-3FB				RN-011-8-0-0000-3FB			
TYPE	INDIRECT FIRED NATURAL GAS				INDIRECT FIRED NATURAL GAS, DX COOLING				INDIRECT FIRED NATURAL GAS				INDIRECT FIRED NATURAL GAS			
DISCHARGE	DOWN				DOWN				DOWN				DOWN			
RETURN AIR	DOWN				DOWN				DOWN				DOWN			
AIR HANDLING																
AIR FLOW	cfm 2,700				1,350				3,800				3,800			
EXTERNAL STATIC	in.w.c. 1.0				0.85				0.85				1.5			
OUTSIDE AIR	cfm 1,200				500				1,500				1,500			
FAN DRIVE	PREMIUM EFFICIENCY, VFD				PREMIUM EFFICIENCY, VFD				PREMIUM EFFICIENCY, VFD				PREMIUM EFFICIENCY, VFD			
FAN SPEED	rpm 1,742				1,271				1,764				1,764			
FAN TYPE	DIRECT DRIVE BACKWARD CURVED PLENUM FAN				DIRECT DRIVE BACKWARD CURVED PLENUM FAN				DIRECT DRIVE BACKWARD CURVED PLENUM FAN				DIRECT DRIVE BACKWARD CURVED PLENUM FAN			
FAN MOTOR	hp 2, INVERTER DUTY C/W VFD				1, INVERTER DUTY C/W VFD				3, INVERTER DUTY C/W VFD				3, INVERTER DUTY C/W VFD			
EXHAUST FAN																
AIR FLOW	cfm 2,700				1,350				3,800				3,800			
EXTERNAL STATIC	in.w.c. 0.25				0.25				0.25				0.25			
FAN DRIVE	PREMIUM EFFICIENCY, VFD				PREMIUM EFFICIENCY, VFD				PREMIUM EFFICIENCY, VFD				PREMIUM EFFICIENCY, VFD			
FAN SPEED	rpm 1,054				1,178				796				796			
FAN TYPE	DIRECT DRIVE BACKWARD CURVED PLENUM FAN				DIRECT DRIVE BACKWARD CURVED PLENUM FAN				DIRECT DRIVE BACKWARD CURVED PLENUM FAN				DIRECT DRIVE BACKWARD CURVED PLENUM FAN			
FAN MOTOR	hp 2, INVERTER DUTY C/W VFD				1, INVERTER DUTY C/W VFD				2, INVERTER DUTY C/W VFD				2, INVERTER DUTY C/W VFD			
COOLING																
EFFICIENCY (EER)	N/A				13.3				N/A				N/A			
REFRIGERANT	N/A				R410A				N/A				N/A			
TOTAL CAPACITY	btuh N/A				52,080				N/A				N/A			
SENSIBLE CAPACITY	btuh N/A				36,750				N/A				N/A			
OAT (DB/WB)	*F N/A				90/75				N/A				N/A			
RAT (DB/WB)	*F N/A				75/62				N/A				N/A			
MAT/EAT (DB/WB)	*F N/A				82.5/67.8				N/A				N/A			
LAT (DB/WB)	*F N/A				54.8/53.6				N/A				N/A			
HEATING																
EFFICIENCY	80%				80%				80%				80%			
TURNDOWN	8:1				10:1				10:1				10:1			
HEATING INPUT	btuh 150,000				60,000				195,000				195,000			
HEATING OUTPUT	btuh 120,000				48,600				156,000				156,000			
OAT (DB/WB)	*F -11.2				-11.2				-11.2				-11.2			
RAT (DB/WB)	*F 75.0				75.0				75.0				75.0			
MAT/EAT	*F 36.7				39.1				41.0				41.0			
LAT	*F 77.8				76.5				78.9				78.9			
ELECTRICAL	volt/ph 208/3				208/3				208/3				208/3			
FLA	amps 16				31				19				19			
MIN. CIRCUIT AMP	amps 18				35				22				22			
MOCAP	amps 25				50				30				30			
FREQUENCY	Hz 63 125 250 500 1000 2000 4000 8000				63 125 250 500 1000 2000 4000 8000				63 125 250 500 1000 2000 4000 8000				63 125 250 500 1000 2000 4000 8000			
UNIT S/A OUTLET SOUND POWER LW	db 90 87 87 82 75 73 69 63 78 79 79 72 67 64 61 56				88 85 89 84 76 75 71 65				88 85 89 84 76 75 71 65				88 85 89 84 76 75 71 65			
FILTERS	2" PLEATED MERV 13				2" PLEATED MERV 13				2" PLEATED MERV 13				2" PLEATED MERV 13			
FILTER NOTE	-CONTRACTOR TO REMOVE MERV8 FILTERS PROVIDED WITH UNIT AND REPLACE WITH 2" MERV13 FILTERS PRIOR TO AIR BALANCING.															
DIMENSIONS	inches 82.25L x 44.1W (BASE) x 44.0H				82.5L x 44.3W (BASE) x 50.5H				88.3L x 59.5W (BASE) x 50.1H				88.3L x 59.5W (BASE) x 50.1H			
APPROXIMATE WEIGHT	lbs 829 + ROOF CURB				927 + ROOF CURB				1,227 + ROOF CURB				1,227 + ROOF CURB			
CONTROLS	-TERMINAL STRIP FOR TIE IN BY CONTROLS CONTRACTOR. REFER TO CONTROLS DETAILS.															
ACCESSORIES	-DOUBLE WALL CONSTRUCTION WITH R13 INSULATION -BASE INSULATION -24" INSULATED ROOF CURB -INLET HOOD C/W BIRD SCREEN -MIXED AIR DAMPER CONTROL -ECONOMIZER -MODULATING DX COOLING - 1 VARIABLE CAPACITY COMPRESSOR, 1 ON/OFF COMPRESSOR (RTU-2 ONLY) -AIR COOLED CONDENSER & EVAPORATION COIL (RTU-2 ONLY) -COMPRESSOR BLANKETS (RTU-2 ONLY) -MODULATING GAS HEATING C/W DISCHARGE AIR TEMPERATURE CONTROL & BAS RESET -STAINLESS STEEL HEAT EXCHANGER -STAINLESS STEEL DRAIN PAN -PREMIUM EFFICIENCY MOTOR, INVERTER DUTY FOR VFD -INSULATED LOW LEAKAGE DAMPERS C/W BELIMO OR SIEMENS ACTUATORS (NON-MFT STYLE) -BOTTOM ENTRY FOR POWER AND CONTROLS -HINGED ACCESS DOORS C/W LEVER HANDLES, LOCKABLE BY SHIPPING SCREWS OR TOOL -UNIT MOUNTED NON-FUSED DISCONNECT -UNIT MOUNTED 115V, 20A GFI RECEPTACLE (FIELD WIRED) -VFD SUPPLIED WITH UNIT -PHASE AND BROWN OUT PROTECTION -MAGNETIC FILTER GAUGES C/W CLOGGED FILTER SWITCH -REMOTE SAFETY SHUTDOWN TERMINALS															
NOTES	-INSTALLING CONTRACTOR TO PROVIDE ROXUL INSULATION TO FILL WITHIN ROOF CURB FOR SOUND ATTENUATION															
ALTERNATE MANUFACTURERS	REFER TO SPECIFICATIONS															

AIR OUTLET SCHEDULE						
TAG	A	A1	B	C	D	D1
TYPE	SQUARE CONE DIFFUSER	ROUND CONE DIFFUSER	EGG CRATE RETURN	LOUVERED FACE RETURN	HEAVY DUTY GRILLE	HEAVY DUTY GRILLE
MANUFACTURER	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE
MODEL	SCD-31-3C	RCDA	80	535(D)-F-L-A	95	93
SIZE	SEE DRAWINGS	SEE DRAWINGS	SEE DRAWINGS	SEE DRAWINGS	SEE DRAWINGS	SEE DRAWINGS
COLOUR	B12	B12	B12	B12	WASHED MILL	B12
NOTES	-24x24 CEILING MODULE FOR T-BAR MOUNTING	-FOR DUCT MOUNTING -SAFETY CHAINS	-NO BORDER FOR T-BAR MOUNTING -C/W BORDER (F) AND SCREWS FOR DRYWALL MOUNTING	-SINGLE DEFLECTION (FIXED BLADES) -1/2" BLADE SPACING -NO DAMPER UNLESS NOTED	-SURFACE MOUNT -NO DAMPER UNLESS NOTED -3/4" BLADE SPACING -0° DEFLECTION	-SURFACE MOUNT -NO DAMPER UNLESS NOTED -1/2" BLADE SPACING -45° DEFLECTION
ALTERNATE MANUFACTURERS	REFER TO SPECIFICATIONS					

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1	ISSUED FOR CLIENT REVIEW	FEB 11 2022
2	ISSUED FOR PERMIT & TENDER	FEB 15 2022

DES DURHAM ENERGY SPECIALIST LIMITED
CONSULTING ENGINEERS
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DURHAM DISTRICT SCHOOL BOARD
CLAREMONT PS VENTILATION UPGRADES
1675 CENTRAL STREET
CLAREMONT, ONTARIO

DATE: FEBRUARY 2022	SCALE: NTS
DRAWN BY: MRC	CHECKED BY: BRT
DES PROJECT NUMBER: 22-549	SHEET SIZE: D

SCHEDULES

M802

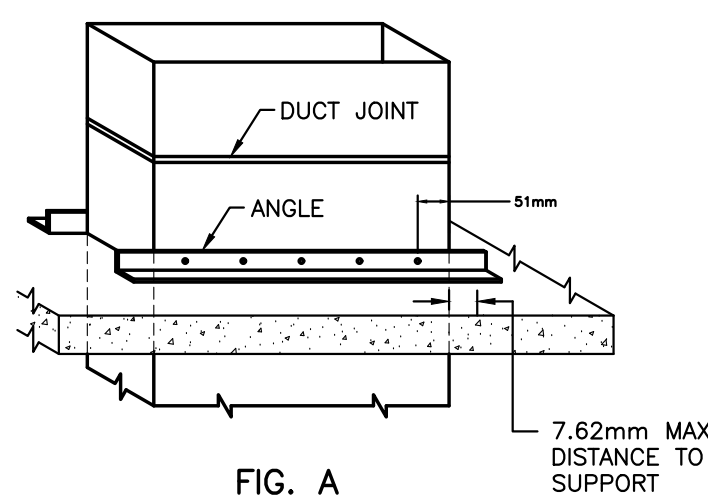


FIG. A
SUGGESTED SIZING FOR SUPPORT OF 3.7M OF DUCT

DUCT SIZE	ANGLE
914 x 457mm	38.1 x 38.1 x 3.2mm
1219 x 610mm	38.1 x 38.1 x 3.2mm
1524 x 762mm	38.1 x 38.1 x 4.8mm
1524 x 1524mm	38.1 x 38.1 x 6.4mm OR 51 x 51 x 3.2mm

RISER SUPPORT - FROM FLOOR
NTS

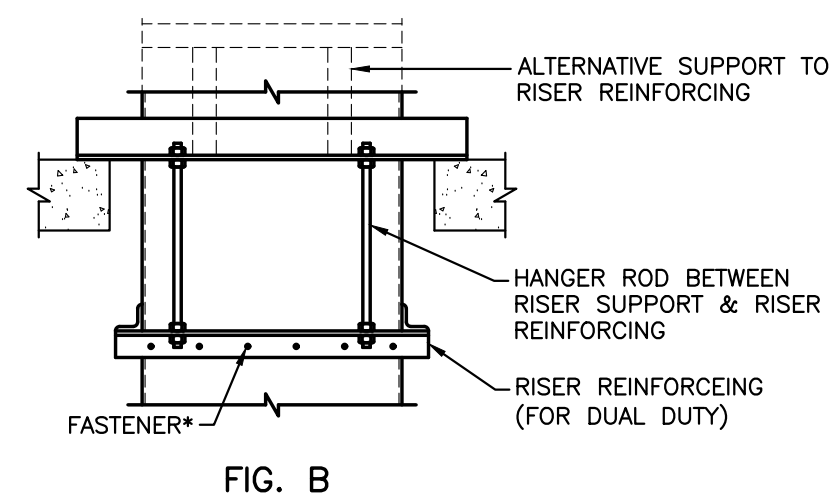


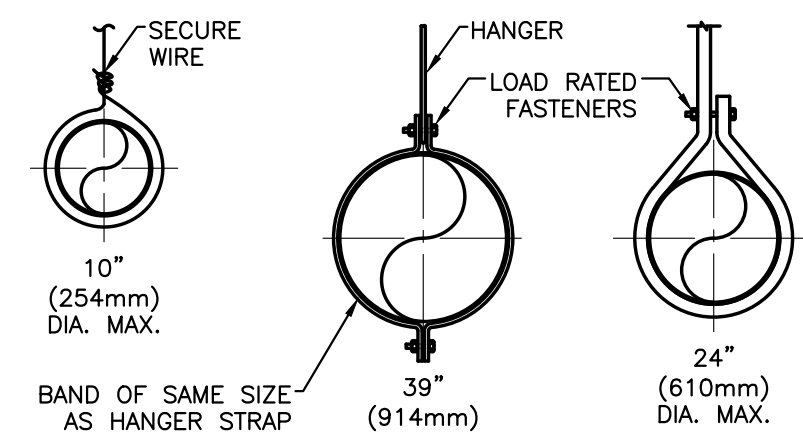
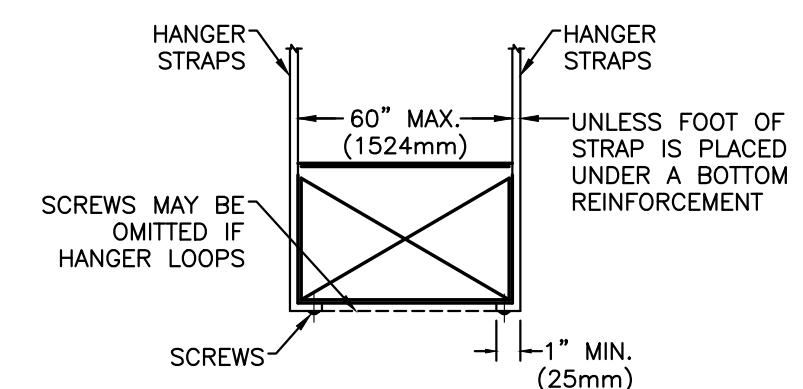
FIG. B

* MINIMUM NUMBER OF FASTENERS ON EACH OF TWO SUPPORT BARS

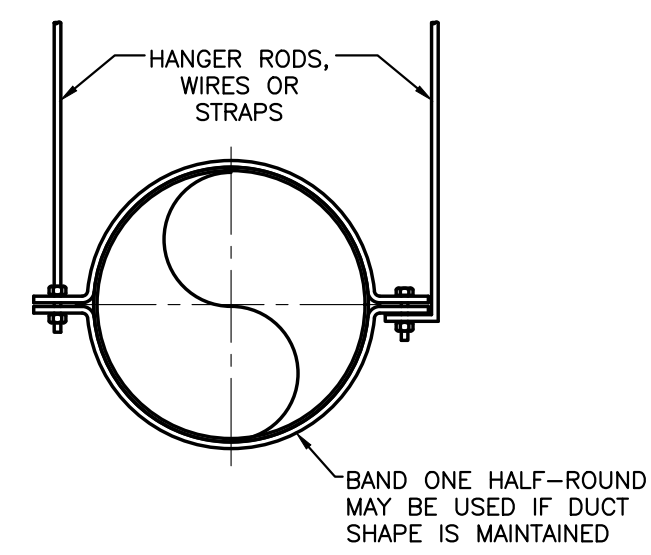
LARGEST DUCT DIA.	MINIMUM NUMBER OF FASTENERS
406mm AND DOWN	2
432mm - 610mm	3

LARGEST DUCT DIM DIVIDED BY 8

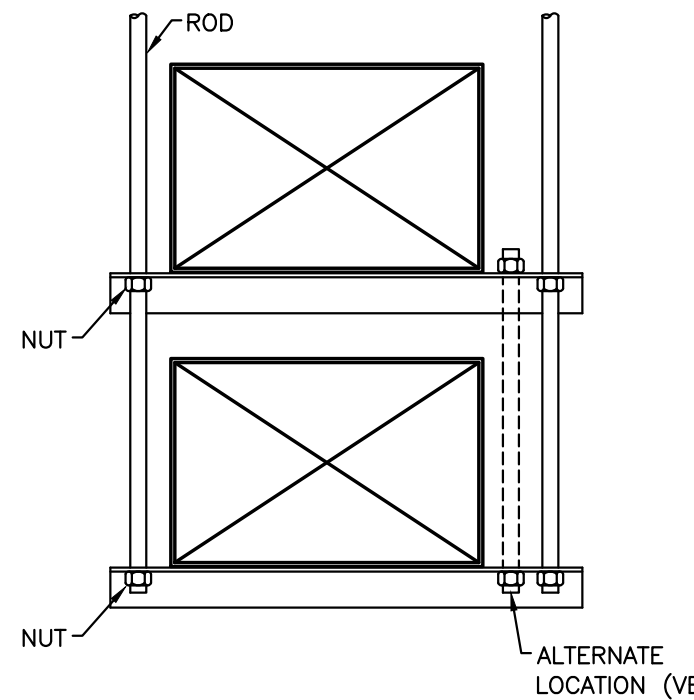
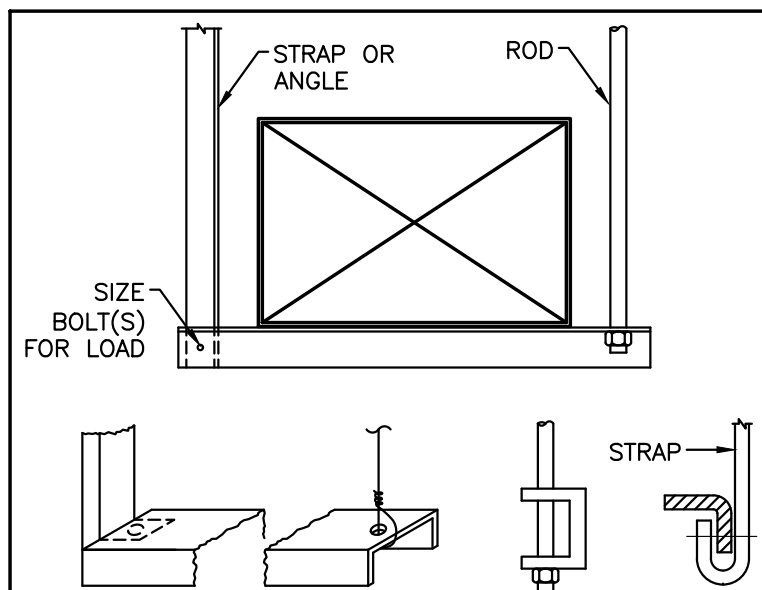
LOCATE A FASTENER WITHIN 51mm OF THE DUCT EDGES, LOCATE OTHERS AT EVENLY SPACED INTERVALS. SEE TABLE 4-4 ON PAGE 4.16 OF SMACNA.



NOTE: HANGERS MUST NOT DEFORM DUCT SHAPE

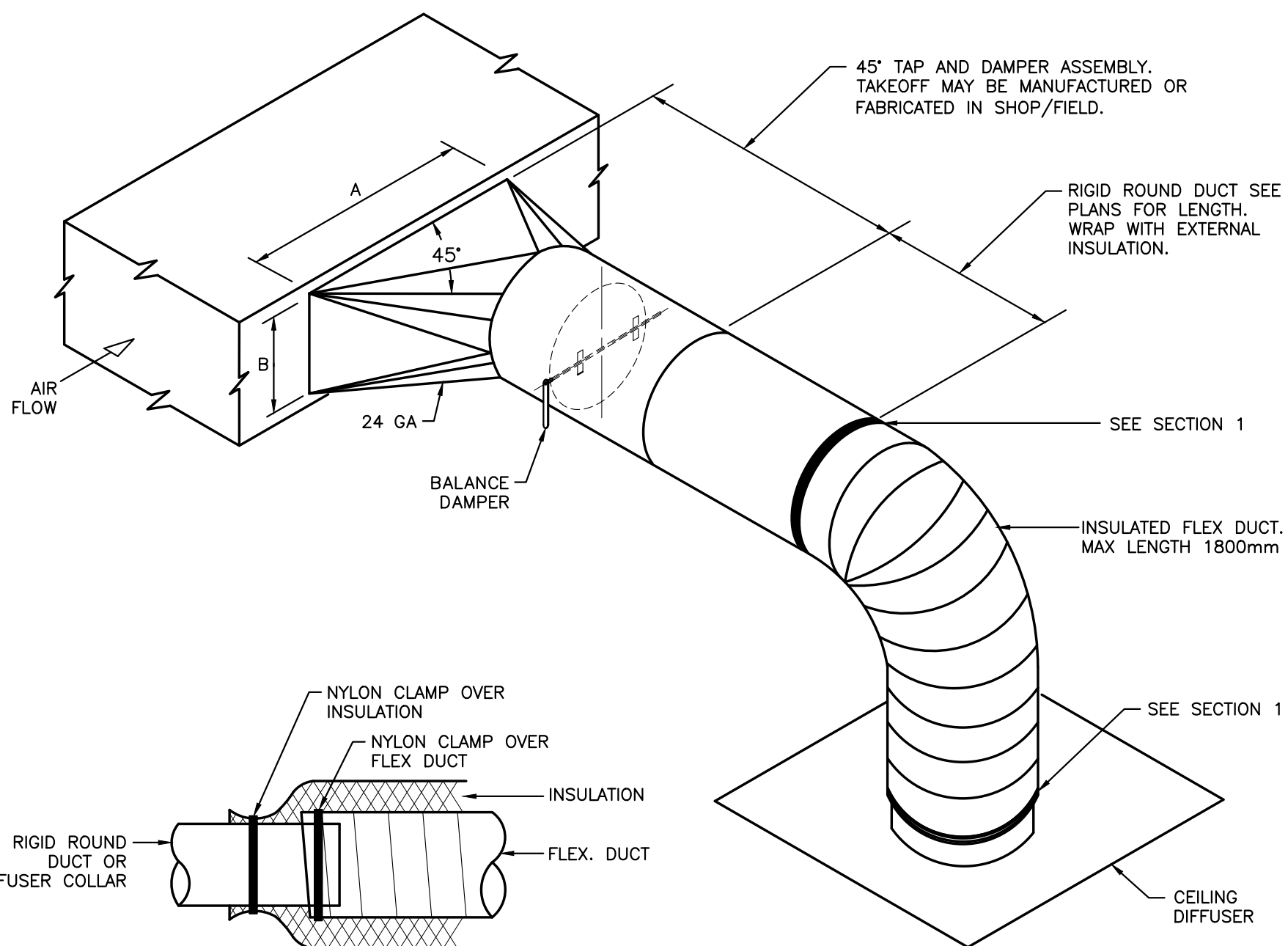


STRAP HANGERS
NTS



NOTES:
1. REINFORCEMENT MAY BE USED FOR ATTACHMENT IF IT QUALIFIES FOR BOTH DUTIES.
2. DO NOT EXCEED ALLOWABLE LOAD LIMITS.

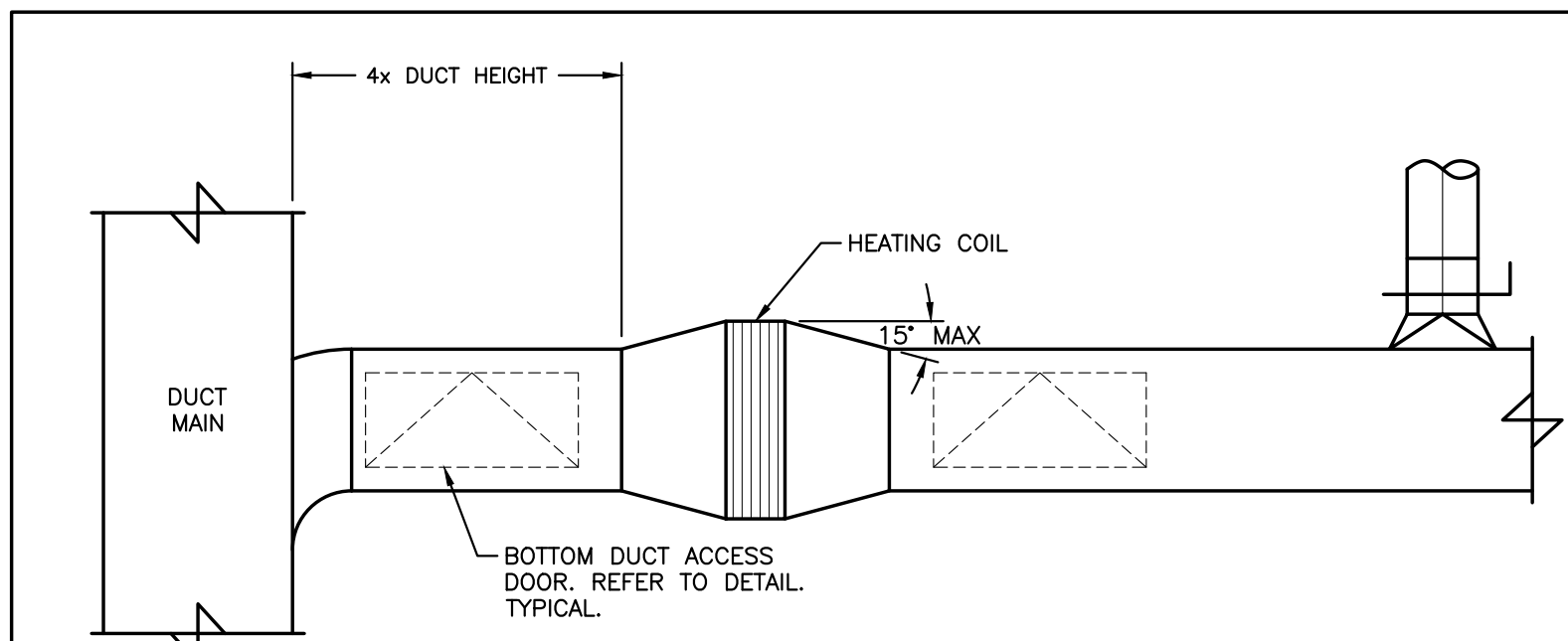
TRAPEZE HANGERS
NTS



SECTION 1

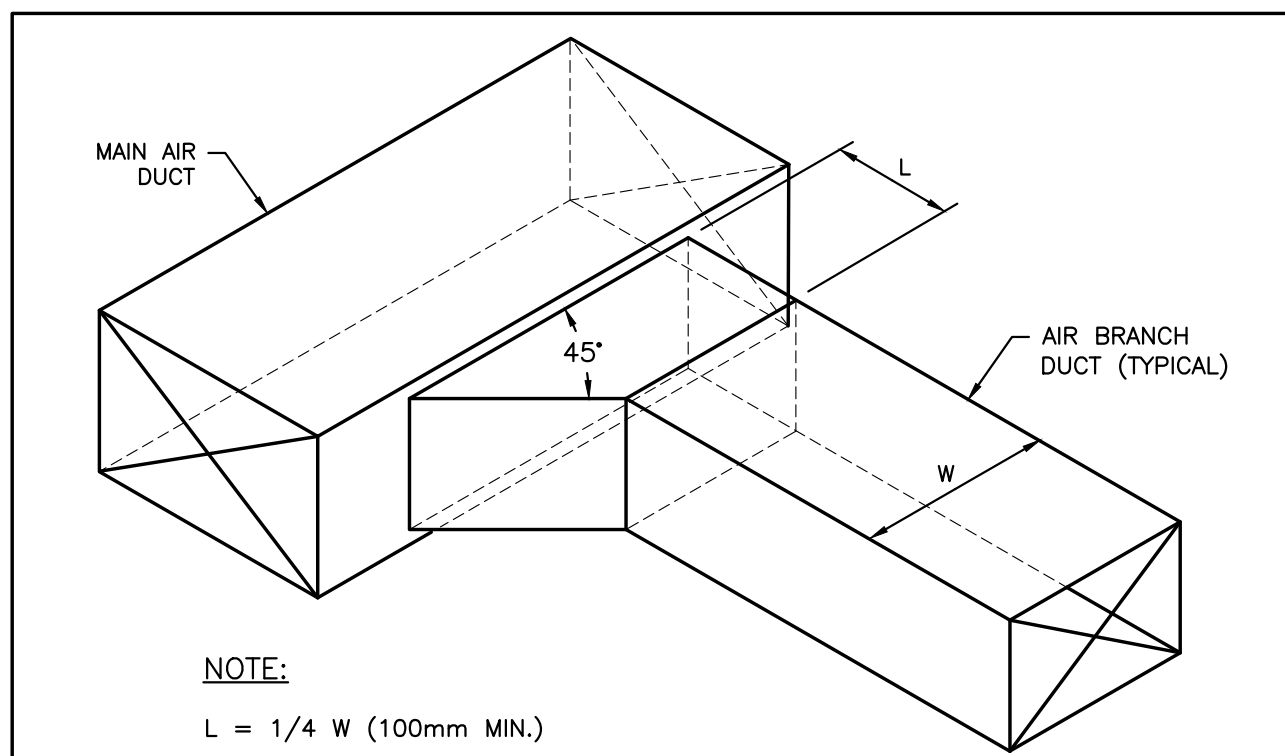
NOTE:
1. TAKE-OFFS SHOULD NOT BE INSTALLED CLOSER THAN TWO WIDTHS TO ELBOWS OR INTERSECTIONS.
2. AREA OF AxB SHALL BE EQUAL TO 1.5x AREA BRANCH DUCT.
3. PRIOR APPROVAL SHALL BE OBTAINED FROM CONSULTANT FOR ANY LOCATIONS WHERE HEIGHT OF TAKEOFF MUST BE REDUCED TO SUIT CEILING CLEARANCES.

SQUARE TO ROUND TAKE-OFF DETAIL
NTS

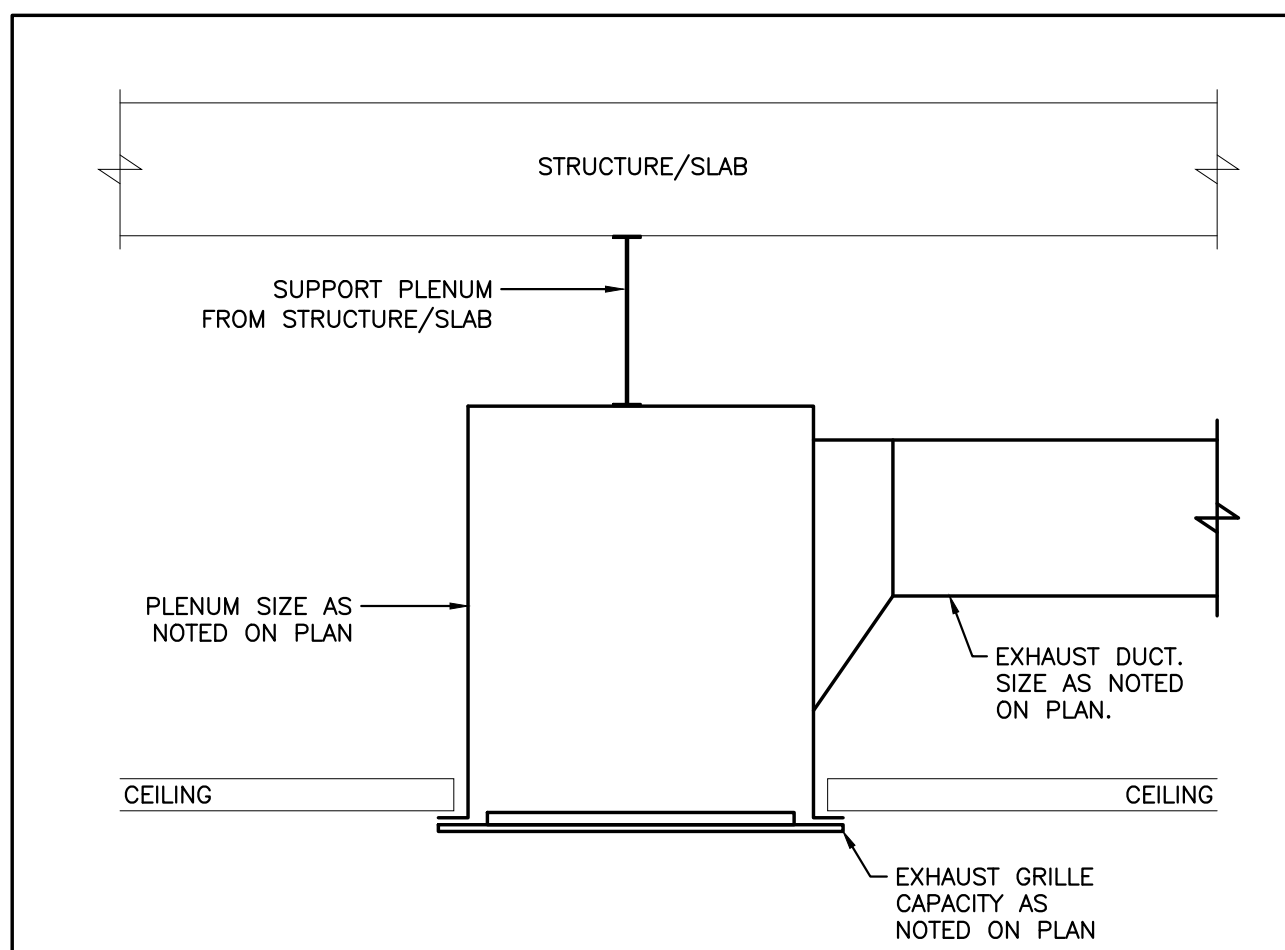


HEATING COIL DUCT DETAIL
NTS

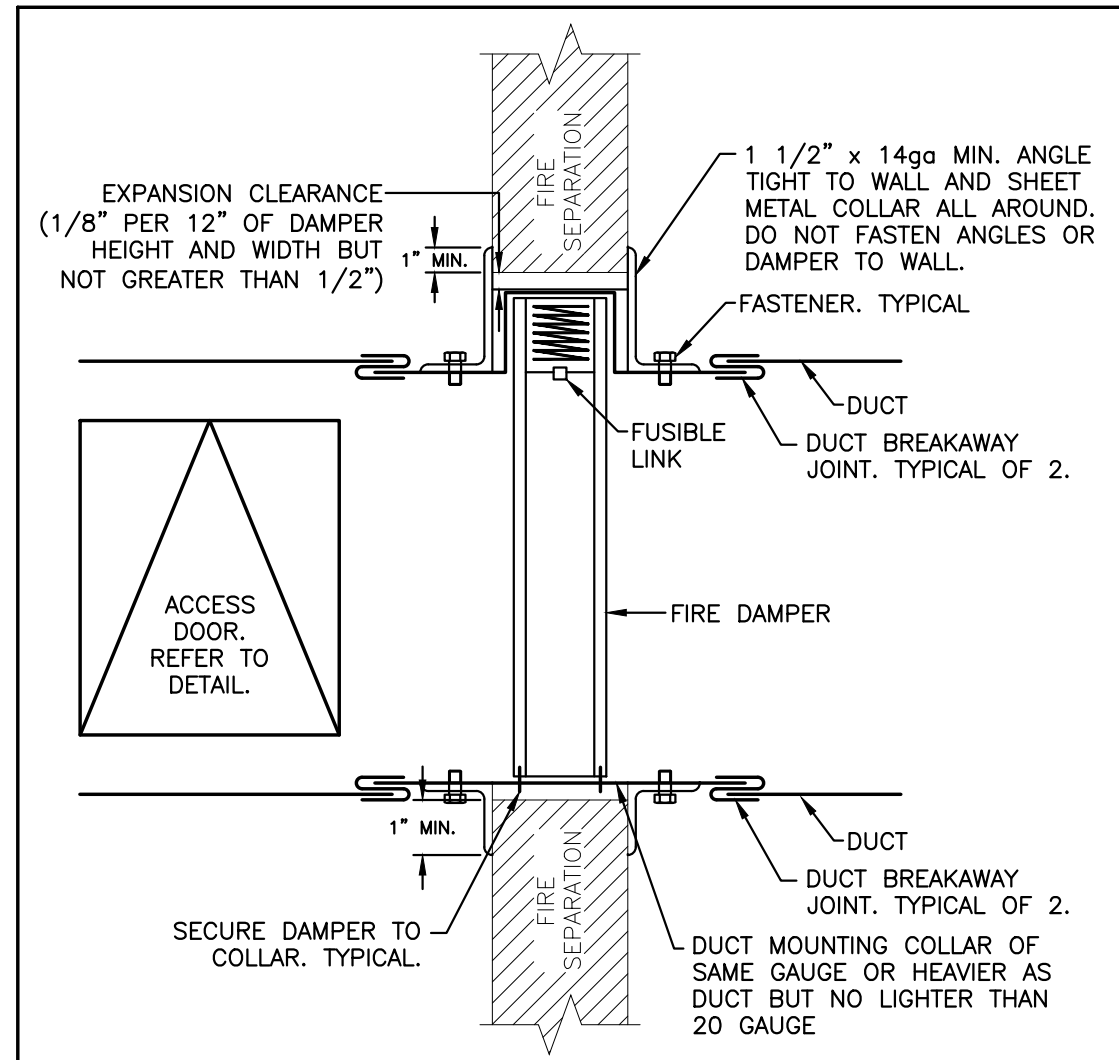
NOTE:
NOTIFY ENGINEER OF ANY INSTALLATION LOCATIONS WHERE SPACE CONSTRAINTS MAY REQUIRE SMALLER ACCESS DOORS THAN THOSE SPECIFIED OR SHARPER TRANSITIONS THAN THOSE SPECIFIED.



SUPPLY OR RETURN AIR DUCT BRANCH CONNECTION DETAIL
NTS

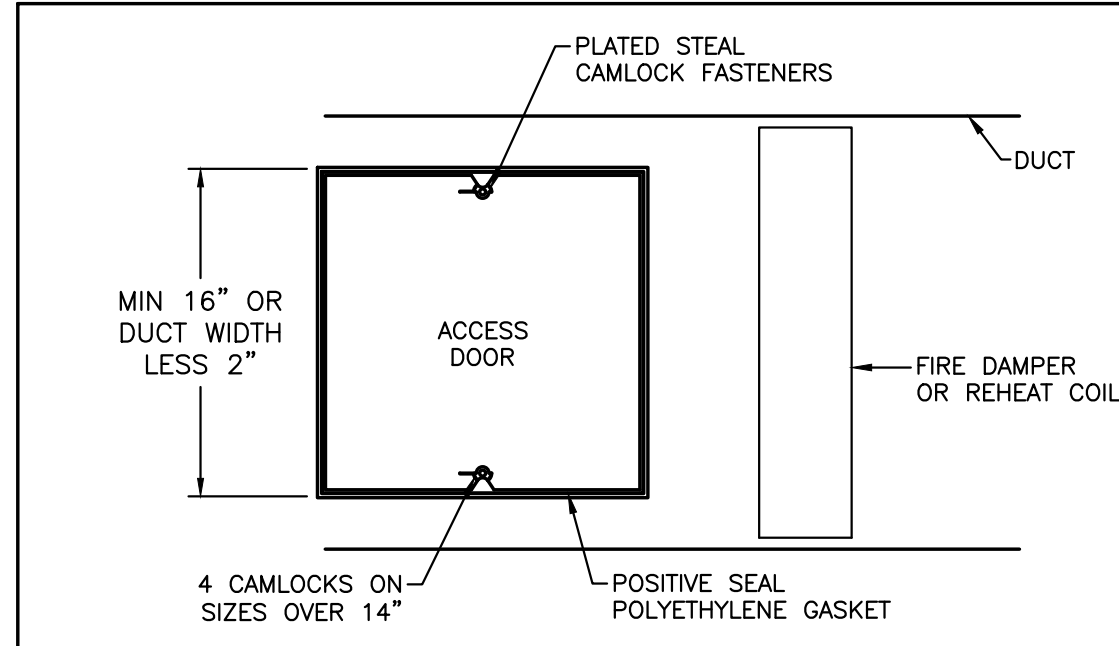


CEILING EXHAUST PLENUM DETAIL
NTS



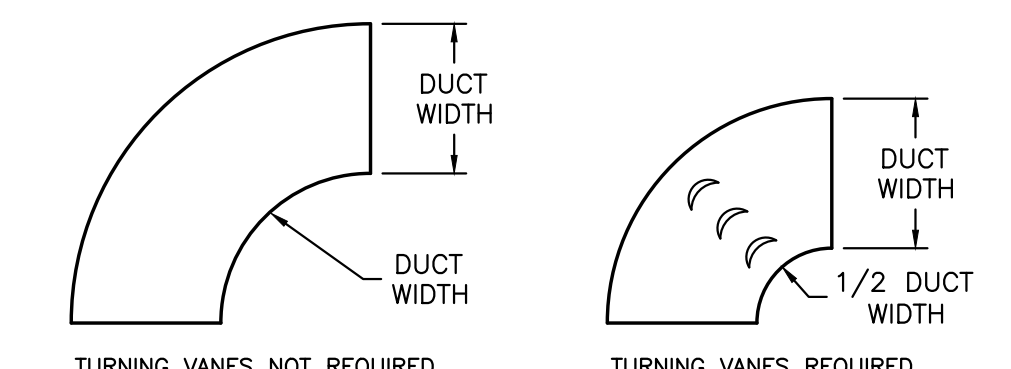
NOTE:
WHERE ACCESS IS BELOW FIRE DAMPERS IN HORIZONTAL INSTALLATIONS, PULL TAB MUST BE SPECIFIED TO ALLOW RESETTING OF LINKAGE FROM BELOW.

FIRE DAMPER DETAIL
NTS



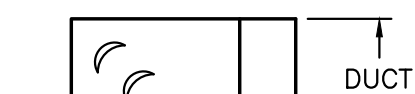
ACCESS DOOR EQUAL TO:
SQUARE/RECTANGLE: NAILOR 085CL
FLAT OVAL: NAILOR 0800
SIZE:
SQUARE/RECTANGLE: 16x16"
FLAT OVAL: 18x10"

DUCT ACCESS DOOR DETAIL
NTS

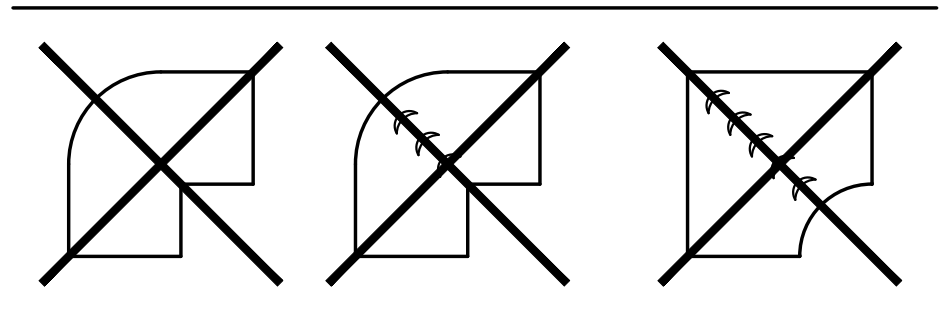


LONG RADIUS

SHORT RADIUS

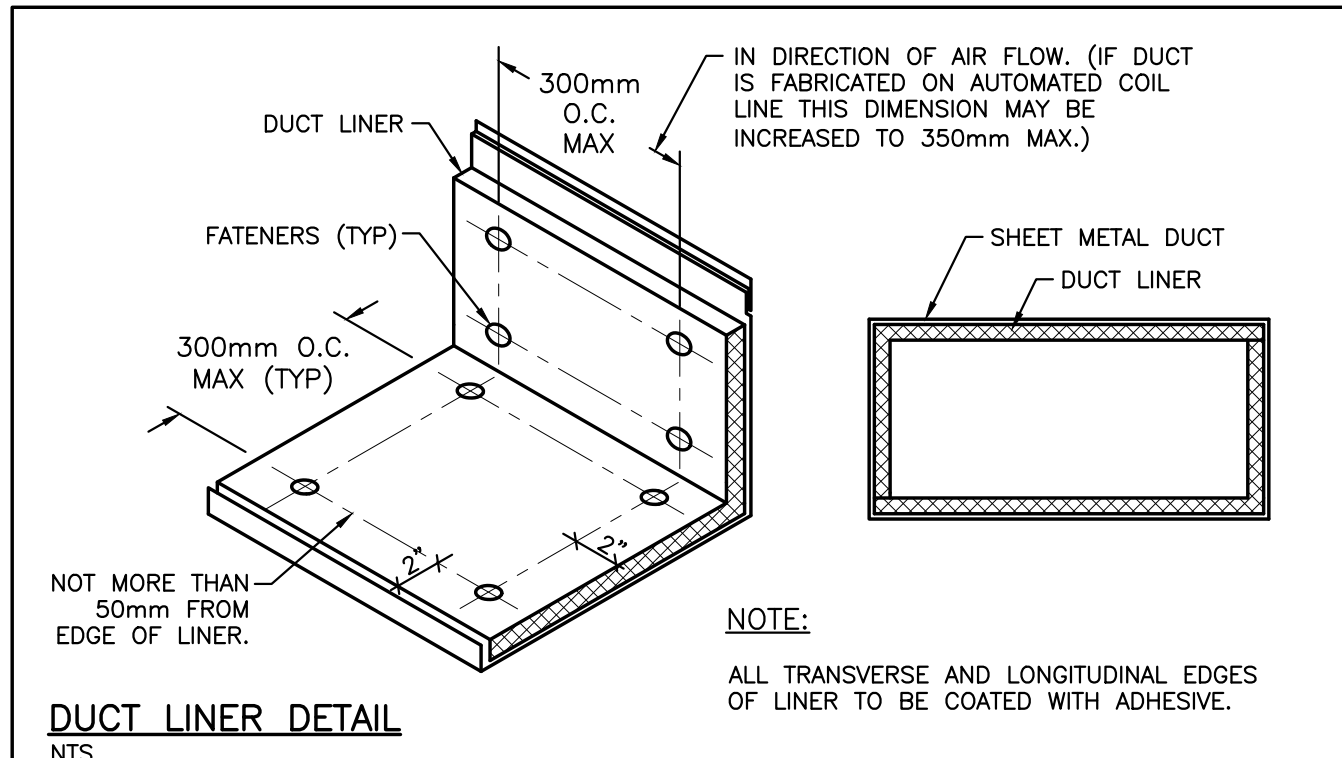


SQUARE ELBOW

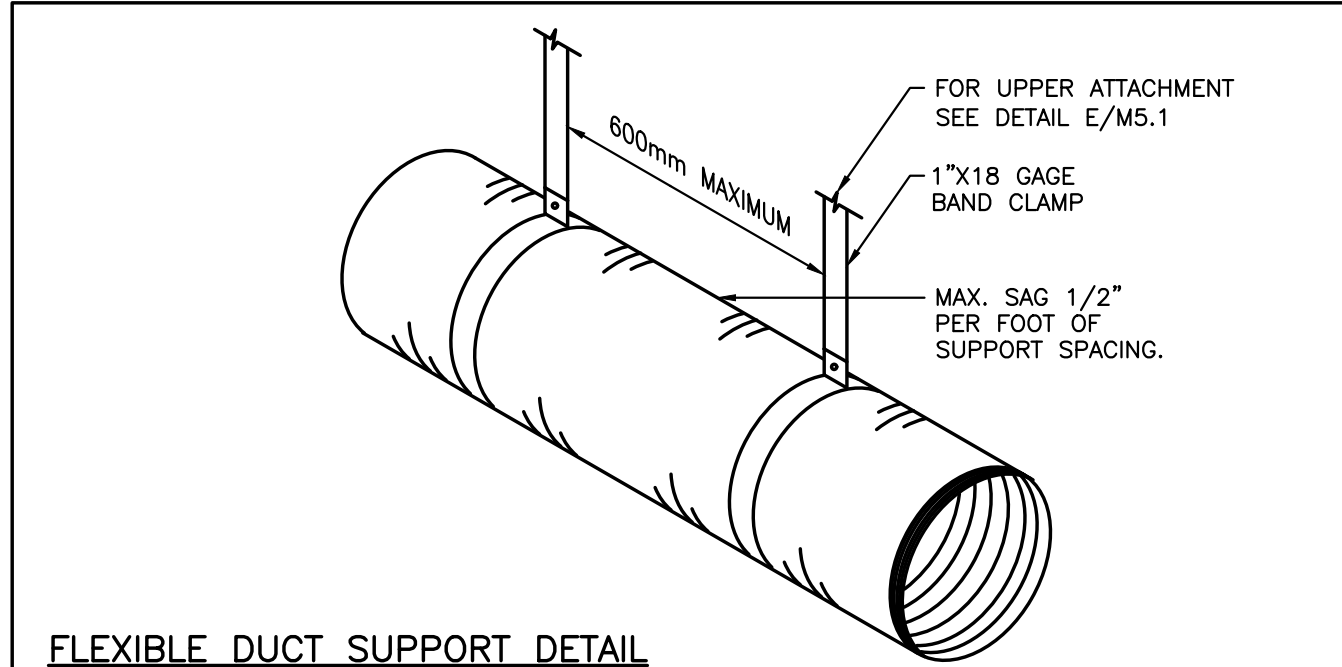


NOT ACCEPTABLE

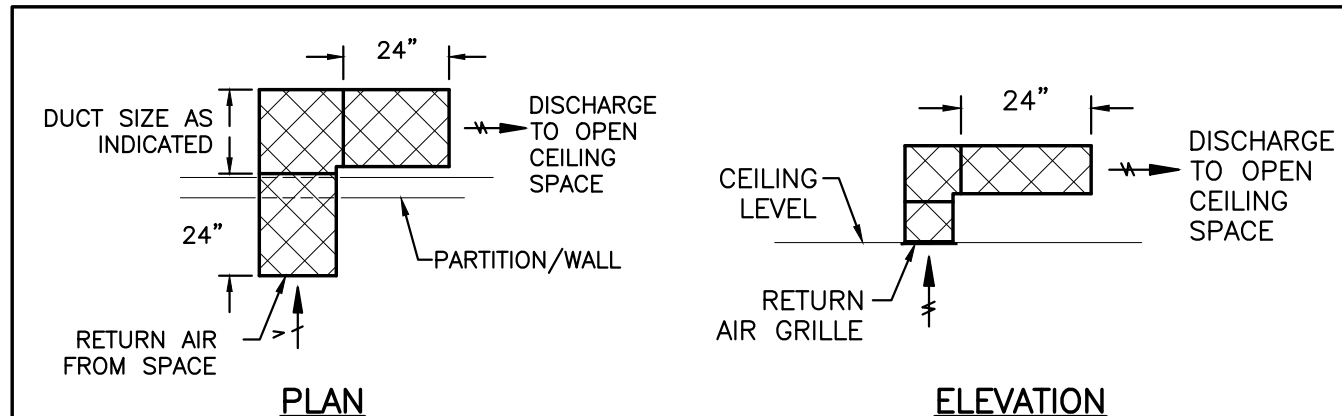
DUCT ELBOW DETAILS
NTS



DUCT LINER DETAIL
NTS



FLEXIBLE DUCT SUPPORT DETAIL
NTS



TRANSFER DUCT WITH SOUND ATTENUATION DETAIL
NTS

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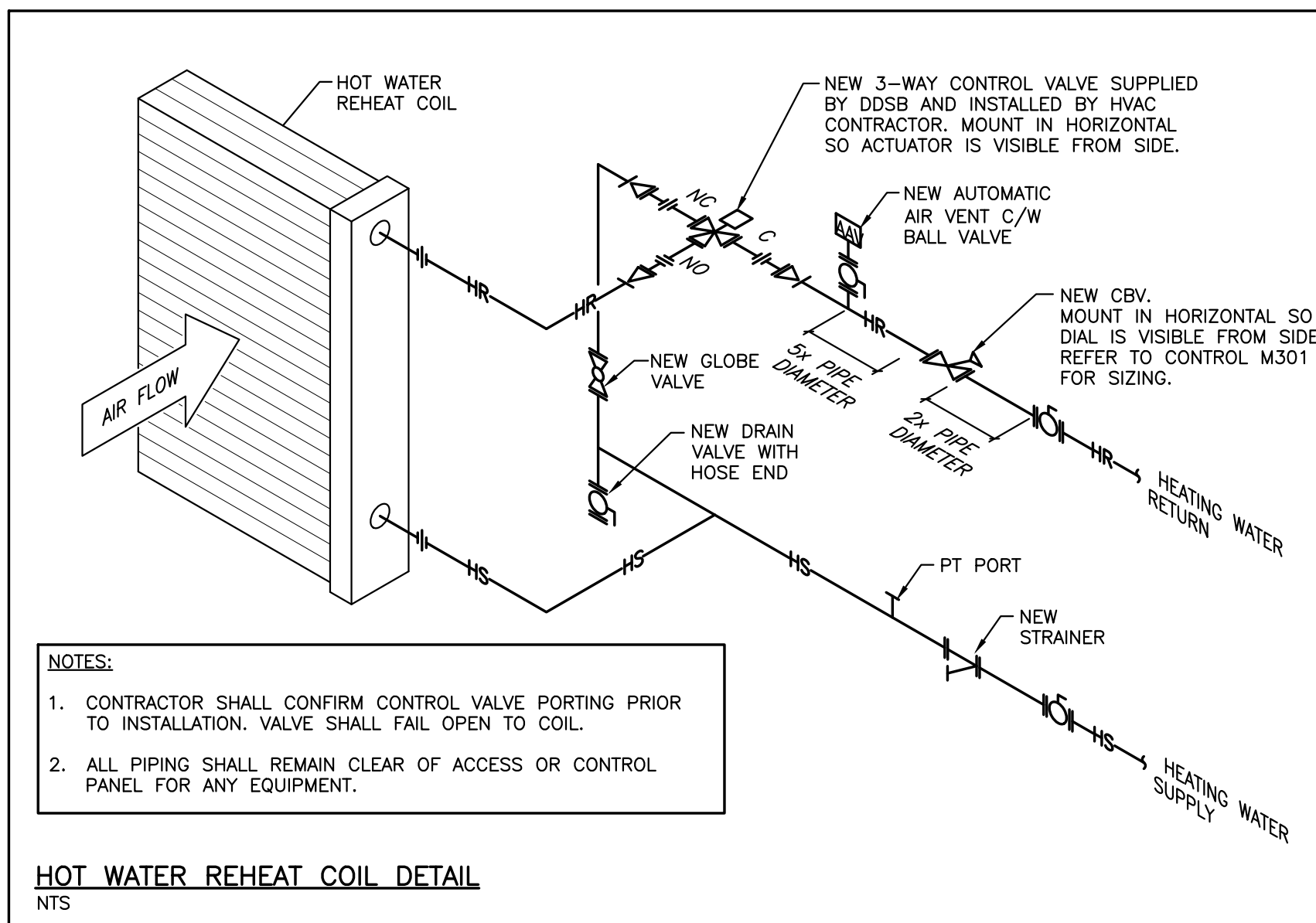
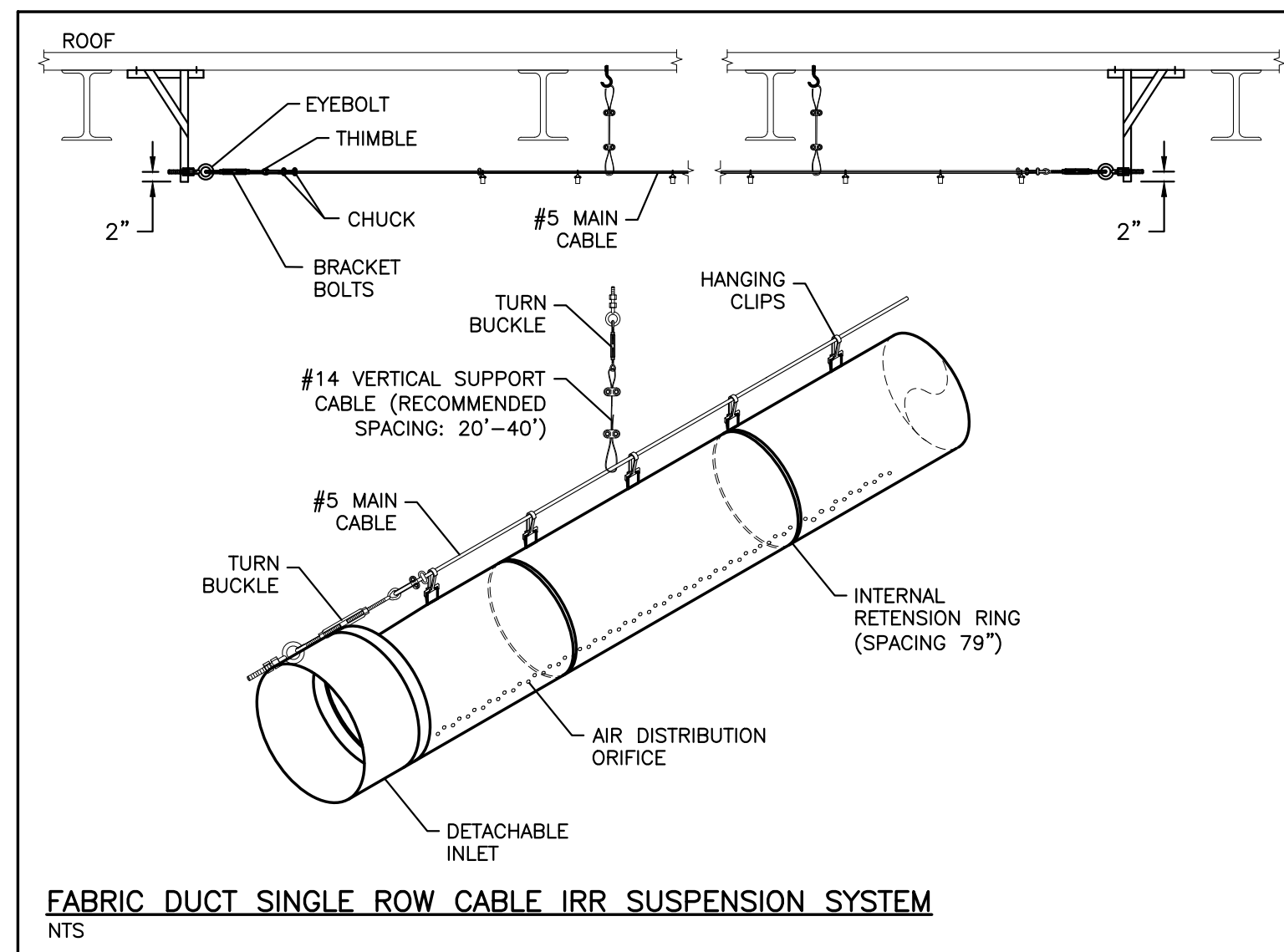
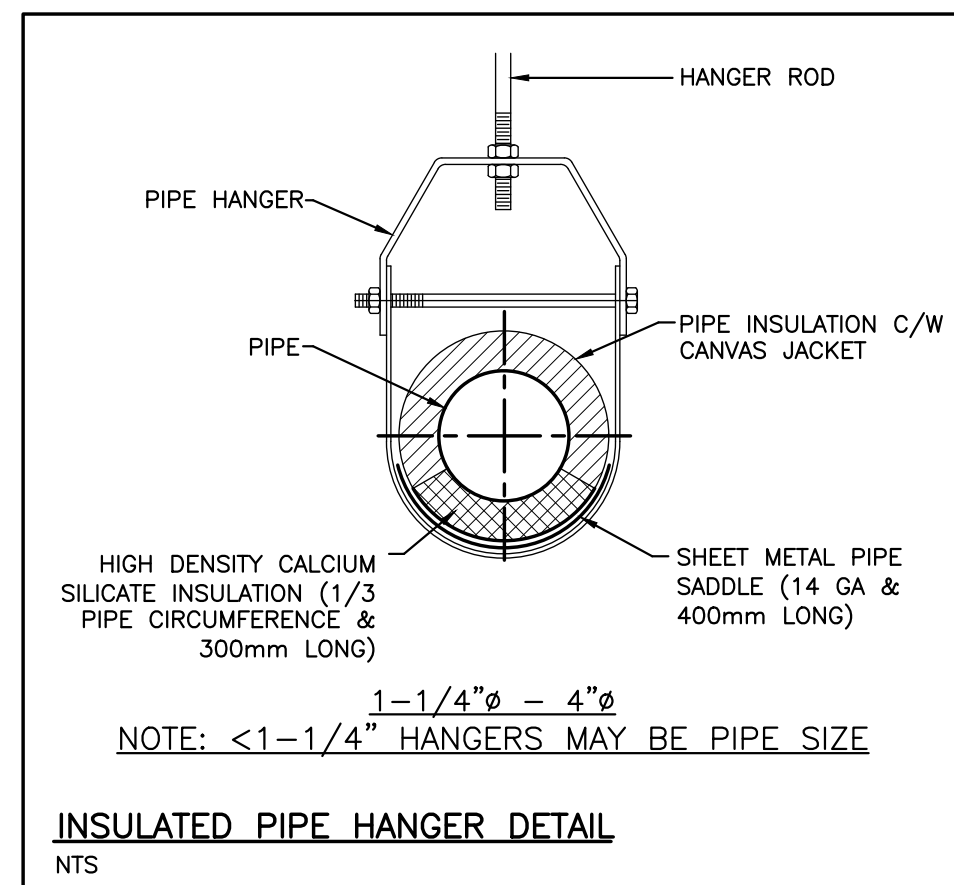


DURHAM DISTRICT SCHOOL BOARD
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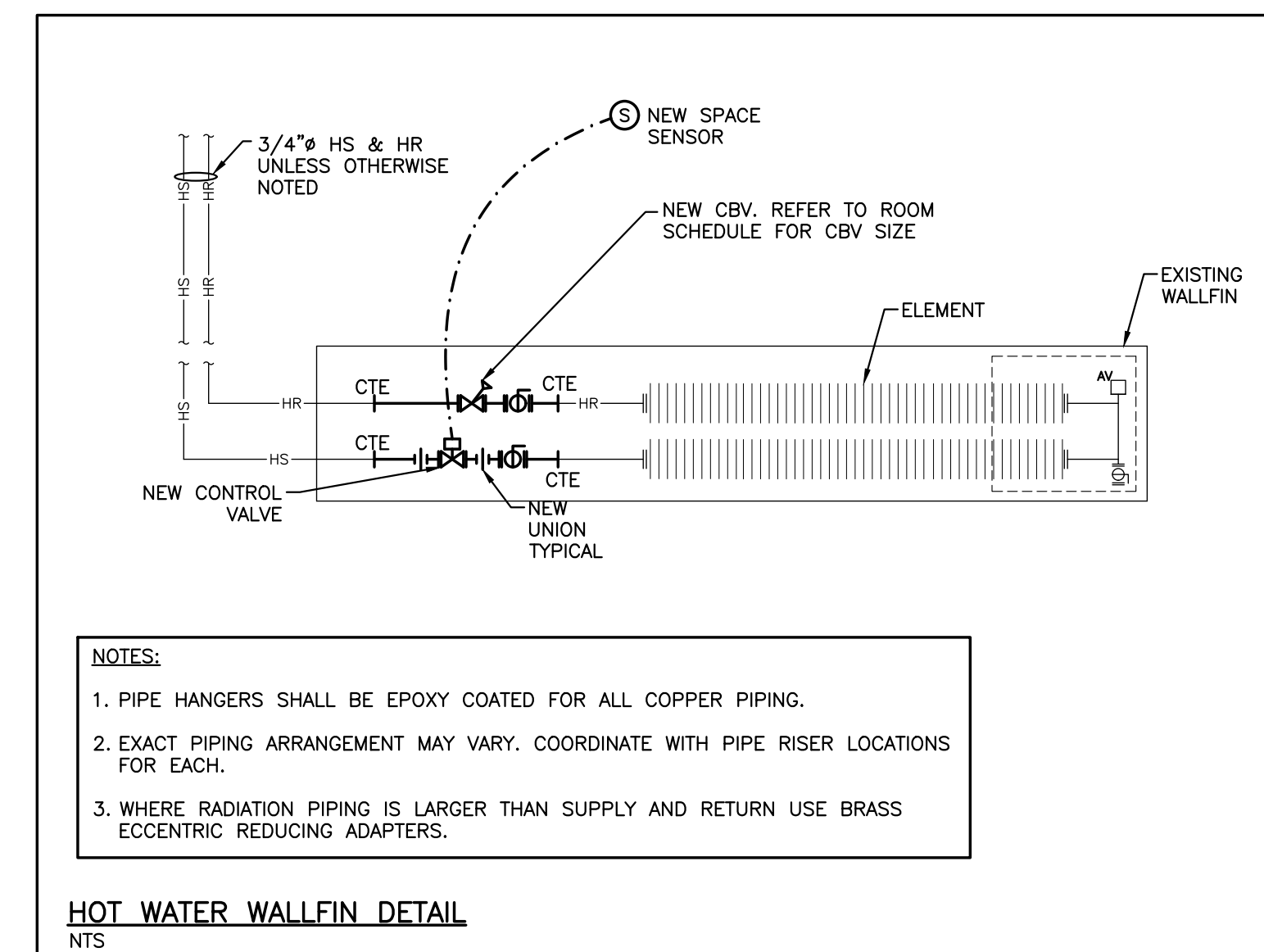
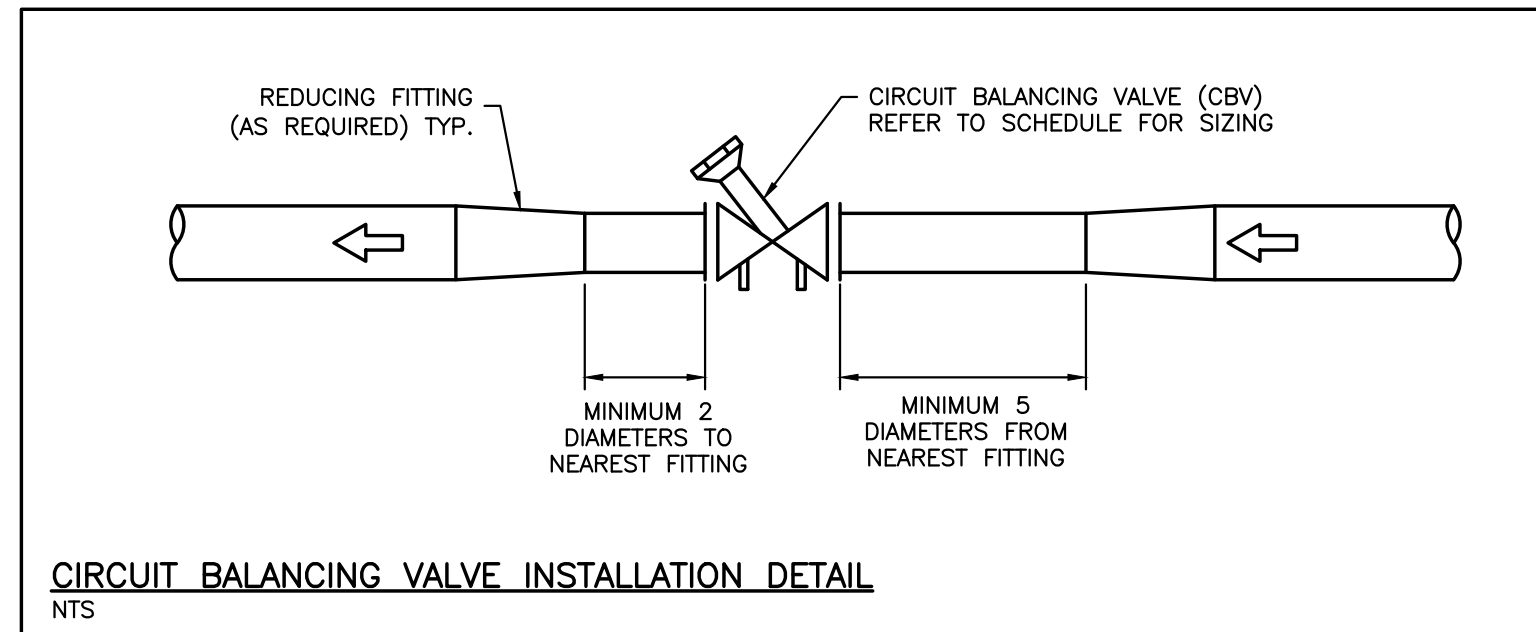
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DETAILS

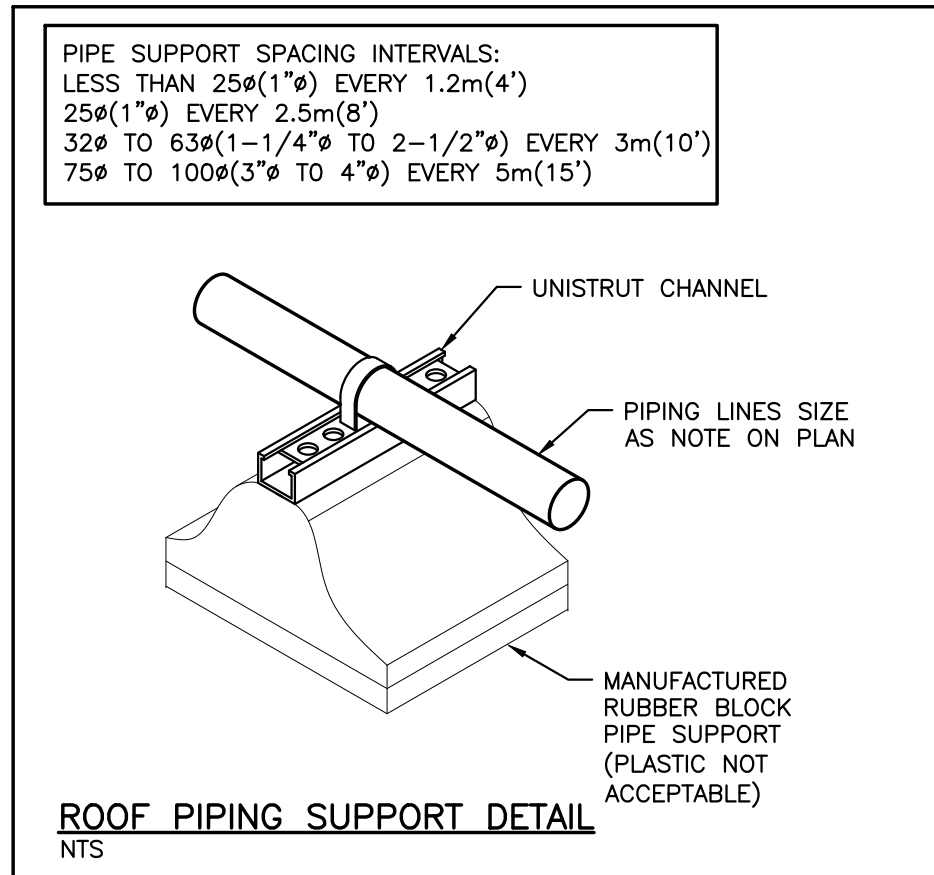
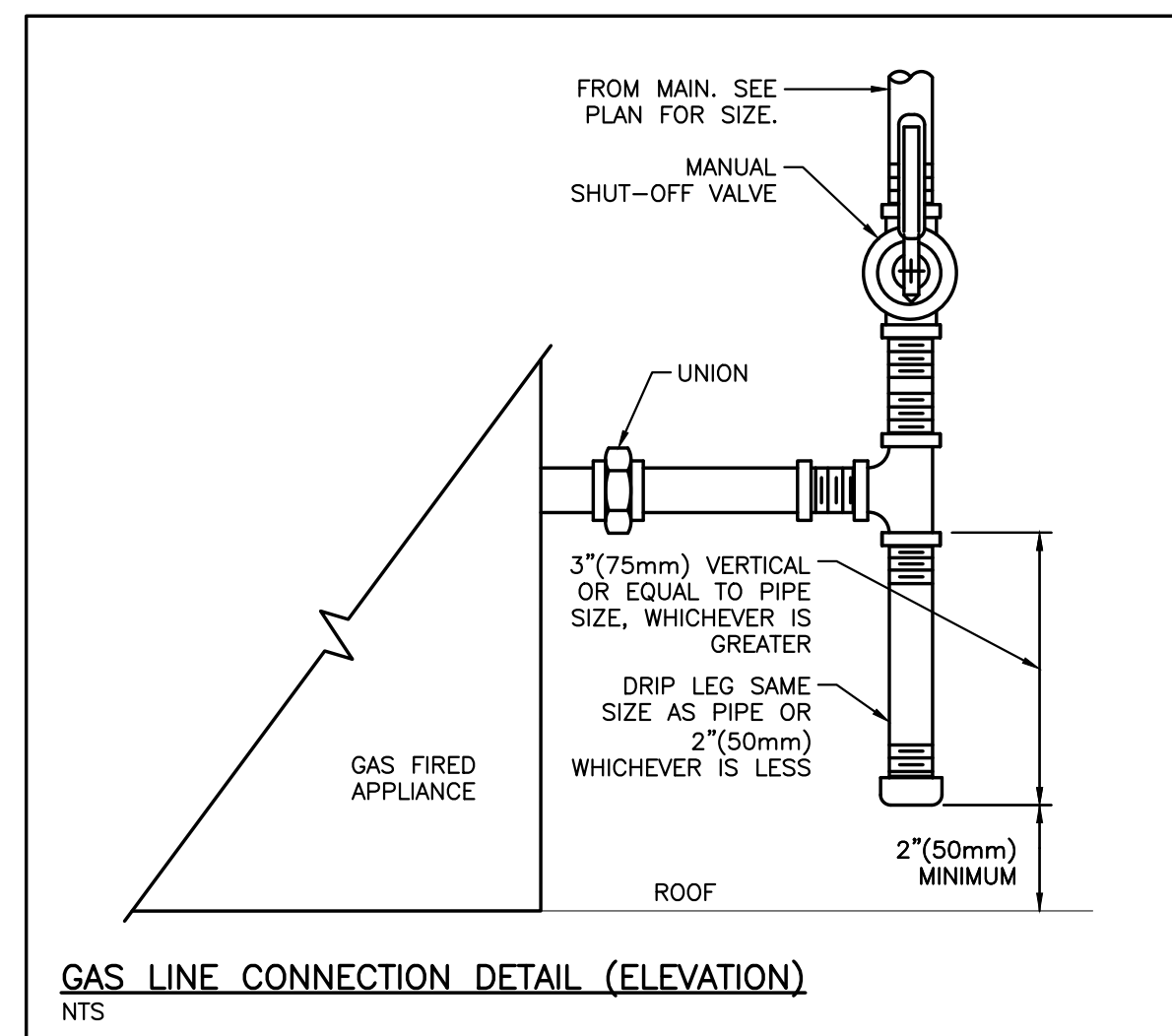
M901



- NOTES:
- CONTRACTOR SHALL CONFIRM CONTROL VALVE PORTING PRIOR TO INSTALLATION. VALVE SHALL FAIL OPEN TO COIL.
 - ALL PIPING SHALL REMAIN CLEAR OF ACCESS OR CONTROL PANEL FOR ANY EQUIPMENT.



- NOTES:
- PIPE HANGERS SHALL BE EPOXY COATED FOR ALL COPPER PIPING.
 - EXACT PIPING ARRANGEMENT MAY VARY. COORDINATE WITH PIPE RISER LOCATIONS FOR EACH.
 - WHERE RADIATION PIPING IS LARGER THAN SUPPLY AND RETURN USE BRASS ECCENTRIC REDUCING ADAPTERS.



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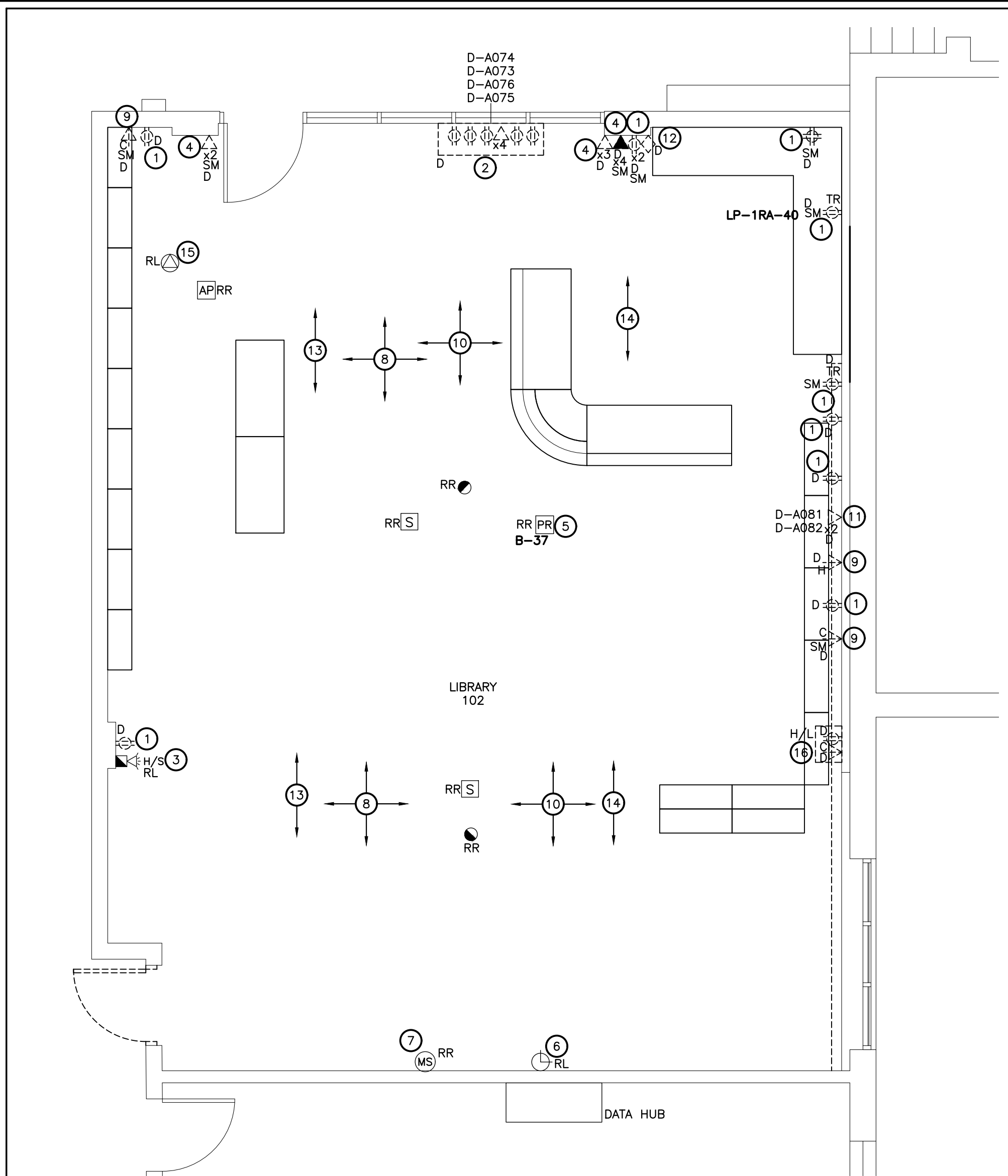


DURHAM DISTRICT SCHOOL BOARD
CLAREMONT PS VENTILATION UPGRADES
 1675 CENTRAL STREET
 CLAREMONT, ONTARIO

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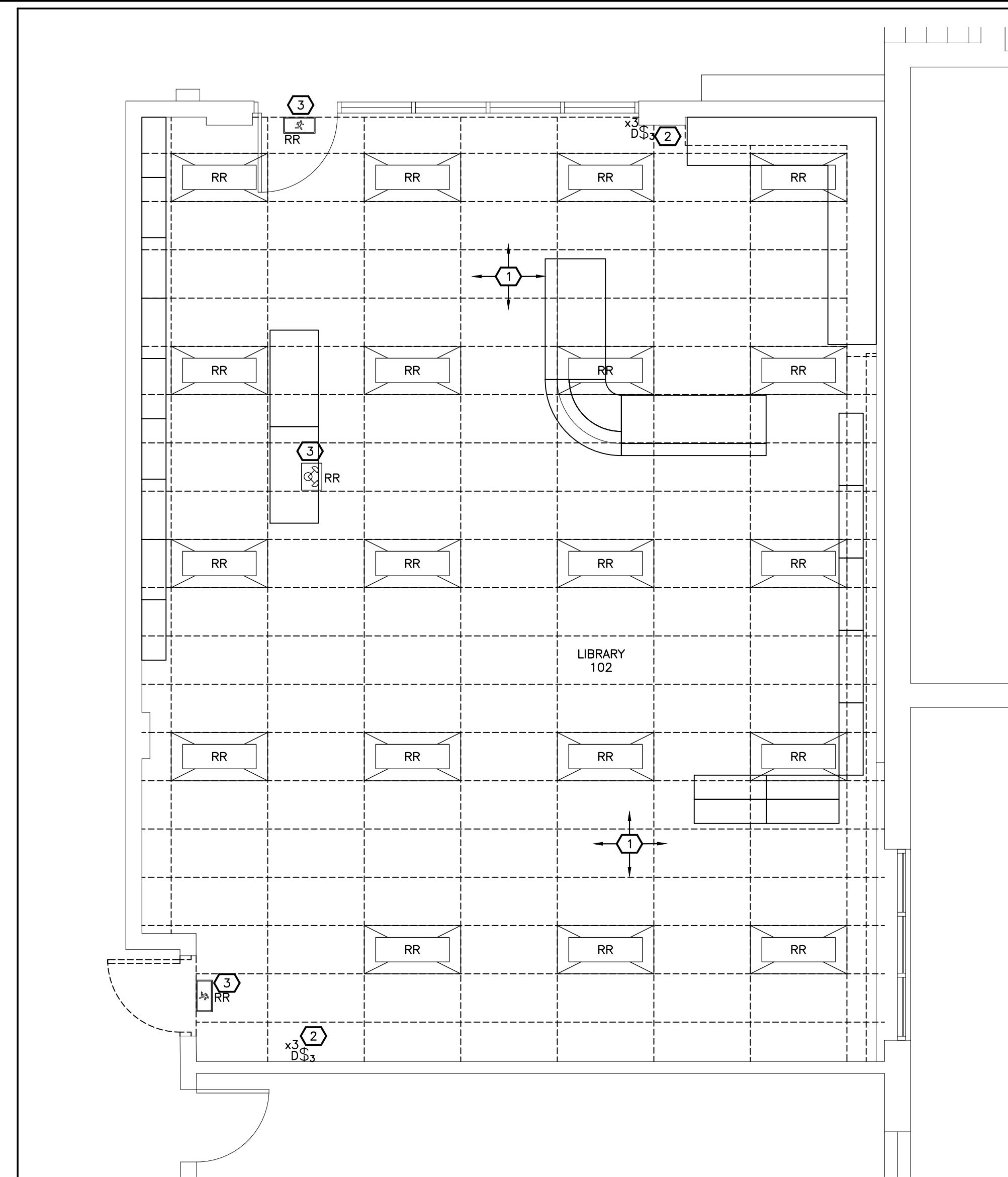
DETAILS
 M902

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LIBRARY 102 - DEMO POWER LAYOUT
1/4"=1'

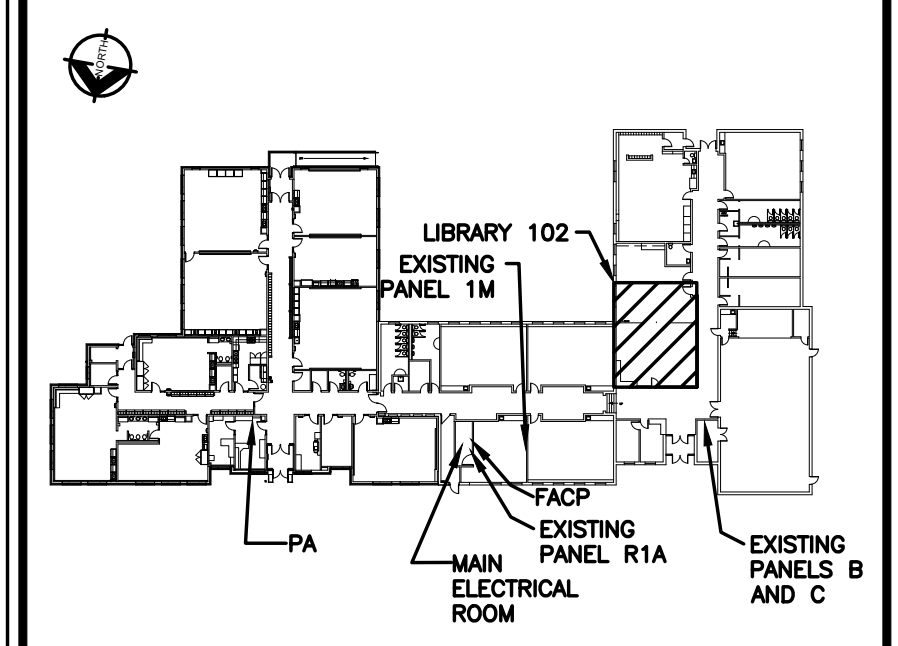
- DEMO POWER WORKING NOTES:**
- ① DISCONNECT AND REMOVE RECEPTACLE. REMOVE FEED UP TO CEILING SPACE AND RETAIN FOR REUSE. PROVIDE COVER PLATE FOR BACK BOX AS REQUIRED.
 - ② DISCONNECT AND REMOVE SURFACE MOUNTED RACEWAY C/W RECEPTACLES AND DATA DEVICES. REMOVE WIRING UP TO JUNCTION BOX AND RETAIN POWER FEEDS FOR REUSE. REMOVE DATA WIRING BACK TO SOURCE.
 - ③ DISCONNECT AND REMOVE FIRE ALARM DEVICE. REMOVE WIRING BACK TO NEAREST JUNCTION BOX. RETAIN FOR RELOCATION.
 - ④ DISCONNECT AND REMOVE COMMUNICATION DEVICE. REMOVE WIRING FOR (2) OUTLETS UP TO CEILING SPACE FOR POSSIBLE REUSE. REMAINING WIRING TO BE REMOVED BACK TO SOURCE. REMOVE SURFACE MOUNTED CONDUIT AS REQUIRED.
 - ⑤ DISCONNECT AND REMOVE PROJECTOR C/W PROJECTOR PLATE. ELECTRICAL CONTRACTOR RESPONSIBLE FOR SAFELY STORING UNTIL REINSTALLED.
 - ⑥ EXISTING CLOCK TO BE RELOCATED.
 - ⑦ DISCONNECT AND REMOVE MOTION SENSOR. RETAIN FOR REINSTALLATION.
 - ⑧ DISCONNECT AND REMOVE CEILING MOUNTED DEVICES TO ALLOW FOR MECHANICAL WORK. RETAIN FOR REINSTALLATION.
 - ⑨ DISCONNECT AND REMOVE EXISTING VIDEO OUTLET. REMOVE SURFACE MOUNTED CONDUIT WHERE APPLICABLE. REMOVE WIRING BACK TO SOURCE.
 - ⑩ ALLOW FOR RESUPPORTING FIFTY (50) RUNS OF DATA CABLES TO SUIT NEW MECHANICAL WORK. CABLES TO BE RESUPPORTED WITH J-HOOKS WITH SPACING AS PER MANUFACTURER RECOMMENDATIONS. ALLOW FOR DISCONNECTION AT DATA HUBS, REMOVAL TO CORRIDOR AND REINSTALLATION TO SUIT MECHANICAL WORK. COORDINATE WITH MECHANICAL CONTRACTOR.
 - ⑪ DISCONNECT AND REMOVE COMMUNICATION DEVICE C/W WIRING BACK TO SOURCE.
 - ⑫ OLD COMMUNICATION DEVICE ASSUMED TO BE REDUNDANT. CONTRACTOR TO CONFIRM AND REMOVE DEVICE C/W FEED BACK TO SOURCE. PROVIDE 8"x4" COVERPLATE FOR EMPTY BACK BOX.
 - ⑬ ALLOW FOR RELOCATION OF THREE (3) RUNS OF 3/4" CONDUITS IN CEILING SPACE TO SUIT NEW MECHANICAL DUCTWORK. EXTEND FEEDS AS REQUIRED. COORDINATE WITH MECHANICAL CONTRACTOR.
 - ⑭ ALLOW FOR RELOCATION OF THREE (3) 2-1/2" CONDUITS IN CEILING SPACE TO SUIT NEW MECHANICAL DUCTWORK. EXTEND FEEDS AS REQUIRED. COORDINATE WITH MECHANICAL CONTRACTOR.
 - ⑮ DISCONNECT AND REMOVE 120V POWER FROM HEPA FILTER UNIT RETAIN FOR RELOCATION. EXTEND FEED AS REQUIRED. COORDINATE WITH MECHANICAL CONTRACTOR.
 - ⑯ DISCONNECT AND REMOVE RECEPTACLE AND VIDEO OUTLETS IN DUAL GANG BACK BOX C/W WIRING AND FEED BACK TO SOURCE. PROVIDE COVER PLATE FOR EMPTY BACK BOX.



LIBRARY 102 - DEMO LIGHTING LAYOUT
1/4"=1'

- DEMO LIGHTING WORKING NOTES:**
- ① DISCONNECT AND REMOVE LUMINAIRES C/W FEED BACK TO CORRIDOR TO ALLOW FOR MECHANICAL WORK. RETAIN LUMINAIRES FOR REINSTALLATION.
 - ② DISCONNECT AND REMOVE SWITCH. REMOVE WIRING BACK TO SOURCE. PROVIDE COVER PLATE FOR EMPTY BACK BOX.
 - ③ DISCONNECT AND REMOVE EMERGENCY DEVICE. RETAIN FOR REINSTALLATION.

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KEY PLAN - GROUND FLOOR

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NORTH

DURHAM DISTRICT SCHOOL BOARD
CLAREMONT PS VENTILATION UPGRADES
1675 CENTRAL STREET
CLAREMONT, ONTARIO

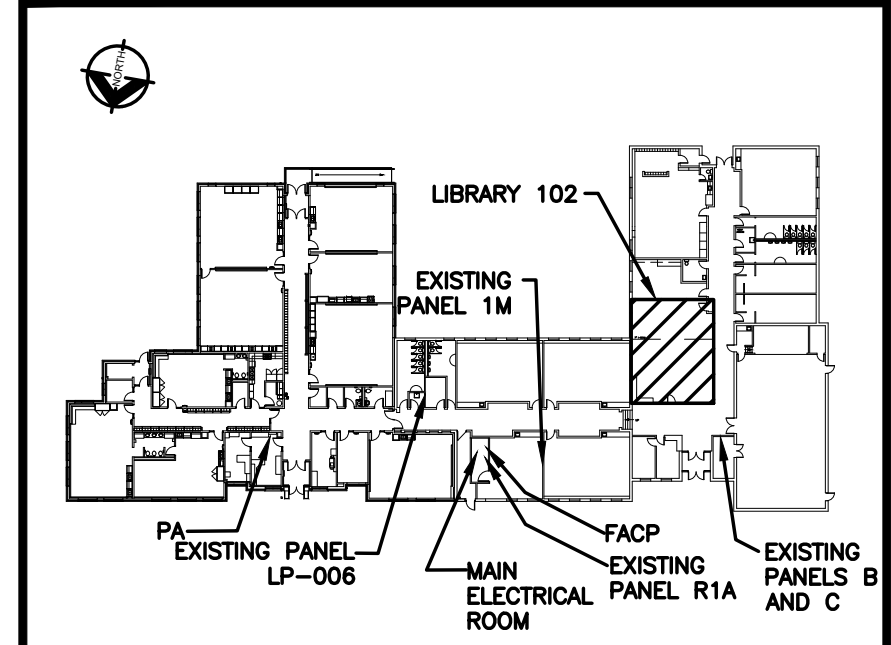
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LIBRARY 102 DEMO POWER & LIGHTING LAYOUTS

E101

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KEY PLAN - GROUND FLOOR

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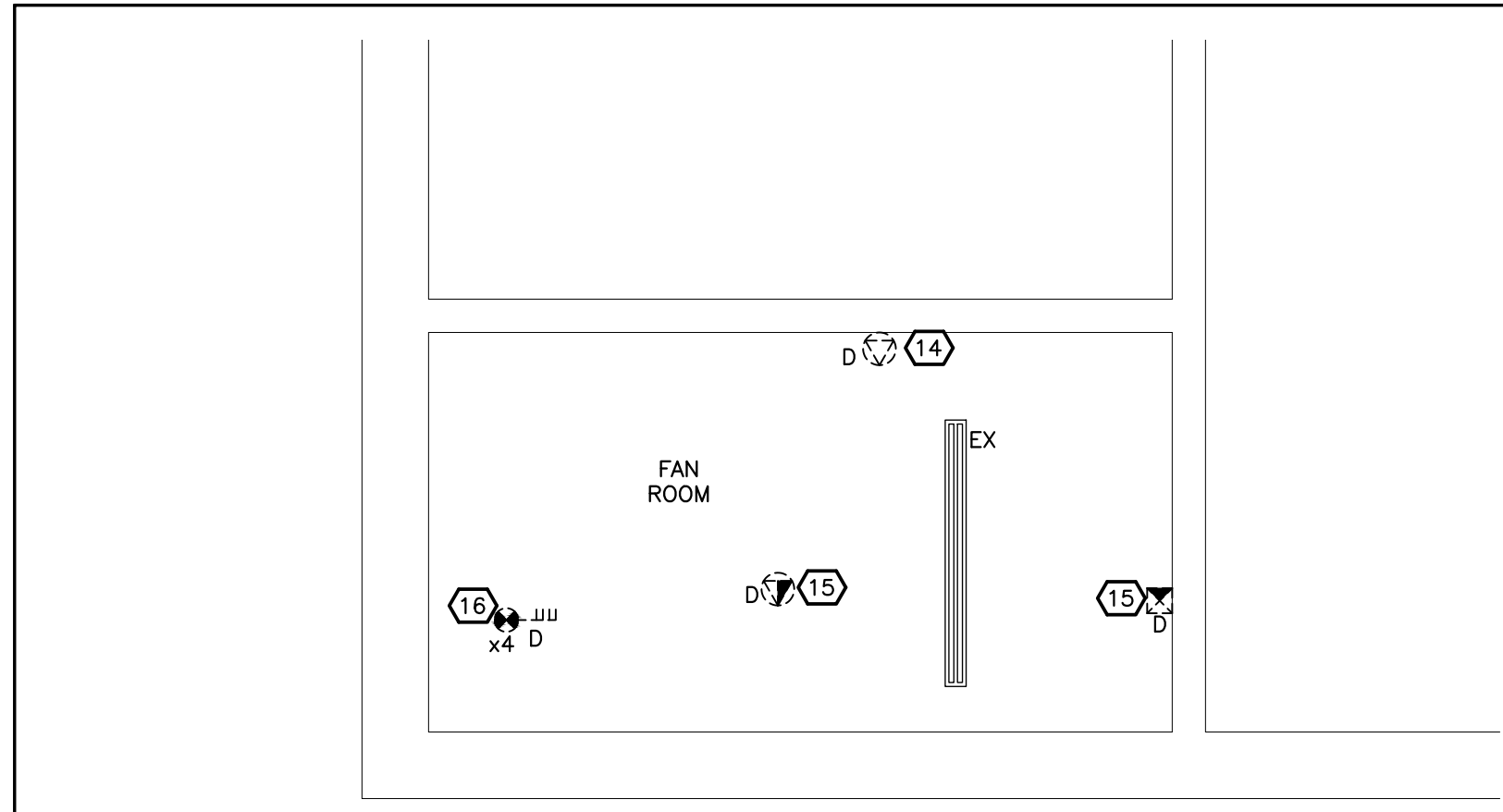
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100178622
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PROVINCE OF ONTARIO

DURHAM DISTRICT SCHOOL BOARD
CLAREMONT PS VENTILATION UPGRADES
1675 CENTRAL STREET
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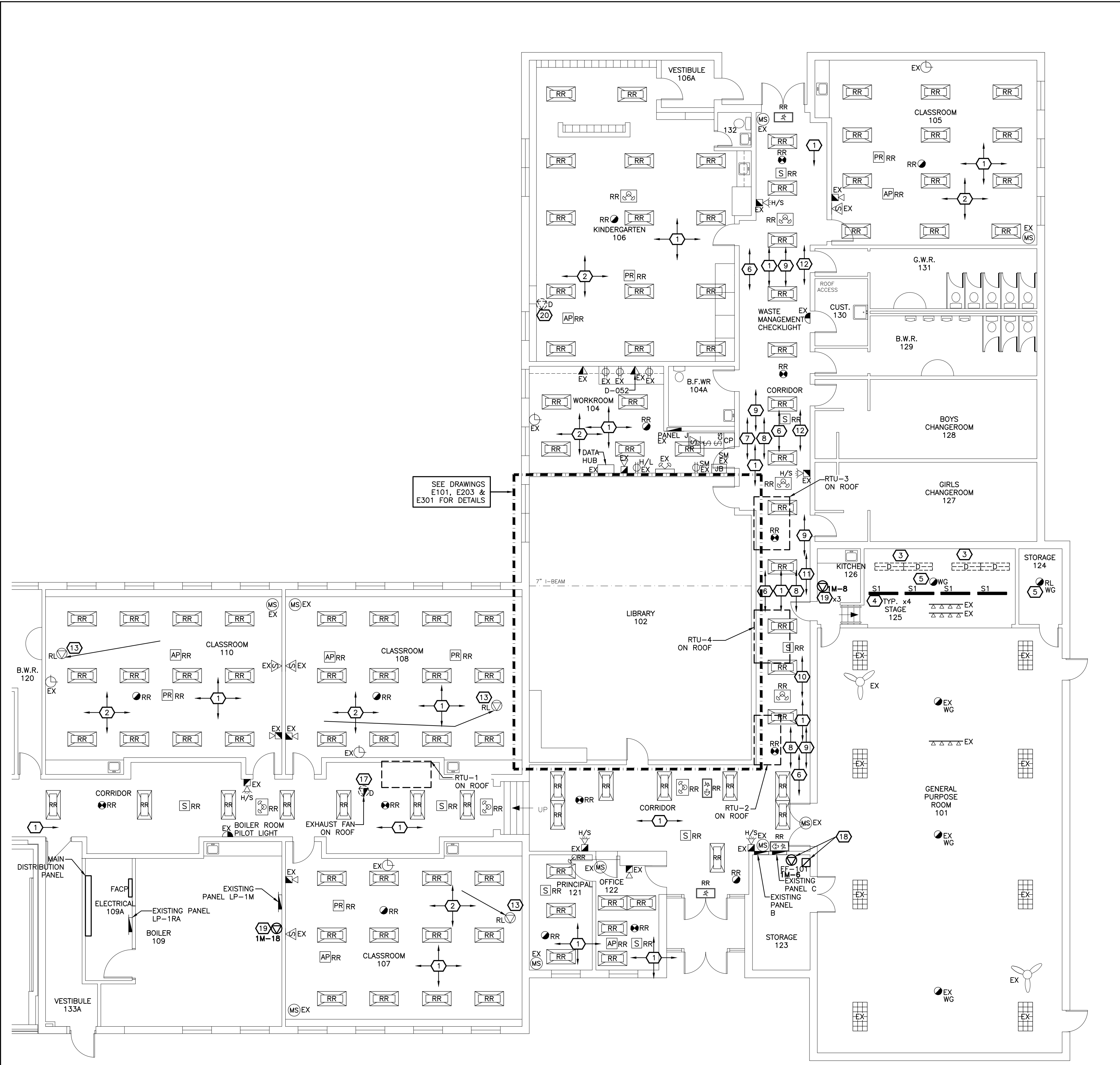
1972 ADDITION & CENTRAL CLASSROOMS
REVISED ELECTRICAL LAYOUT

E201



FAN ROOM - NEW ELECTRICAL LAYOUT
3/8"=1'

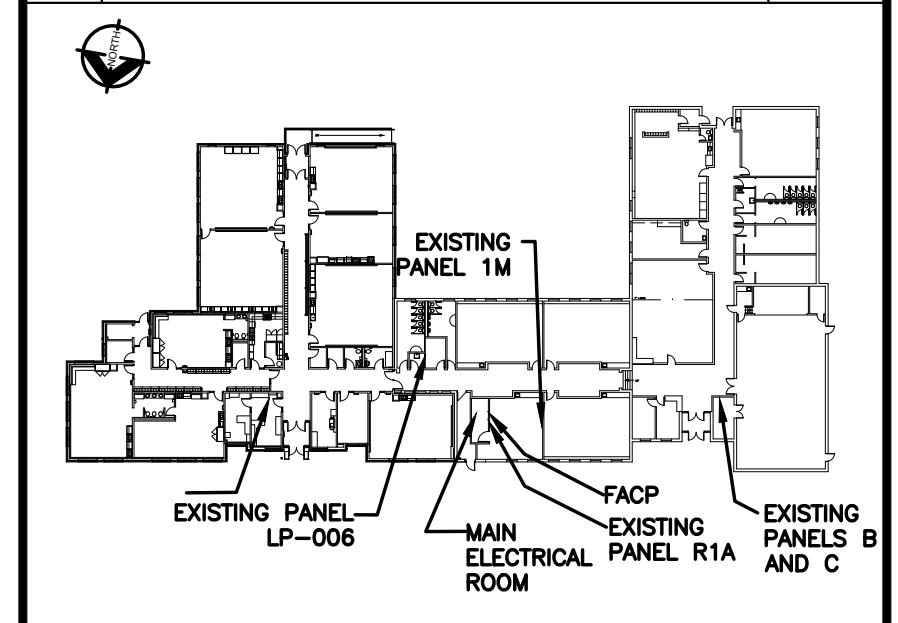
- WORKING NOTES:**
- DISCONNECT AND REMOVE CEILING MOUNTED DEVICES TO ALLOW FOR MECHANICAL WORK. RETAIN FOR REINSTALLATION.
 - DISCONNECT AND REMOVE LUMINAIRES C/W FEED BACK TO CORRIDOR TO ALLOW FOR MECHANICAL WORK. RETAIN LUMINAIRES FOR REINSTALLATION. PROVIDE NEW CONDUIT THROUGH CORRIDOR WALL AND NEW WIRING AS PER LUMINAIRE WIRING DETAIL.
 - DISCONNECT AND REMOVE EXISTING LUMINAIRES. RETAIN FEED FOR REUSE.
 - PROVIDE NEW SUSPENDED LUMINAIRE. LUMINAIRE TO BE SUSPENDED BELOW NEW MECHANICAL DUCT WORK. COORDINATE FINAL MOUNTING HEIGHT WITH MECHANICAL CONTRACTOR. RECONNECT TO EXISTING CIRCUIT AND EXTEND WIRING AS REQUIRED.
 - ALLOW FOR RELOCATION OF EXISTING HEAT DETECTOR TO SUIT MECHANICAL DUCT WORK. EXTEND WIRING AS REQUIRED.
 - RELOCATE THREE (3) RUNS OF EMERGENCY LIGHTING CONDUIT IN CEILING SPACE TO SUIT MECHANICAL WORK. COORDINATE WITH MECHANICAL CONTRACTOR.
 - RELOCATE EMPTY JUNCTION BOX AND CONDUIT TO SUIT MECHANICAL WORK. COORDINATE WITH MECHANICAL CONTRACTOR.
 - RELOCATE 1" C FOR EXISTING POWER PANEL J TO SUIT MECHANICAL WORK. COORDINATE WITH MECHANICAL CONTRACTOR.
 - RELOCATE TWO (2) RUNS OF FIRE ALARM CONDUIT TO SUIT MECHANICAL WORK. COORDINATE WITH MECHANICAL CONTRACTOR.
 - RELOCATE EXISTING 1" C FOR EXISTING MECHANICAL FEEDS IN CEILING SPACE TO SUIT NEW MECHANICAL WORK. COORDINATE WITH MECHANICAL CONTRACTOR.
 - RELOCATE FOUR (4) CONDUIT RUNS FOR EXISTING MECHANICAL FEEDS IN CEILING SPACE TO SUIT NEW MECHANICAL WORK. COORDINATE WITH MECHANICAL CONTRACTOR.
 - RELOCATE TWO (2) CONDUIT RUNS FOR EXISTING MECHANICAL FEEDS IN CEILING SPACE TO SUIT NEW MECHANICAL WORK. COORDINATE WITH MECHANICAL CONTRACTOR.
 - DISCONNECT AND REMOVE 120V POWER FOR HEPA FILTER RETAIN FOR RELOCATION. EXTEND FEED AS REQUIRED. COORDINATE WITH MECHANICAL CONTRACTOR.
 - DISCONNECT AND REMOVE 120V POWER FOR ELECTRIC BAS CONTROL PANEL C/W FEED BACK TO PANEL LP-1M IN BOILER ROOM. COORDINATE WITH MECHANICAL CONTRACTOR.
 - DISCONNECT AND REMOVE 208V/3PH POWER FOR EXISTING AIR HANDLING UNIT S-1 FANS C/W WALL MOUNTED STARTER AND FEED BACK TO EXISTING PANEL C. COORDINATE WITH MECHANICAL CONTRACTOR.
 - DISCONNECT AND REMOVE EXISTING DUCT SMOKE FOR AIR HANDLING UNIT S-1 C/W WIRING BACK TO FACP. RELABEL EXISTING ACTIVE GRAPHIC TO SUIT. COORDINATE WITH MECHANICAL CONTRACTOR.
 - DISCONNECT AND REMOVE 208V/3PH POWER FOR EXISTING EXHAUST FAN MOUNTED ON ROOF C/W FEED BACK TO EXISTING PANEL LP-006 IN CUST 118. COORDINATE WITH MECHANICAL CONTRACTOR.
 - PROVIDE NEW 120V POWER FOR NEW EXHAUST FAN C/W WALL MOUNTED STARTER. TIE INTO CIRCUIT AS NOTED. COORDINATE WITH MECHANICAL CONTRACTOR.
 - PROVIDE 120V POWER FOR NEW BAS PANEL x3. TIE INTO CIRCUIT AS NOTED. COORDINATE EXACT LOCATION WITH MECHANICAL CONTRACTOR.
 - DISCONNECT AND REMOVE EXISTING 120V POWER FROM VENTILATOR C/W FEED BACK TO EXISTING PANEL J. COORDINATE WITH MECHANICAL CONTRACTOR.



PARTIAL FLOOR PLAN - REVISED ELECTRICAL LAYOUT
1/8"=1'

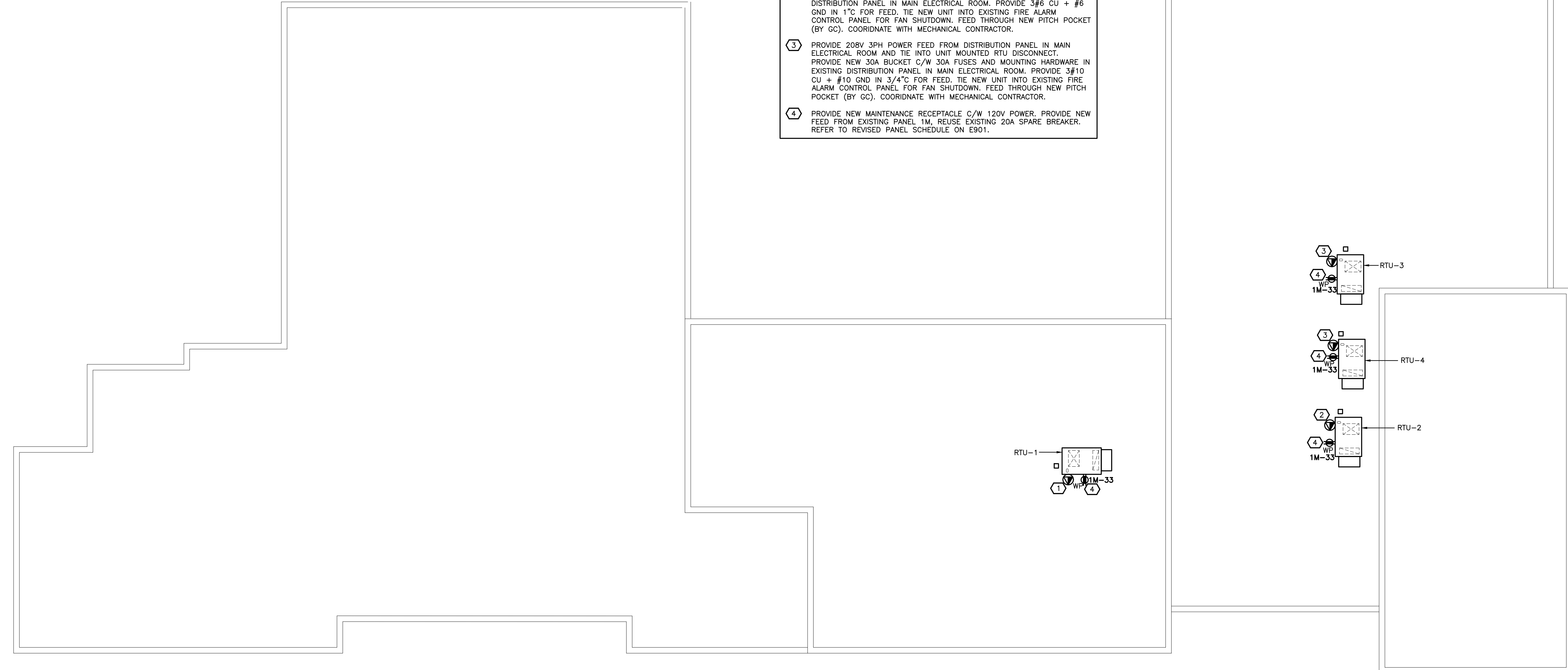
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KEY PLAN - GROUND FLOOR

- WORKING NOTES:**
- ① PROVIDE 208V 3PH POWER FEED FROM DISTRIBUTION PANEL IN MAIN ELECTRICAL ROOM AND TIE INTO UNIT MOUNTED RTU DISCONNECT. PROVIDE NEW 30A BUCKET FUSED AT 25A C/W MOUNTING HARDWARE IN EXISTING DISTRIBUTION PANEL IN MAIN ELECTRICAL ROOM. PROVIDE 3#10 CU + #10 GND IN 3/4" FOR FEED. TIE NEW UNIT INTO EXISTING FIRE ALARM CONTROL PANEL FOR FAN SHUTDOWN. FEED THROUGH NEW PITCH POCKET (BY GC). COORDINATE WITH MECHANICAL CONTRACTOR.
 - ② PROVIDE 208V 3PH POWER FEED FROM DISTRIBUTION PANEL IN MAIN ELECTRICAL ROOM AND TIE INTO UNIT MOUNTED RTU DISCONNECT. PROVIDE NEW 50A FUSES FOR EXISTING 60A SPARE BUCKET IN EXISTING DISTRIBUTION PANEL IN MAIN ELECTRICAL ROOM. PROVIDE 3#6 CU + #6 GND IN 1" FOR FEED. TIE NEW UNIT INTO EXISTING FIRE ALARM CONTROL PANEL FOR FAN SHUTDOWN. FEED THROUGH NEW PITCH POCKET (BY GC). COORDINATE WITH MECHANICAL CONTRACTOR.
 - ③ PROVIDE 208V 3PH POWER FEED FROM DISTRIBUTION PANEL IN MAIN ELECTRICAL ROOM AND TIE INTO UNIT MOUNTED RTU DISCONNECT. PROVIDE NEW 30A BUCKET C/W 30A FUSES AND MOUNTING HARDWARE IN EXISTING DISTRIBUTION PANEL IN MAIN ELECTRICAL ROOM. PROVIDE 3#10 CU + #10 GND IN 3/4" FOR FEED. TIE NEW UNIT INTO EXISTING FIRE ALARM CONTROL PANEL FOR FAN SHUTDOWN. FEED THROUGH NEW PITCH POCKET (BY GC). COORDINATE WITH MECHANICAL CONTRACTOR.
 - ④ PROVIDE NEW MAINTENANCE RECEPTACLE C/W 120V POWER. PROVIDE NEW FEED FROM EXISTING PANEL 1M. REUSE EXISTING 20A SPARE BREAKER. REFER TO REVISED PANEL SCHEDULE ON E901.



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NORTH

LICENCED PROFESSIONAL ENGINEER
 L. CONFORTI
 100178622
 FEB 15/22
 PROVINCE OF ONTARIO

DURHAM DISTRICT SCHOOL BOARD
CLAREMONT PS VENTILATION UPGRADES
 1675 CENTRAL STREET
 CLAREMONT, ONTARIO

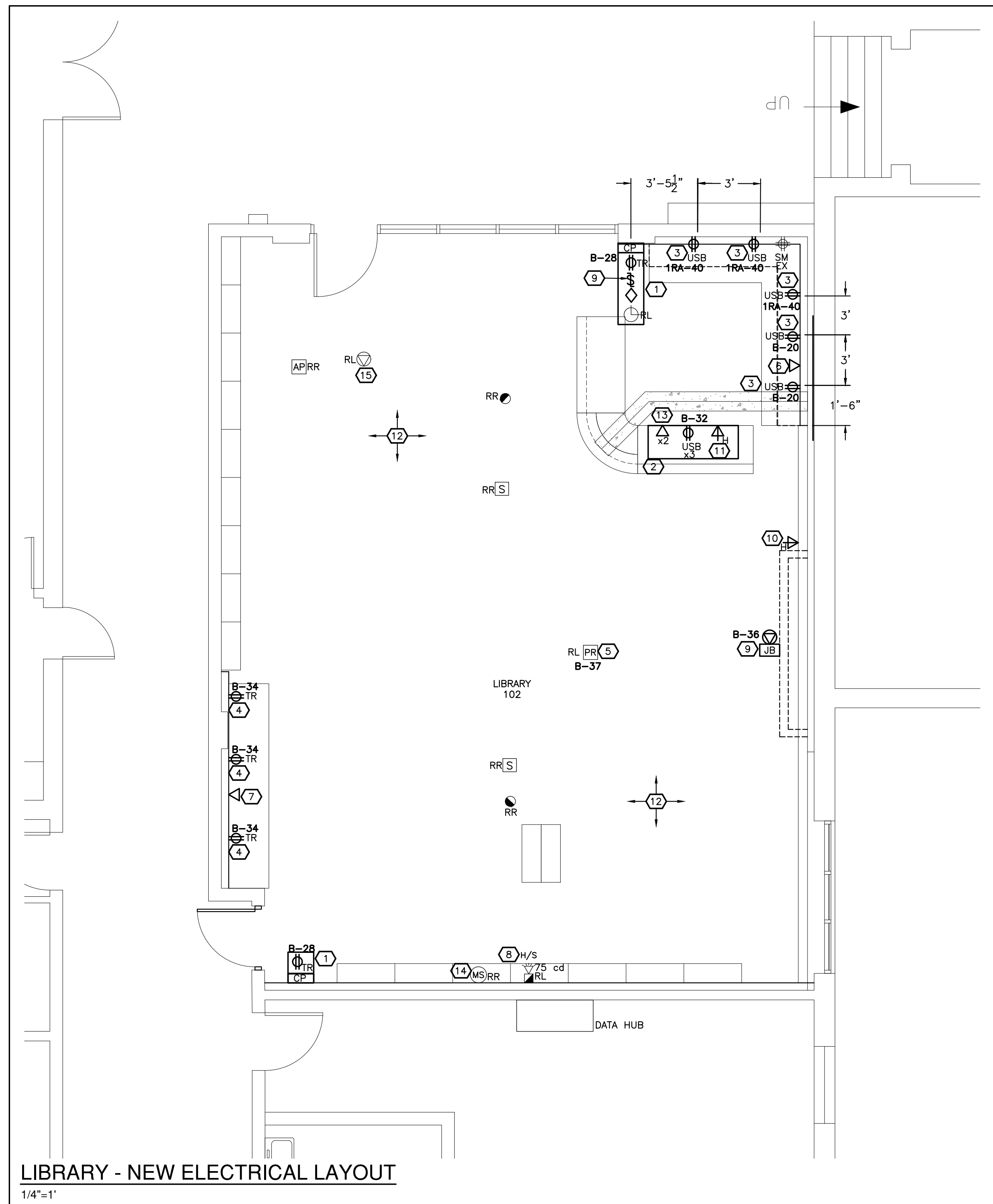
DATE: FEBRUARY 2022	SCALE: 3/32"=1'
DRAWN BY: RJC	CHECKED BY: LC/DCP
DES PROJECT NUMBER: 22-549	SHEET SIZE: D

ROOF NEW POWER LAYOUT

E202

NEW POWER WORKING NOTES:

- 1 PROVIDE NEW, AND RELOCATE EXISTING, DEVICES AS NOTED IN NEW CONTROL PANEL. REFER TO DETAIL. COORDINATE INSTALLATION WITH GENERAL CONTRACTOR.
- 2 PROVIDE THREE (3) USB RECEPTACLES, TWO (2) DATA OUTLETS AND ONE (1) HDMI OUTLET FOR NEW CIRCULATION DESK. MOUNT BOXES UNDER COUNTER. PROVIDE NEW WIRING FOR DATA OUTLETS. FEED RECEPTACLES FROM CIRCUIT AS NOTED. C/W NEW 15A BREAKER FOR PANEL B. COORDINATE EXACT LOCATIONS WITH DDSB PROJECT SUPERVISOR.
- 3 PROVIDE NEW RECEPTACLE MOUNTED AT 36" AFF TO BOTTOM OF BOX TO SUIT MILLWORK. COORDINATE EXACT HEIGHT WITH GENERAL CONTRACTOR PRIOR TO INSTALLATION. FEED FROM CIRCUIT AS NOTED.
- 4 PROVIDE NEW RECEPTACLE MOUNTED AT 44" AFF TO BOTTOM OF BOX TO SUIT MILLWORK. COORDINATE EXACT HEIGHT WITH GENERAL CONTRACTOR AND DDSB REP PRIOR TO INSTALLATION. FEED FROM CIRCUIT AS NOTED C/W NEW 15A BREAKER FOR PANEL B.
- 5 REINSTALL EXISTING PROJECTOR AND PROJECTOR PLATE. EXTEND FEED AS REQUIRED.
- 6 PROVIDE NEW DATA OUTLET MOUNTED AT 36" AFF TO BOTTOM OF BOX TO SUIT MILLWORK. REUSE EXISTING WIRING IN CEILING SPACE. COORDINATE EXACT HEIGHT WITH GENERAL CONTRACTOR AND DDSB PROJECT SUPERVISOR PRIOR TO INSTALLATION.
- 7 PROVIDE NEW DATA OUTLET MOUNTED AT 44" AFF TO BOTTOM OF BOX TO SUIT MILLWORK. REUSE EXISTING WIRING IN CEILING SPACE. COORDINATE EXACT HEIGHT WITH GENERAL CONTRACTOR AND DDSB PROJECT SUPERVISOR PRIOR TO INSTALLATION.
- 8 RELOCATE EXISTING FIRE ALARM SIGNAL DEVICE. MOUNT AS PER CAN/ULC-S524 SPECIFICATIONS. ADJUST CANDELA RATING AS NOTED. EXTEND WIRING AS REQUIRED.
- 9 PROVIDE EMPTY BACK BOX WITH 1" EMT RUN FROM CONTROL PANEL TO BULKHEAD C/W PULL STRING FOR FUTURE SCREEN CONTROLS AND 120V POWER TERMINATED IN JUNCTION BOX. LOW VOLTAGE CABLING, CONTROLS AND CONNECTIONS TO BE INSTALLED BY OTHERS AT FUTURE DATE. PROVIDE NEW POWER FEED FROM PANEL B C/W NEW 15A BREAKER.
- 10 PROVIDE NEW HDMI OUTLET MOUNTED AT 36" AFF TO BOTTOM OF BOX C/W HDMI CABLE. HDMI CABLES HARDWIRED TO CEILING MOUNTED PROJECTOR. MAKE USE OF HDMI 1 AND 2 INPUTS ON PROJECTOR. LABEL HDMI OUTLETS WITH CORRESPONDING PROJECTOR INPUTS. HDMI CABLES TO BE EQUAL TO KRAMER C-HM/HM-50
- 11 PROVIDE NEW HDMI CABLE HARDWIRED TO CEILING MOUNTED PROJECTOR. MAKE USE OF HDMI 1 AND 2 INPUTS ON PROJECTOR. LABEL HDMI OUTLETS WITH CORRESPONDING PROJECTOR INPUTS. HDMI CABLES TO BE EQUAL TO KRAMER C-HM/HM-75
- 12 REINSTALL DEVICES IN CEILING FOLLOWING COMPLETION OF MECHANICAL WORK. COORDINATE WITH MECHANICAL CONTRACTOR.
- 13 PROVIDE ONE (1) 3/4" CONDUIT FOR POWER, ONE (1) 3/4" CONDUIT FOR DATA DATA AND ONE (1) 1-1/2" CONDUIT FOR HDMI CABLE MOUNTED IN CIRCULATION DESK. CONDUITS TO BE RUN THROUGH TRENCH PROVIDED BY GENERAL CONTRACTOR. POWER AND DATA TO BE RUN IN SEPARATE CONDUITS. COORDINATE WITH GENERAL CONTRACTOR.
- 14 REINSTALL EXISTING MOTION SENSOR.
- 15 REINSTALL EXISTING 120V POWER FOR HEPA FILTER. EXTEND FEED AS REQUIRED. COORDINATE WITH MECHANICAL CONTRACTOR.

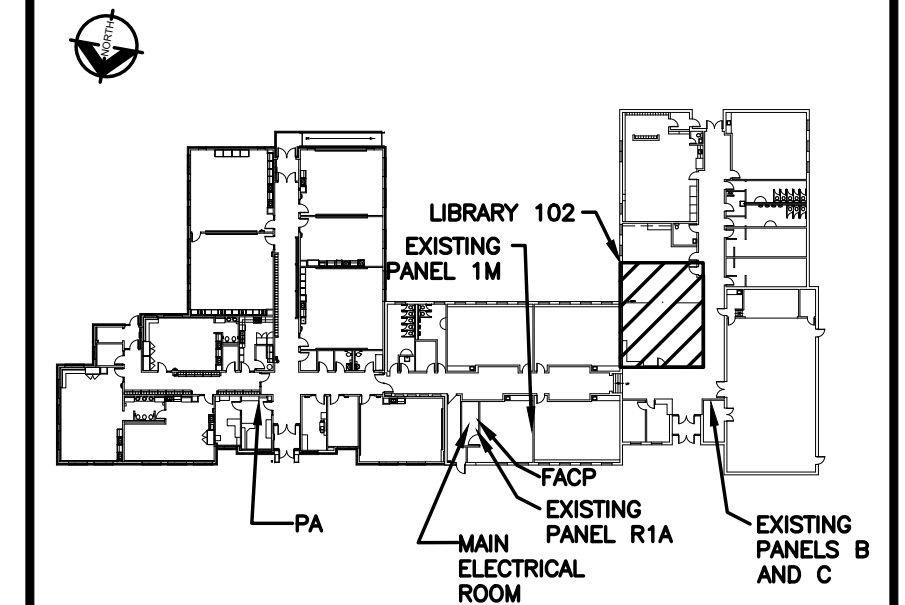


LIBRARY - NEW ELECTRICAL LAYOUT

1/4"=1'

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ISSUES/REVISIONS		
No.	DESCRIPTION	DATE
1	ISSUED FOR CLIENT REVIEW	FEB 11 2022
2	ISSUED FOR PERMIT & TENDER	FEB 15 2022



KEY PLAN - GROUND FLOOR

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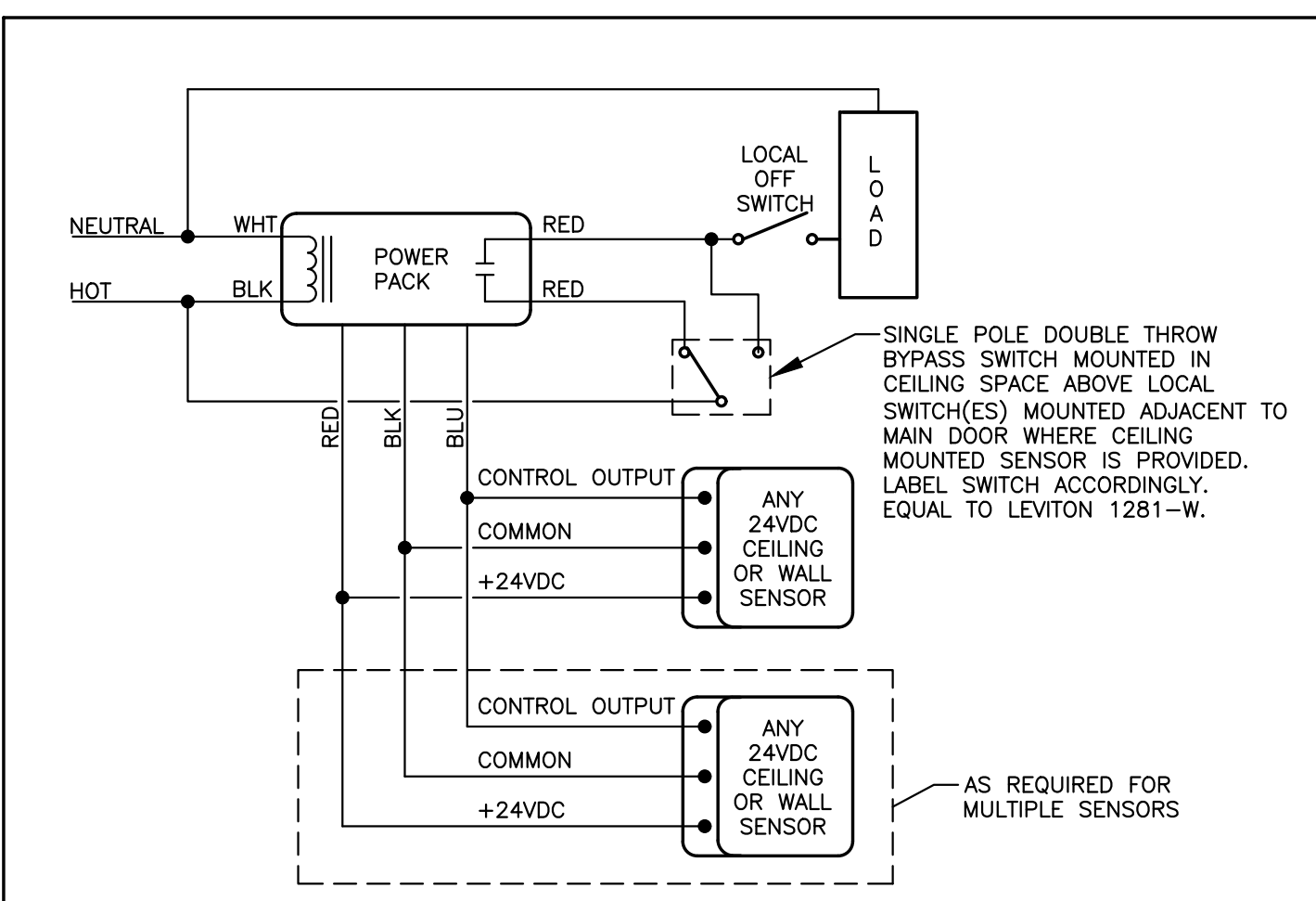
DURHAM DISTRICT SCHOOL BOARD
CLAREMONT PS VENTILATION UPGRADES
 1675 CENTRAL STREET
 CLAREMONT, ONTARIO

DATE: FEBRUARY 2022	SCALE: AS NOTED
DRAWN BY: RJC	CHECKED BY: LC/DCP
DES PROJECT NUMBER: 22-549	SHEET SIZE: D

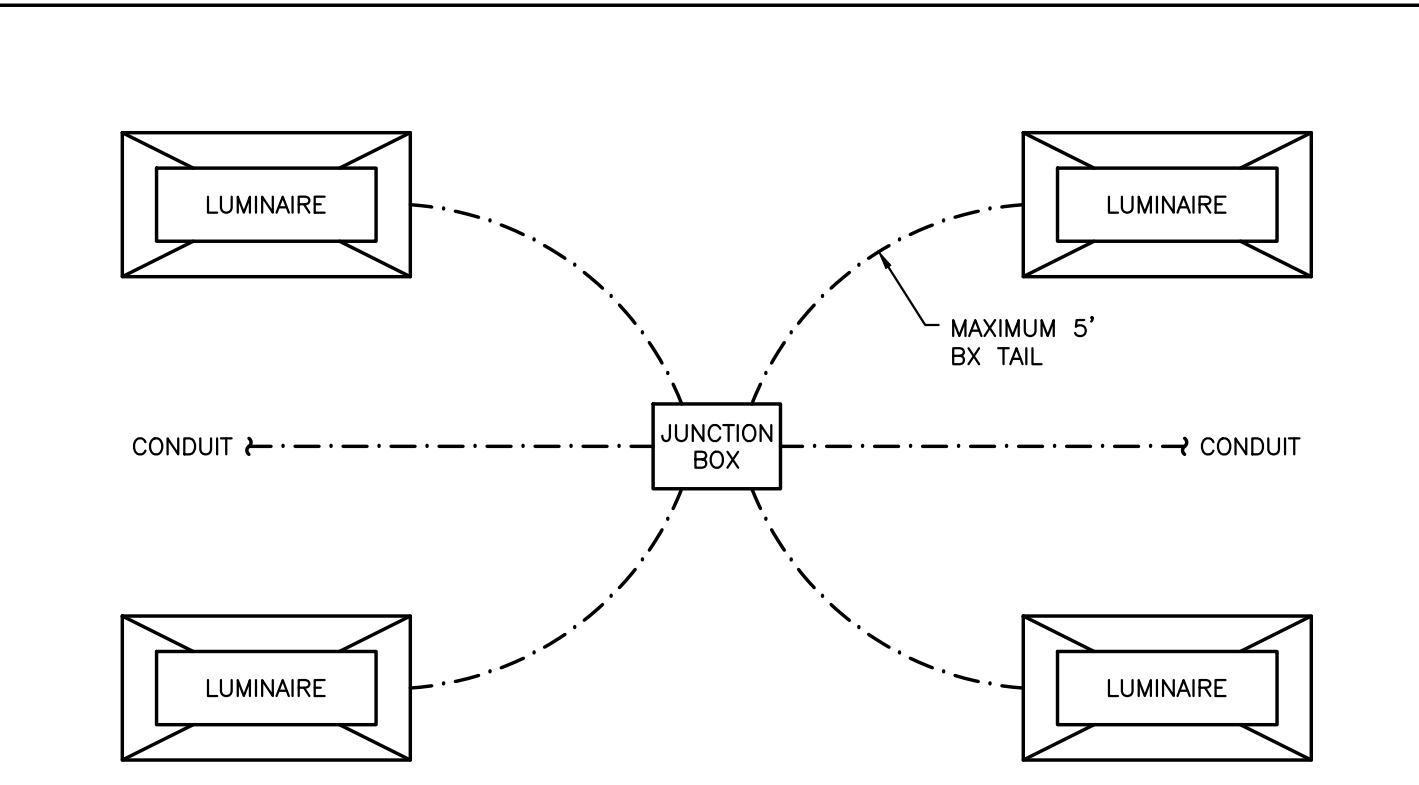
**LIBRARY 102
 NEW POWER LAYOUT**

E203

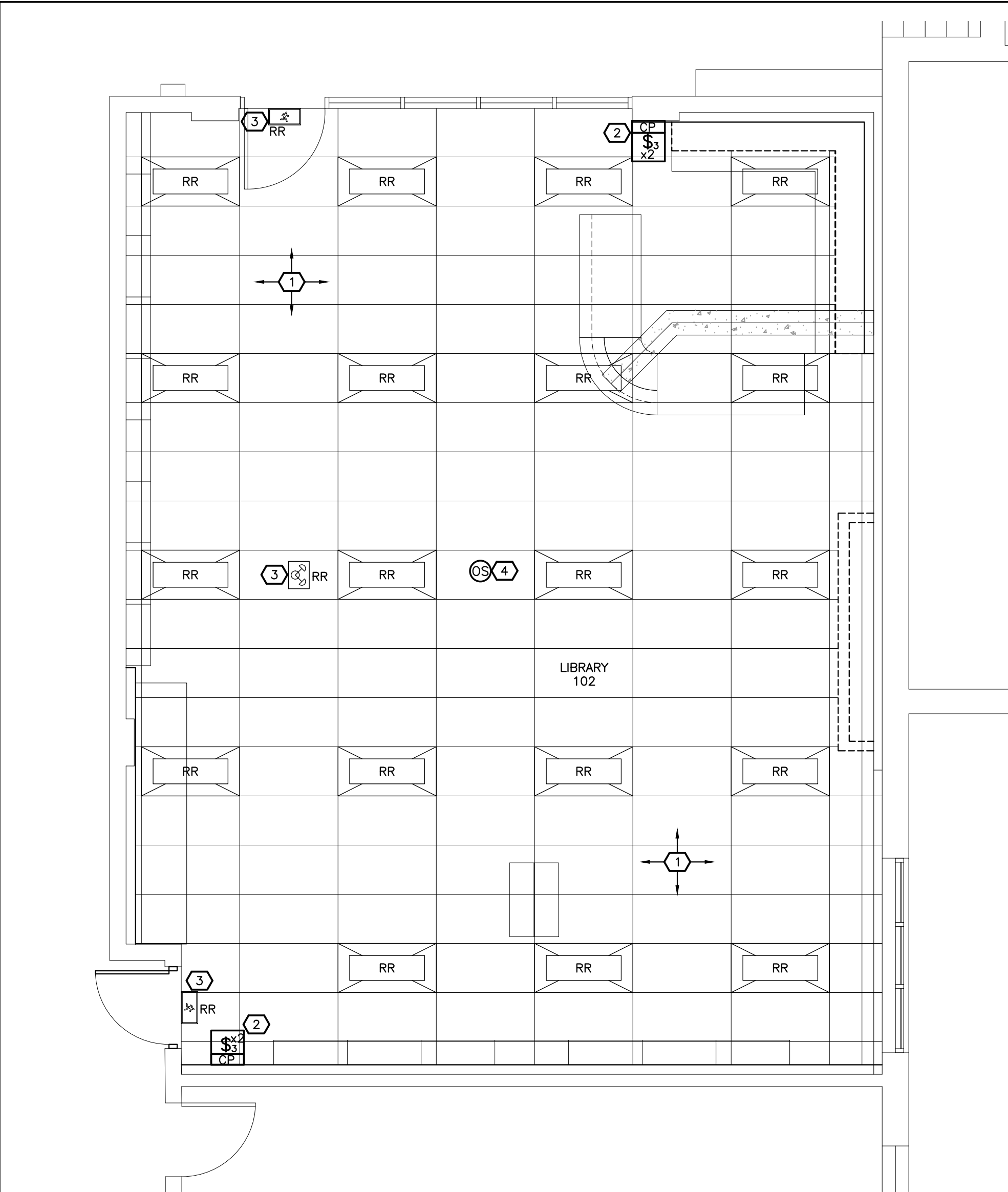
- NEW LIGHTING WORKING NOTES:**
- ① REINSTALL EXISTING LUMINAIRES, PROVIDE NEW CONDUIT THROUGH CORRIDOR WALL AND NEW WIRING AS PER LUMINAIRE WIRING DETAIL.
 - ② PROVIDE NEW LIGHT SWITCHES MOUNTED IN NEW CONTROL PANEL. COORDINATE WITH GENERAL CONTRACTOR. REFER TO CONTROL PANEL DETAIL.
 - ③ REINSTALL EXISTING EMERGENCY DEVICE. TIE INTO EXISTING FEED.
 - ④ PROVIDE NEW CEILING MOUNTED OCCUPANCY SENSOR. REFER TO TYPICAL OCCUPANCY SENSOR WIRING SCHEMATIC FOR DETAILS.



TYPICAL OCCUPANCY SENSOR WIRING SCHEMATIC
NTS



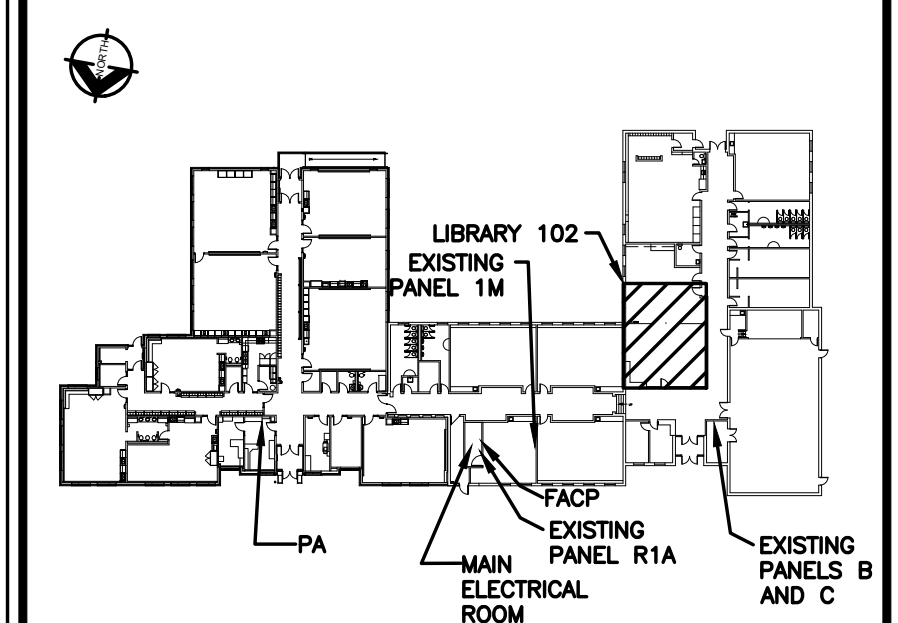
LUMINAIRE WIRING DETAIL
NTS



LIBRARY 102 - NEW LIGHTING LAYOUT
1/4"=1'

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ISSUES/REVISIONS		
No.	DESCRIPTION	DATE
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2	ISSUED FOR PERMIT & TENDER	FEB 15 2022



KEY PLAN - GROUND FLOOR

DES DURHAM ENERGY SPECIALIST LIMITED
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NORTH

DURHAM DISTRICT SCHOOL BOARD
CLAREMONT PS VENTILATION UPGRADES
1675 CENTRAL STREET
CLAREMONT, ONTARIO

DATE: FEBRUARY 2022	SCALE: AS NOTED
DRAWN BY: RJC	CHECKED BY: LC/DCP
DES PROJECT NUMBER: 22-549	SHEET SIZE: D

LIBRARY 102
NEW LIGHTING LAYOUT

E301

GENERAL NOTES:

- 1. THOROUGHLY REVIEW AND COORDINATE WITH SITE CONDITIONS AND COMPLETE DRAWING SET PRIOR TO PRICING AND INSTALLATION.
2. OBTAIN, ARRANGE AND PAY FOR ALL REQUIRED PERMITS AND INSPECTIONS.
3. OBTAIN AND REVIEW THE DESIGNATED SUBSTANCE REPORT FROM THE CLIENT AND COORDINATE ANY DESIGNATED SUBSTANCE ISSUES WITH THE CLIENT PRIOR TO ANY WORK BEING DONE.
...
23. PROVIDE ONE(1) ELECTRONIC COPY OF USB, CLOSE-OUT DOCUMENTATION INCLUDING CONTRACTOR INFORMATION, WARRANTY LETTER, ESA CERTIFICATE, FIRE ALARM VERIFICATION REPORT, EMERGENCY LIGHTING TEST REPORT, SHOP DRAWINGS, O&Ms, ANY OTHER REQUIRED REPORTS AND AS-BUILT DRAWINGS INCLUDING ALL PANEL SCHEDULES. AS-BUILT DRAWINGS SHALL INCLUDE COMPLETE ELECTRICAL DRAWING SET WITH ANY CHANGES MARKED CLEARLY AND NEATLY IN COLOUR.

ELECTRICAL NOTES:

- 1. ALL WORK SHALL CONFORM TO ESA REQUIREMENTS.
2. PROVIDE CHAINS FOR ALL LIGHT FIXTURES. CHAINS SHALL BE PROVIDED AT ALL FOUR CORNERS.
3. BOND ALL METALLIC WATER, DRAIN AND GAS PIPING AS PER ESA REQUIREMENTS.
...
23. ARRANGE FOR ESA INSTALLATION PERMIT AND INSPECTION AND FORWARD A COPY OF THE ESA CERTIFICATE TO THE ENGINEER UPON ACCEPTANCE (INCLUDING FIRE ALARM LISTED AS A SEPARATE ITEM). ARRANGE AND PAY FOR OCCUPANCY PERMIT IF FINAL INSPECTION CANNOT BE SCHEDULED BY COMPLETION DATE, SET FORTH IN TENDER DOCUMENTS.

P.A. SYSTEMS

- 1. ELECTRICAL CONTRACTOR TO OBTAIN THE SERVICES OF APPROVED CONTRACTOR TO CARRY OUT ALL WORK ASSOCIATED WITH P.A. SYSTEM INCLUDING BUT NOT LIMITED TO DEVICES, BACK BOXES, CONDUIT, WIRING, TESTING AND VERIFICATION.
2. EXISTING SYSTEM ASSUMED TO BE SIMPLEX.
3. ANY NEW DEVICES TO MATCH EXISTING SYSTEM. PROVIDE SHOP DRAWINGS FOR REVIEW.
...
11. COST OF SUBCONTRACTOR TO BE CARRIED UNDER CASH ALLOWANCE APPROVED SUB-CONTRACTORS: ANY CERTIFIED SIMPLEX CONTRACTOR OR PA CONTRACTOR WITH SIMPLEX EXPERIENCE.

SYSTEMS LEGEND

Table with columns: TAG, DESCRIPTION, MAKE/MODEL. Includes items like EXISTING WALL MOUNTED P.A. SPEAKER, ACCESS POINT, MOTION SENSOR, EXISTING CEILING MOUNTED P.A. SPEAKER, EXISTING BATTERY OPERATED CLOCK AT 7' ABOVE FLOOR, DATA ONLY OUTLET BOX, WALL MOUNTED TELEVISION VIDEO OUTLET, P.A. TELEPHONE, FUTURE SCREEN CONTROLS.

COMMUNICATIONS SCOPE OF WORK/SPECS:

- 1. ELECTRICAL CONTRACTOR RESPONSIBLE FOR OBTAINING THE SERVICES OF A QUALIFIED COMMUNICATION CONTRACTOR TO CARRY OUT ALL WORK ASSOCIATED WITH TELEPHONE AND DATA SYSTEMS INCLUDING BUT NOT LIMITED TO DEVICES, WIRING, TESTING AND VERIFICATION.
2. ELECTRICAL CONTRACTOR RESPONSIBLE FOR PROVIDING ALL INFRASTRUCTURE FOR COMMUNICATION CABLING INCLUDING BUT NOT LIMITED TO BACK BOXES, CONDUIT UP WALL WITH PULL STRING AND INSULATING BUSHINGS, AND CONDUIT INFRASTRUCTURE IN CEILING SPACE INCLUDING JUNCTION BOXES, CONDUIT STUBS AS REQUIRED.
...
9. COST OF SUBCONTRACTOR TO BE CARRIED UNDER CASH ALLOWANCE APPROVED SUB-CONTRACTORS: ANY CERTIFIED PANDUIT COMMUNICATION CONTRACTOR

SECURITY SYSTEMS

- 1. ELECTRICAL CONTRACTOR TO OBTAIN SERVICES OF APPROVED CONTRACTOR TO CARRY OUT ALL WORK ASSOCIATED WITH SECURITY SYSTEMS INCLUDING BUT NOT LIMITED TO DEVICES, CONDUIT, WIRING, TESTING AND VERIFICATION.
2. ELECTRICAL CONTRACTOR RESPONSIBLE FOR PROVIDING ALL INFRASTRUCTURE FOR SECURITY SYSTEM INCLUDING BUT NOT LIMITED TO BACK BOXES, CONDUIT UP WALL WITH PULL STRING AND INSULATING BUSHINGS, AND CONDUIT INFRASTRUCTURE IN CEILING SPACE INCLUDING JUNCTION BOXES, CONDUIT STUBS AS REQUIRED.
...
9. APPROVED SUB-CONTRACTOR: ANY CERTIFIED DMP CONTRACTOR.

LIGHT FIXTURE SCHEDULE

Table with columns: TAG, DESCRIPTION, MAKE / MODEL, ALTERNATE. Includes items like EXISTING TRACK LIGHTING, EXISTING GYM LIGHT FIXTURES, EXISTING 2X4 RECESSED LIGHT FIXTURE, EXISTING 8' SUSPENDED LUMINAIRE TO BE REMOVED, FREE HANGING 4' STRIP LIGHT, CEILING MOUNTED DUAL TECHNOLOGY LOW PROFILE OCCUPANCY SENSOR 24V.

EMERGENCY LIGHTING SCHEDULE

Table with columns: TAG, DESCRIPTION, MAKE / MODEL. Includes items like EXISTING EXIT SIGN, EXISTING CEILING MOUNTED REMOTE HEAD, EXISTING CEILING MOUNTED REMOTE HEAD.

APPROVED ALTERNATES: LUMACELL, BEGHELLI, UNIGLO, EMERGI-LITE

- NOTE:
1. ## DENOTES BATTERY UNIT.
2. ALLOW 20% SAFETY ON BACK-UP BATTERY PACK SIZING.
3. ALL UNITS TO BE CSA CERTIFIED.

ELECTRICAL ABBREVIATIONS

Table with columns: ABBREVIATION, DESCRIPTION. Includes EX (EXISTING TO REMAIN), D (EXISTING TO BE REMOVED), RL (EXISTING TO BE RELOCATED), RR (EXISTING TO BE REMOVED & REINSTALLED), *# (QUANTITY OF DEVICES), H/L (HIGH LEVEL), C/W (COMPLETE WITH).

POWER LEGEND

Table with columns: TAG, DESCRIPTION, MAKE/MODEL. Includes items like EXISTING PROJECTOR, EXISTING INDICATION LIGHT, EXISTING PANEL, 15A 120V 1PH GROUNDED RECEPTACLE WITH TWO(2) USB PORTS MOUNTED IN COMPUTER RACEWAY, 15A 120V 1PH GROUNDED DUPLEX RECEPTACLE TAMPER RESISTANT C/W STAINLESS STEEL COVER PLATE, 20A 120V 1PH GROUNDED DUPLEX RECEPTACLE IN WEATHERPROOF ENCLOSURE, JUNCTION BOX, 120V 1PH GROUNDED DIRECT EQUIPMENT CONNECTION, 208V 3PH GROUNDED DIRECT EQUIPMENT CONNECTION, MANUAL MOTOR STARTER.

FIRE ALARM LEGEND

Table with columns: SYMBOL, DESCRIPTION. Includes EXISTING HEAT DETECTOR, EXISTING SMOKE DETECTOR, EXISTING COMBINATION HORN/STROBE DEVICE, EXISTING FIRE ALARM CONTROL PANEL, EXISTING DUCT SMOKE DETECTOR.

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Table with columns: No., DESCRIPTION, DATE. Includes entries for 'ISSUED FOR CLIENT REVIEW' and 'ISSUED FOR PERMIT & TENDER'.

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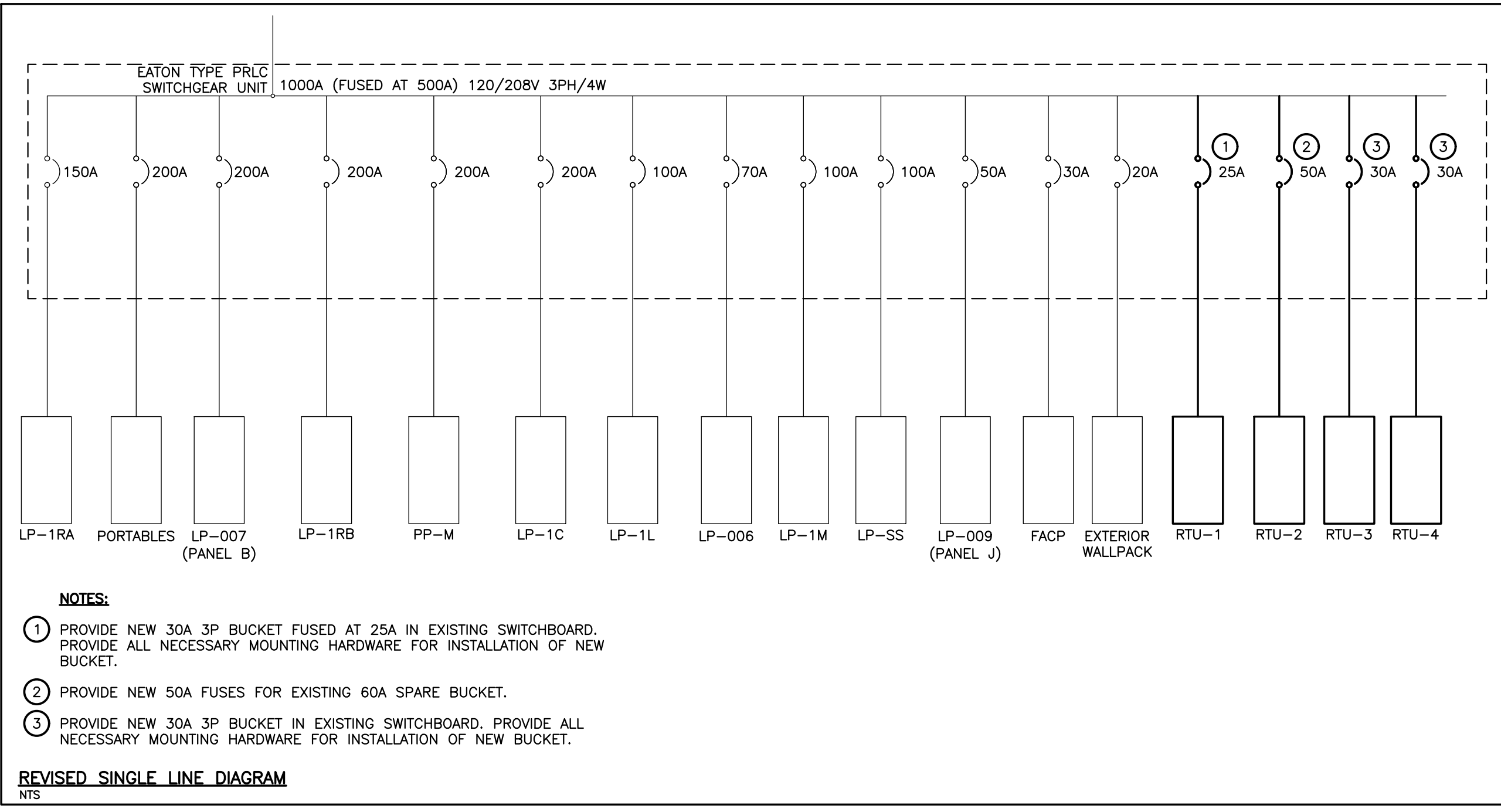


DURHAM DISTRICT SCHOOL BOARD
CLAREMONT PS
VENTILATION UPGRADES
1675 CENTRAL STREET
CLAREMONT, ONTARIO

Table with columns: DATE, SCALE, DRAWN BY, CHECKED BY, DES PROJECT NUMBER, SHEET SIZE. Includes values like FEBRUARY 2022, NTS, RJC, LC/DCP, 22-549, D.

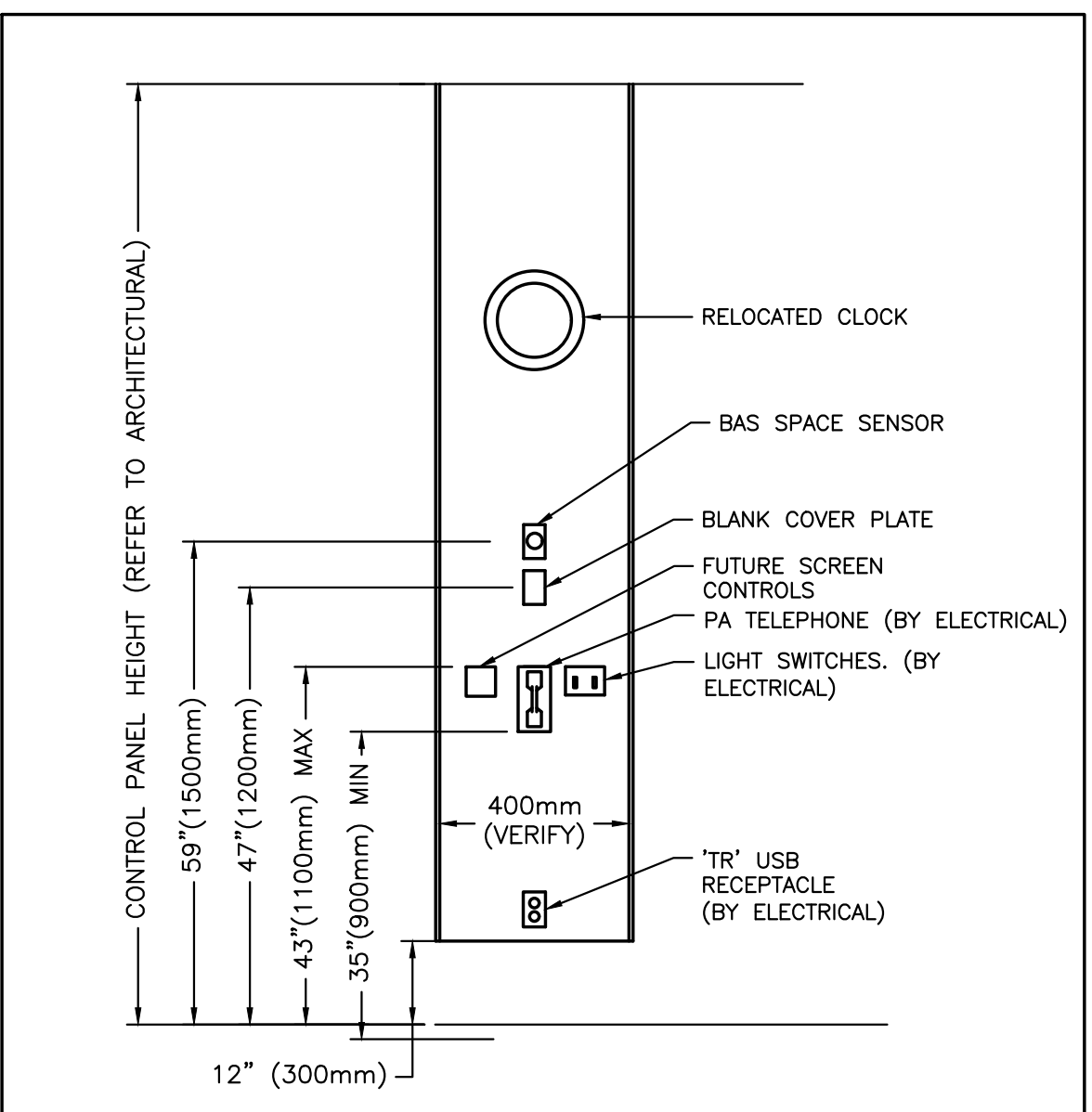
LEGENDS & NOTES

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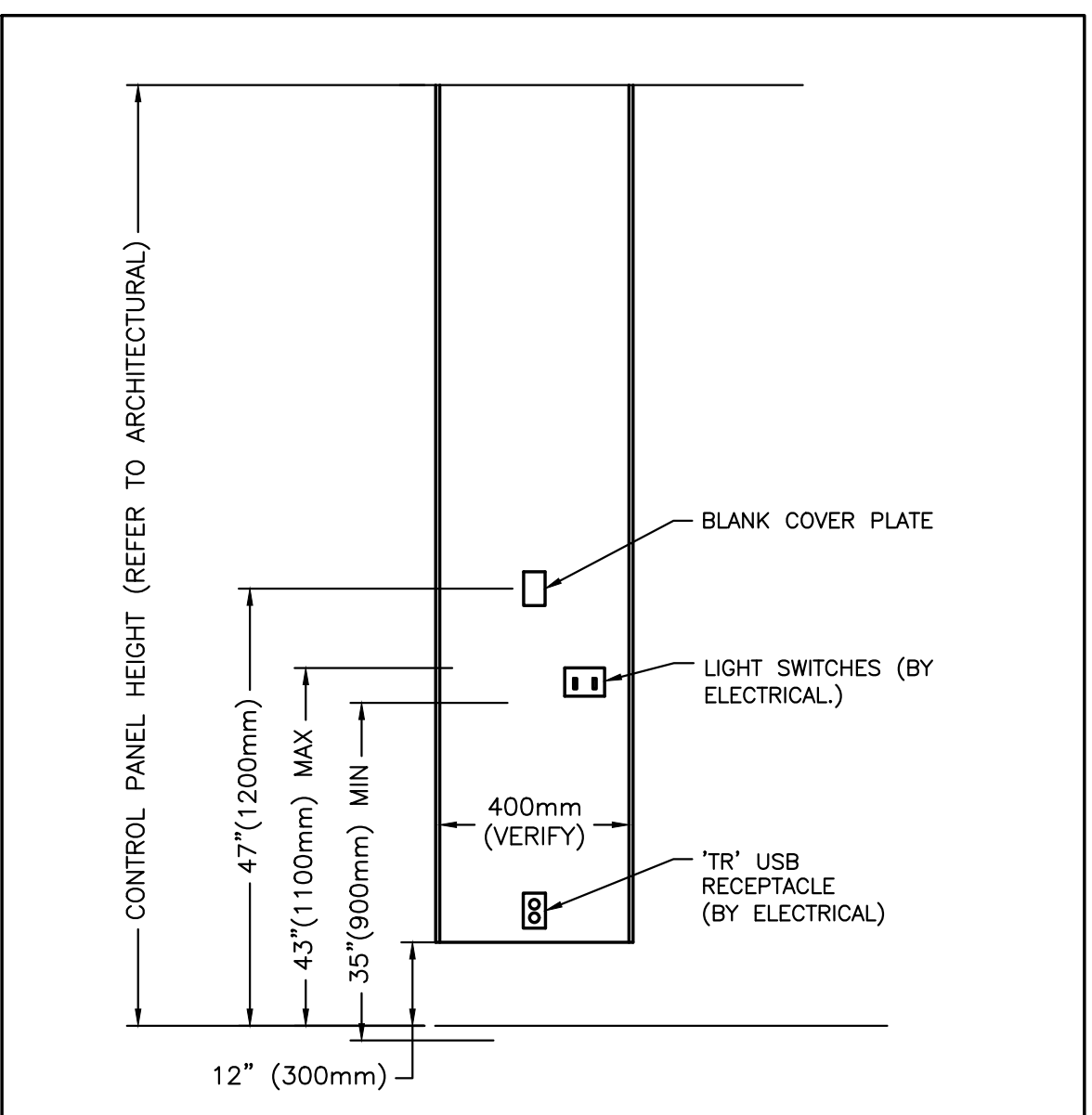


- NOTES:**
- 1 PROVIDE NEW 30A 3P BUCKET FUSED AT 25A IN EXISTING SWITCHBOARD. PROVIDE ALL NECESSARY MOUNTING HARDWARE FOR INSTALLATION OF NEW BUCKET.
 - 2 PROVIDE NEW 50A FUSES FOR EXISTING 60A SPARE BUCKET.
 - 3 PROVIDE NEW 30A 3P BUCKET IN EXISTING SWITCHBOARD. PROVIDE ALL NECESSARY MOUNTING HARDWARE FOR INSTALLATION OF NEW BUCKET.

REVISED SINGLE LINE DIAGRAM
NTS



CONTROL PANEL DETAIL (NORTH LIBRARY) (MILLWORK SUPPLIED BY GENERAL)
NTS



CONTROL PANEL DETAIL (SOUTH LIBRARY) (MILLWORK SUPPLIED BY GENERAL)
NTS

EXISTING PANEL LP-1M

EXISTING MANUFACTURER EATON TYPE PRL1A
225A, 42 CIRCUIT, 3φ, 4W, 120/208 VOLT SURFACE MOUNTED BOLT-ON CIRCUIT BREAKER PANEL BOARD WITH MAIN LUGS ONLY

* DENOTES BREAKER LOCK-ON DEVICE
+ DENOTES MISLABELED CIRCUIT. CONTRACTOR TO VERIFY LOAD

DESCRIPTION	BKR	CCT	S/N	CCT	BKR	DESCRIPTION
GFI REC INSIDE AHU-1 ON ROOF	15A	1	2	15A		CABINET UNIT HEATER VEST (101)
F-2	15A	3	4	15A		CABINET UNIT HEATER VEST (121)
F-4	15A	5	6	15A		SPARE
OUTLET FOR CONTROLS	15A	7	8	15A		SPARE
OUTLET FOR CONTROLS	15A	9	10	15A		SPARE
OUTLET FOR CONTROLS	15A	11	12	15A 2P		CONDENSER AC-1
GFI REC ON ROOF	20A	13	14	15A		STAGE PERFORM LIGHTS
BOILER CONTACTOR CONTROL CIRCUIT	15A*	15	16	15A		STAGE PERFORM LIGHTS
UNKNOWN	15A+	17	18	15A		SPARE
HWT GAS BURNER (E113)	15A	19	20	15A		WELL PUMP
RECIRC PUMP (E113)	15A	21	22	15A 2P		WELL PUMP
HOT WATER TEMP ALARM	15A	23	24	15A		OUTLET FOR WATER TREATMENT
RECEPTACLES RM M&E (134)	15A	25	26	15A		OUTLET FOR WATER TREATMENT
F-7	15A	27	28	15A		OUTLET FOR WATER TREATMENT
UNIT HEATER M&E (134)	15A	29	30	15A		OUTLET FOR WATER TREATMENT
FIRE CISTRN CONTROL PANEL	20A	31	32	15A		BAS PANEL
SPARE	20A	33	34	15A		ELECTRONIC PRIMER (134) 112(124)
GLYCOL TANK	15A	35	36	15A		BOILER #1
CABINET UNIT HEATER CORR (132)	15A	37	38	15A		BOILER #2
SUBDRIVE WELL PUMP	20A 3P	39	40			
		41	42			

EXISTING PANEL B

EXISTING MANUFACTURER SQUARE D TYPE NQ0B
225A, 39 CIRCUIT, 3φ, 4W, 120/208 VOLT FLUSH MOUNTED BOLT-ON CIRCUIT BREAKER PANEL BOARD WITH MAIN LUGS ONLY

+ DENOTES MISLABELED CIRCUIT. CONTRACTOR TO VERIFY LOAD

DESCRIPTION	BKR	CCT	S/N	CCT	BKR	DESCRIPTION
LTS ROOM 10 KIND. / BB NET / PROJECTOR	15A	1	2	15A		LTS RM 6 & CHANGE RM
LTS ROOM 10/PA/CLOCK	20A	3	4	15A		LTS RM 6 & CHANGE RM
LTS NORTH LIB	15A	5	6	15A		LTS RM 6 & CHANGE RM
LTS CORRIDOR SOUTH	20A	7	8	20A		LTS/TIME CLOCK OUTSIDE
LTS CORRIDOR EAST	15A	9	10	20A		LTS GEN PURP
LTS VEST S/SHOWERS	15A	11	12	20A		LTS GEN PURP
SPOT LTS GEN PURP	15A	13	14	20A		GYM WEST RECEP
SPOT LTS GEN PURP	15A	15	16	20A		LTG WASH
SOUTH LIB LTG	20A	17	18	15A		LTG ROOM NO. 5
REC./PRIN./SECT.	15A	19	20	15A		REC - LIBRARY/COMP N. WALL & RM GFI
REC./GEN PURP CL FANS	15A	21	22	15A		REC RM 9/10/5
PA RECEP	15A	23	24	15A		REC RM 10/5 / H CABLE / CONTROLS PLUGS
REC. CORR.	20A	25	26	15A		REC CH/RM-W/RM
REC. SHOWCASE	15A	27	28	15A+		COMPUTER LIB/UNKNOWN
UNKNOWN	15A+	29	30	15A		HALL REC POP MACHINE
PANEL C	70A 3P	31	32			
		33	34			
		35	36			
LIBRARY PROJECTOR	15A	37	38	20A		BOYS HAND DRYER
		39	20A			GIRLS HAND DRYER

EXISTING PANEL LP-1RA

EXISTING MANUFACTURER EATON TYPE PRL1A
225A, 60 CIRCUIT, 3φ, 4W, 120/208 VOLT SURFACE MOUNTED BOLT-ON CIRCUIT BREAKER PANEL BOARD WITH MAIN LUGS ONLY

* DENOTES BREAKER LOCK-ON DEVICE

DESCRIPTION	BKR	CCT	S/N	CCT	BKR	DESCRIPTION
CORRIDOR RECEPTACLES	20A	1	2	15A		HANDICAP DOOR OPERATOR VEST (101)
CORRIDOR RECEPTACLES	20A	3	4	15A		PA SYSTEM EMERGENCY DISPLAY
DOOR HOLDERS	15A	5	6	15A		RECEPTACLES PRINCIPAL (106)
RECEPTACLE OFFICE 100(105)	15A	7	8	15A		RECEPTACLES PRINCIPAL (106)
RECEPTACLES RM M&E(133)	15A	9	10	15A		RECEPTACLES PRINCIPAL (106)
METER CABINET RECEPTACLE	15A*	11	12	15A		RECEPTACLES CALMING (125)
RECEPTACLES RM 111(131)	15A	13	14	15A		RECEPTACLES CALMING (125)
GFI RECEPTACLE RM 111(131)	15A	15	16	15A		IG RECEPTACLES LAN (126)
RECEPTACLES RM 111(131)	15A	17	18	15A		IG RECEPTACLES LAN (126)
RECEPTACLES RM 111(131)	15A	19	20	15A		IG RECEPTACLES LAN (126)
RECEPTACLES RM 111(131)	15A	21	22	15A		IG RECEPTACLES LAN (126)
CEILING RECEPTACLE RM 111(131)	15A	23	24	15A		IG RECEPTACLES LAN (126)
RECEPTACLES RM 113(130)	15A	25	26	15A		GFI REC/ELECTRONIC FAUCET (128)(127)
RECEPTACLES RM 113(130)	15A	27	28	15A		HYDRAULIC BED REC (128)
RECEPTACLES RM 113(130)	15A	29	30	15A		LIFT REC (128)
RECEPTACLES RM (129)	15A	31	32	15A		DOOR OPERATOR WR (128)
RECEPTACLE OFFICE 100(105)	15A	33	34	15A		BF DOME SOUNDER
RECEPTACLES RM (129)	15A	35	36	20A		COPIER RECEPTACLE RM (129)
RECEPTACLE OFFICE 100(105)	15A	37	38	15A		EXTERIOR GFI RECEPTACLE MAIN ENTRANCE
RECEPTACLE OFFICE 100(105)	15A	39	40	15A		N. LIBRARY COUNTER REC
RECEPTACLE OFFICE 100(105)	15A	41	42	15A		SPARE
CARMA	15A*	43	44	15A		TV RECEPTACLES BOTTLE FILLER CORRIDOR (103)
SECURITY PANEL	15A*	45	46	15A		SPARE
SPARE	15A	47	48	15A		SPARE
		49	50			
		51	52			
		53	54			
		55	56			
		57	58			
		59	60			

REVISED PANEL LP-1M

EXISTING MANUFACTURER EATON TYPE PRL1A
225A, 42 CIRCUIT, 3φ, 4W, 120/208 VOLT SURFACE MOUNTED BOLT-ON CIRCUIT BREAKER PANEL BOARD WITH MAIN LUGS ONLY

* DENOTES BREAKER LOCK-ON DEVICE

DESCRIPTION	BKR	CCT	S/N	CCT	BKR	DESCRIPTION
GFI REC INSIDE AHU-1 ON ROOF	15A	1	2	15A		CABINET UNIT HEATER VEST (101)
F-2	15A	3	4	15A		CABINET UNIT HEATER VEST (121)
F-4	15A	5	6	15A		EF-101 - STORAGE 101A
OUTLET FOR CONTROLS	15A	7	8	15A		RTU BAS PANEL
OUTLET FOR CONTROLS	15A	9	10	15A 2P		CONDENSER AC-1
OUTLET FOR CONTROLS	15A	11	12	15A 2P		CONDENSER AC-1
GFI REC ON ROOF	20A	13	14	15A		STAGE PERFORM LIGHTS
BOILER CONTACTOR CONTROL CIRCUIT	15A*	15	16	15A		STAGE PERFORM LIGHTS
UNKNOWN	15A	17	18	15A		RTU BAS PANEL
HWT GAS BURNER (E113)	15A	19	20	15A		WELL PUMP
RECIRC PUMP (E113)	15A	21	22	15A 2P		WELL PUMP
HOT WATER TEMP ALARM	15A	23	24	15A		OUTLET FOR WATER TREATMENT
RECEPTACLES RM M&E (134)	15A	25	26	15A		OUTLET FOR WATER TREATMENT
F-7	15A	27	28	15A		OUTLET FOR WATER TREATMENT
UNIT HEATER M&E (134)	15A	29	30	15A		OUTLET FOR WATER TREATMENT
FIRE CISTRN CONTROL PANEL	20A	31	32	15A		BAS PANEL
MAINTENANCE REC RTU-1/2/3/4	20A	33	34	15A		ELECTRONIC PRIMER (134) 112(124)
GLYCOL TANK	15A	35	36	15A		BOILER #1
CABINET UNIT HEATER CORR (132)	15A	37	38	15A		BOILER #2
SUBDRIVE WELL PUMP	20A 3P	39	40			
		41	42			

REVISED PANEL B

EXISTING MANUFACTURER SQUARE D TYPE NQ0B
225A, 39 CIRCUIT, 3φ, 4W, 120/208 VOLT FLUSH MOUNTED BOLT-ON CIRCUIT BREAKER PANEL BOARD WITH MAIN LUGS ONLY

++ DENOTES NEW BREAKER REQUIRED

DESCRIPTION	BKR	CCT	S/N	CCT	BKR	DESCRIPTION
LTS ROOM 10 KIND. / BB NET / PROJECTOR	15A	1	2	15A		LTS RM 6 & CHANGE RM
LTS ROOM 10/PA/CLOCK	20A	3	4	15A		LTS RM 6 & CHANGE RM
LTS NORTH LIB	15A	5	6	15A		LTS RM 6 & CHANGE RM
LTS CORRIDOR SOUTH	20A	7	8	20A		LTS/TIME CLOCK OUTSIDE
LTS CORRIDOR EAST	15A	9	10	20A		LTS GEN PURP
LTS VEST S/SHOWERS	15A	11	12	20A		LTS GEN PURP
SPOT LTS GEN PURP	15A	13	14	20A		GYM WEST RECEP
SPOT LTS GEN PURP	15A	15	16	20A		LTG WASH
SOUTH LIB LTG	20A	17	18	15A		LTG ROOM NO. 5
REC./PRIN./SECT.	15A	19	20	15A		REC LIBRARY COUNTER NORTH EAST WALL
REC./GEN PURP CL FANS	15A	21	22	15A		REC RM 9/10/5
PA RECEP	15A	23	24	15A		REC RM 10/5 / H CABLE / CONTROLS PLUGS
REC. CORR.	20A	25	26	15A		REC CH/RM-W/RM
REC. SHOWCASE	15A	27	28	15A+		COMPUTER LIB/UNKNOWN
UNKNOWN	15A	29	30	15A		HALL REC POP MACHINE
PANEL C	70A 3P	31	32	15A++		REC LIBRARY CIRCULATION DESK
		33	34	15A++		REC LIBRARY SOUTH WEST WALL
		35	36	15A++		LIBRARY SCREEN
LIBRARY PROJECTOR	15A	37	38	20A		BOYS HAND DRYER
		39	20A			GIRLS HAND DRYER

ISSUES/REVISIONS

No.	DESCRIPTION	DATE
1	ISSUED FOR CLIENT REVIEW	FEB 11 2022
2	ISSUED FOR PERMIT & TENDER	FEB 15 2022

DES DURHAM ENERGY SPECIALIST LIMITED
CONSULTING ENGINEERS
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DURHAM DISTRICT SCHOOL BOARD
CLAREMONT PS VENTILATION UPGRADES
1675 CENTRAL STREET
CLAREMONT, ONTARIO

DATE: FEBRUARY 2022	SCALE: NTS
DRAWN BY: RJC	CHECKED BY: LC/DCP
DES PROJECT NUMBER: 22-549	SHEET SIZE: D

PANEL SCHEDULES & DETAILS

E901

GENERAL NOTES

A. GENERAL INFORMATION

1. READ STRUCTURAL DOCUMENTS IN CONJUNCTION WITH CONTRACT DOCUMENTS, WHICH INCLUDE, BUT ARE NOT LIMITED TO, ARCHITECTURAL, MECHANICAL, AND ELECTRICAL DOCUMENTS.
2. CONTRACTOR TO BE RESPONSIBLE FOR CHECKING SITE CONDITIONS AGAINST DOCUMENTS, BEFORE PROCEEDING WITH THE WORK, AND REPORT DISCREPANCIES TO THE CONSULTANT.
3. CONTRACTOR TO PROVIDE LABOUR, MATERIALS, AND EQUIPMENT TO COMPLETE ALL STRUCTURAL WORK INDICATED.
4. CARRY OUT CONSTRUCTION OPERATIONS, INCLUDING THE INSTALLATION OF TEMPORARY GUYING AND SHORING REQUIRED, ENSURING THAT THE EXISTING STRUCTURE OR MEMBERS ALREADY ERRECTED ARE NOT LOADED IN EXCESS OF THEIR SAFE LOAD CARRYING CAPACITY.
5. STRUCTURAL DOCUMENTS DO NOT NECESSARILY SHOW ALL OPENINGS AND SLAB VARIATIONS REQUIRED. THE CONTRACTOR SHALL REFER TO ARCHITECTURAL, MECHANICAL, AND ELECTRICAL DRAWINGS FOR THE EXACT LOCATION, NUMBER, AND SIZE OF OPENINGS, TRENCHES, PITS, SLUMPS, SLEEVES, AND DEPRESSIONS. PROVIDE STRUCTURAL FRAMING AT THESE LOCATIONS IN ACCORDANCE WITH THE APPLICABLE TYPICAL DETAIL.

B. REFERENCE STANDARDS/CODES AND ACTS

1. CONFORM WITH THE 2012 BUILDING CODE (ONTARIO REGULATION 332/12, AMENDED BY ONTARIO REGULATIONS 191/14, 563/17 AND 88/19), AND ANY APPLICABLE ACTS OF ANY AUTHORITY HAVING JURISDICTION, AND THE FOLLOWING:

REF	CODE	TITLE
a)	CAN/CSA-S16	LIMIT STATES DESIGN OF STEEL STRUCTURES.
b)	CAN/CSA G40.20/G40.21	STRUCTURAL QUALITY STEEL.
c)	CAN/CSA-A370	CONNECTORS FOR MASONRY
d)	CSA-A371	MASONRY CONSTRUCTION FOR BUILDINGS.
e)	S304.1	DESIGN OF MASONRY STRUCTURES

2. ALL STANDARDS AND PUBLICATIONS REFERENCED BY THE STANDARDS NOTED ABOVE ARE TO APPLY.
3. WHERE THERE ARE DIFFERENCES BETWEEN THE DOCUMENTS AND THE STANDARDS, CODES AND ACTS, THE MOST STRINGENT SHALL GOVERN.

C. SUBMITTALS

1. SUBMIT FOR REVIEW BY THE VARIOUS CONSULTANTS, DETAILED INFORMATION FOR ALL TEMPORARY AND PERMANENT STRUCTURAL WORK. THIS INCLUDES, BUT IS NOT LIMITED TO:

ITEM	SUBMISSION REQUIRED	SUBMISSION TO BE SEALED BY PROFESSIONAL ENGINEER	COMMENTS
TEMPORARY SHORING	YES	YES	
STRUCTURAL STEEL SHOP DRAWINGS	YES	YES	

- 1.1. CONTRACTOR SHALL ALLOW FOR A TURN AROUND TIME OF 5 WORKING DAYS FOR THE REVIEW OF THESE SUBMISSIONS.
2. OUR REVIEW OF THE SHOP DRAWINGS IS ONLY FOR GENERAL CONFORMITY WITH STRUCTURAL CONTRACT DOCUMENTS AND SPECIFICATIONS. COMMENTS MADE ON THE SHOP DRAWINGS DURING THIS REVIEW DO NOT RELIEVE THE CONTRACTOR FROM COMPLIANCE WITH THE REQUIREMENTS OF THE STRUCTURAL CONTRACT DOCUMENTS AND SPECIFICATIONS, NOR DO THEY AUTHORIZE ANY CHANGES TO THE CONTRACT. REVIEW OF A SPECIFIC ITEM SHALL NOT INCLUDE REVIEW OF AN ASSEMBLY OF WHICH THE ITEM IS A COMPONENT. THE CONTRACTOR'S RESPONSIBILITIES INCLUDE ALL QUANTITIES, DETAIL DIMENSIONS, FIELD MEASUREMENTS, FABRICATION PROCESS, MEANS, METHODS, SEQUENCES AND PROCEDURES OF CONSTRUCTION, COORDINATION OF WORK WITH ALL TRADES AND PERFORMING ALL WORK IN A SAFE AND SATISFACTORY MANNER. THE REVIEW OF SHOP DRAWINGS DOES NOT IMPLY ANY CHANGE IN ANY OTHER CONSULTANTS' OR PROFESSIONALS' RESPONSIBILITY RELATED TO DESIGN OF SPECIFIC ITEMS AS OUTLINED BY THE SPECIFICATIONS (SUCH AS STRUCTURAL STEEL CONNECTIONS, STEEL JOISTS, PRECAST ELEMENTS, ETC.). AFTER REVIEW, THE DRAWINGS WILL BE STAMPED AND RETURNED TO SHOW ONE OF THE FOLLOWING:

<u>NOT REVIEWED</u>	SHOWS WORK WHICH IS NOT WITHIN THE SCOPE OF STRUCTURAL CONSULTING SERVICES.
<u>REVIEWED</u>	NO DEVIATIONS FROM THE CONTRACT DOCUMENTS NOTED.
<u>NOTED</u>	WE HAVE MADE COMMENTS, TO BE REVIEWED/INCORPORATED. SUBMIT RECORD PRINT.
<u>RESUBMIT</u>	REVISE AND RESUBMIT FOR REVIEW.

D. MATERIALS

1. PROVIDE ONLY NEW STRUCTURAL MATERIALS IN ACCORDANCE WITH THE REFERENCE STANDARDS AND THE FOLLOWING, UNLESS OTHERWISE NOTED.
 - 1.1. STRUCTURAL STEEL:
 - (a) ANGLES AND CHANNELS (L, C) AND PLATES TO CONFORM TO CAN/CSA-G40.20/G40.21 GRADE 300W.
 - (b) HOLLOW STRUCTURAL SECTIONS (HSS) TO CONFORM TO ASTM A500 GRADE C.
 - 1.2. PRIME PAINT: CONFORM TO CISCPMA STANDARD 2-75.
 - 1.3. STRUCTURAL BOLTS, NUTS AND WASHERS: CONFORM TO ASTM A325M.
 - 1.4. NON-SHRINK GROUT = COMPRESSIVE STRENGTH OF 35 MPa AT 24 HOURS.
 - 1.5. BLOCK: CONFORM TO CAN3-A165 SERIES, MINIMUM COMPRESSIVE STRENGTH = 15.0 MPa (MIN.) BASED ON NET AREA.
 - 1.6. MORTAR: CONFORM TO CSA A179 TYPE S FOR LOADBEARING WALLS UNLESS NOTED.
 - 1.7. MASONRY GROUT: CONFORM TO CSA A179, 15 MPa MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS, 250 mm (10") SLUMP, MAXIMUM AGGREGATE SIZE 10 MM (3/8")
 - 1.8. POST-INSTALLED ANCHORS: PROVIDED BY HILTI (CANADA) CORPORATION. CONTACT HILTI AT (800) 363-4458 FOR PRODUCT RELATED QUESTIONS.

E. EXECUTION

1. STRUCTURAL STEEL
 - 1.1. PAINT ALL STRUCTURAL STEEL TO REQUIREMENTS OF CISCPMA 2-75. TOUCH UP ALL FIELD WELDS.
 - 1.2. ALL WELDS SHALL CONFORM TO CSA STANDARD W59.
 - 1.3. ALL WELDS EXPOSED TO VIEW SHALL BE GROUND SMOOTH.
 - 1.4. ANY ORGANIZATION UNDERTAKING TO WELD UNDER THIS CONTRACT SHALL BE CERTIFIED BY THE CANADIAN WELDING BUREAU UNDER REQUIREMENTS OF DIVISION 1 OR DIVISION 2.1 OF W47.1.
 - 1.5. UNLESS A REINFORCED MASONRY OR CONCRETE LINTEL IS SHOWN, IN MASONRY WALLS OR MASONRY PARTITIONS PROVIDE LOOSE STEEL LINTELS IN ACCORDANCE WITH REQUIREMENTS OF DOCUMENTS OVER ALL DOORWAYS, OTHER OPENINGS, AND RECESSES, INCLUDING THOSE FOR MECHANICAL OR ELECTRICAL SERVICES. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE THE LOCATION, SIZE AND NUMBER OF OPENINGS REQUIRED BY THE MECHANICAL AND ELECTRICAL CONSULTANT.
 - 1.6. DO NOT SPLICE STRUCTURAL STEEL SECTIONS WITHOUT PRIOR APPROVAL OF THE CONSULTANT. ALL SPLICES SHALL DEVELOP THE FULL CAPACITY OF THE SECTION AND ARE TO BE TESTED BY NON DESTRUCTIVE METHODS, BY AN INDEPENDENT INSPECTION AND TESTING COMPANY, AT THE CONTRACTOR'S EXPENSE.
 - 1.7. COMPLETELY FILL VOIDS BENEATH STEEL BASES ON CONCRETE WITH AN APPROVED NON-SHRINK 36 MPa (5 ksi) GROUT
 - 1.8. SEE ARCHITECTURAL DRAWINGS FOR FIREPROOFING REQUIREMENTS. CONFIRM COMPATIBILITY OF FIREPROOFING MATERIAL WITH STEEL PAINT.
2. MASONRY
 - 2.1. PROVIDE A MINIMUM LENGTH OF 200 mm (8") OF 100% SOLID MASONRY UNITS FOR BEARING OF STEEL, CONCRETE OR REINFORCED MASONRY LINTELS.
3. POST-INSTALLED ANCHORS
 - 3.1. ANCHOR CAPACITY USED IN DESIGN SHALL BE BASED ON THE TECHNICAL DATA PUBLISHED BY HILTI OR SUCH OTHER METHOD AS APPROVED BY THE STRUCTURAL ENGINEER OF RECORD. SUBSTITUTION REQUESTS FOR ALTERNATE PRODUCTS MUST BE APPROVED IN WRITING BY THE STRUCTURAL ENGINEER OF RECORD PRIOR TO USE. CONTRACTOR SHALL PROVIDE CALCULATIONS DEMONSTRATING THAT THE SUBSTITUTED PRODUCT IS CAPABLE OF ACHIEVING THE PERFORMANCE VALUES OF THE SPECIFIED PRODUCT. SUBSTITUTIONS WILL BE EVALUATED FOR COMPLIANCE WITH THE RELEVANT BUILDING CODE FOR SEISMIC USES, LOAD RESISTANCE, INSTALLATION CATEGORY, AND AVAILABILITY OF COMPREHENSIVE INSTALLATION INSTRUCTIONS. ADHESIVE ANCHOR EVALUATION WILL ALSO CONSIDER CREEP, IN-SERVICE TEMPERATURE AND INSTALLATION TEMPERATURE.
 - 3.2. INSTALL ANCHORS PER THE MANUFACTURER INSTRUCTIONS, AS INCLUDED IN THE ANCHOR PACKAGING.
 - 3.3. OVERHEAD ADHESIVE ANCHORS MUST BE INSTALLED USING THE HILTI PROFI SYSTEM.
 - 3.4. THE CONTRACTOR SHALL ARRANGE AN ANCHOR MANUFACTURER'S REPRESENTATIVE TO PROVIDE ONSITE INSTALLATION TRAINING FOR ALL OF THEIR ANCHORING PRODUCTS SPECIFIED. THE STRUCTURAL ENGINEER OF RECORD MUST RECEIVE DOCUMENTED CONFIRMATION THAT ALL OF THE CONTRACTOR'S PERSONNEL WHO INSTALL ANCHORS ARE TRAINED PRIOR TO THE COMMENCEMENT OF INSTALLING ANCHORS.
 - 3.5. ANCHOR CAPACITY IS DEPENDANT UPON SPACING BETWEEN ADJACENT ANCHORS AND PROXIMITY OF ANCHORS TO EDGE OF CONCRETE. INSTALL ANCHORS IN ACCORDANCE WITH SPACING AND EDGE CLEARANCES INDICATED ON THE DRAWINGS.
 - 3.6. EXISTING REINFORCING BARS IN THE CONCRETE STRUCTURE MAY CONFLICT WITH SPECIFIC ANCHOR LOCATIONS. UNLESS NOTED ON THE DRAWINGS THAT THE BARS CAN BE CUT, THE CONTRACTOR SHALL REVIEW THE EXISTING STRUCTURAL DRAWINGS AND SHALL UNDERTAKE TO LOCATE THE POSITION OF THE REINFORCING BARS AT THE LOCATIONS OF THE CONCRETE ANCHORS, BY HILTI FERROSCAN, HILTI PS 1000, GPR, X-RAY, CHIPPING OR OTHER MEANS.
4. ALTERATIONS AND/OR CONNECTIONS TO EXISTING STRUCTURE
 - 4.1. INSPECT THE EXISTING BUILDING AND BECOME THOROUGHLY FAMILIAR WITH THE EXISTING CONDITIONS.
 - 4.2. PRIOR TO FABRICATION OF STRUCTURAL STEEL, OPEN UP ALL AREAS WHERE CONNECTIONS ARE TO BE MADE TO EXISTING WORK AND TAKE FIELD MEASUREMENTS. MODIFY METHODS FOR CONNECTING TO SUIT SITE CONDITIONS FOUND AND TO THE APPROVAL OF THE CONSULTANT. CARRY OUT LOCAL REPAIRS TO THE EXISTING WORK AS NECESSARY AND AS DIRECTED BY THE CONSULTANT.
 - 4.3. SHORE EXISTING WORK AS REQUIRED UNTIL ALL NEW WORK HAS BEEN COMPLETED AND REVIEWED BY THE CONSULTANT.
 - 4.4. SHORE FLOORS AS REQUIRED TO SUPPORT CRANES, HOISTS AND OTHER CONSTRUCTION EQUIPMENT.
 - 4.5. DO NOT CUT CONCRETE REINFORCEMENT UNLESS REVIEWED AND APPROVED BY THE CONSULTANT.
 - 4.6. WHERE REQUIRED TO AVOID CUTTING EXISTING REINFORCEMENT, MODIFY THE LAYOUT OF NEW THROUGH BOLTS, EXPANSION ANCHORS AND OTHER ANCHORING DEVICES.
 - 4.7. MAKE GOOD THE EXISTING WORK.
5. CUTTING AND CORING OF EXISTING STRUCTURE
 - 5.1. PRIOR TO CUTTING AND CORING ANY OPENINGS IN THE EXISTING BUILDING, PROVIDE THE CONSULTANT WITH A SLEEVING DRAWING INDICATING THE SIZE AND LOCATION OF OPENINGS RELATIVE TO BUILDING GRIDLINES. EXISTING OPENINGS IN THE VICINITY OF THE NEW OPENING MUST ALSO BE SHOWN.
 - 5.2. ALL DIMENSIONS PROVIDED TO THE CONSULTANT ARE TO BE CONFIRMED WITH THE APPROPRIATE CONTRACTOR (MECHANICAL OR ELECTRICAL) PRIOR TO CUTTING/CORING.
 - 5.3. ANY REVISIONS TO THE DIMENSIONS BY THE CONSULTANT MUST BE REVIEWED BY THE APPROPRIATE CONTRACTOR PRIOR TO CUTTING/CORING.
 - 5.4. THE CONSULTANT MAY IDENTIFY AREAS WHERE EXISTING REINFORCEMENT AND EMBEDDED SERVICES MUST BE LOCATED PRIOR TO CUTTING/CORING. THIS REINFORCEMENT IS TO BE LOCATED BY A POSITIVE MEANS, (I.E. X-RAYING OR SCANNING OF SLAB).

- 5.5. AFTER REINFORCEMENT AND EMBEDDED SERVICES HAS BEEN LOCATED IN THESE AREAS, NOTIFY CONSULTANT WHO WILL REVIEW AND APPROVE OF LOCATION PRIOR TO CUTTING/CORING. MAKE ANY NECESSARY ADJUSTMENTS TO THE HOLE LOCATION AS DIRECTED BY THE CONSULTANT.
- 5.6. FOR ANY OPENINGS WHICH ARE TO BE SAWCUT INTO THE EXISTING STRUCTURE, PRE-DRILL THE CORNERS USING A 100 MM DIAMETER CORE DRILL. DO NOT OVERCUT CORNERS OF OPENING.
- 5.7. ALL PRICES FOR CUTTING/CORING ARE TO INCLUDE ANY COSTS ASSOCIATED WITH X-RAYING, SCANNING, ETC.
- 5.8. FOR ANY AREAS WHERE REINFORCEMENT IS CUT, THE CONTRACTOR SHALL INDICATE THE DIRECTION AND LAYER OF REINFORCEMENT ON THE AS-BUILT SLEEVING DRAWINGS.

F. QUALITY CONTROL

1. GENERAL
 - 1.1. IMPLEMENT A SYSTEM OF QUALITY CONTROL TO ENSURE THAT THE MINIMUM STANDARDS SPECIFIED HEREIN ARE ATTAINED.
 - 1.2. BRING TO THE ATTENTION OF THE CONSULTANT ANY DEFECTS IN THE WORK OR DEPARTURES FROM THE CONTRACT DOCUMENTS, WHICH MAY OCCUR DURING CONSTRUCTION. THE CONSULTANT WILL DECIDE UPON CORRECTIVE ACTION AND GIVE RECOMMENDATIONS IN WRITING.
 - 1.3. THE CONSULTANT'S GENERAL REVIEW DURING CONSTRUCTION AND INSPECTION AND TESTING BY INDEPENDENT INSPECTION AND TESTING AGENCIES REPORTING TO THE CONSULTANT ARE BOTH UNDERTAKEN TO INFORM THE OWNER/CLIENT OF THE CONTRACTOR'S PERFORMANCE AND SHALL IN NO WAY AUGMENT THE CONTRACTOR'S QUALITY CONTROL OR RELIEVE THE CONTRACTOR OF CONTRACTUAL RESPONSIBILITY.
2. NOTIFICATION
 - 2.1. PRIOR TO COMMENCING SIGNIFICANT SEGMENTS OF THE WORK, GIVE THE CONSULTANT AND INDEPENDENT INSPECTION AND TESTING COMPANIES APPROPRIATE NOTIFICATION (MINIMUM 24 HOURS) SO AS TO AFFORD THEM REASONABLE OPPORTUNITY TO REVIEW THE WORK. FAILURE TO MEET THIS REQUIREMENT MAY BE CAUSE FOR THE CONSULTANT TO CLASSIFY THE WORK AS DEFECTIVE.
3. INSPECTION AND TESTING
 - 3.1. AN INDEPENDENT INSPECTION AND TESTING COMPANY SHALL MAKE INSPECTIONS OR PERFORM TESTS AS THE CONSULTANT DIRECTS. THE INDEPENDENT INSPECTION AND TESTING COMPANIES SHALL BE RESPONSIBLE ONLY TO THE CONSULTANT AND SHALL MAKE ONLY SUCH INSPECTIONS OR TESTS AS THE CONSULTANT MAY DIRECT.
 - 3.2. THE FOLLOWING ITEMS REQUIRE TESTING AND/OR INSPECTION BY A CERTIFIED, INDEPENDENT INSPECTION AND TESTING COMPANY UNLESS OTHERWISE NOTED. THE TESTING FIRM SHALL SUBMIT COPIES OF ALL STRUCTURAL TESTING AND INSPECTION REPORTS TO THE CONSULTANT FOR REVIEW:

ITEM	REQUIRED	COMMENTS
STRUCTURAL STEEL ERECTION	YES	REVIEW MEMBER SIZE, PLUMBNESS, BOLTED CONNECTIONS, ETC.
STRUCTURAL STEEL WELDING	YES	VISUALLY INSPECT ALL FIELD WELDING

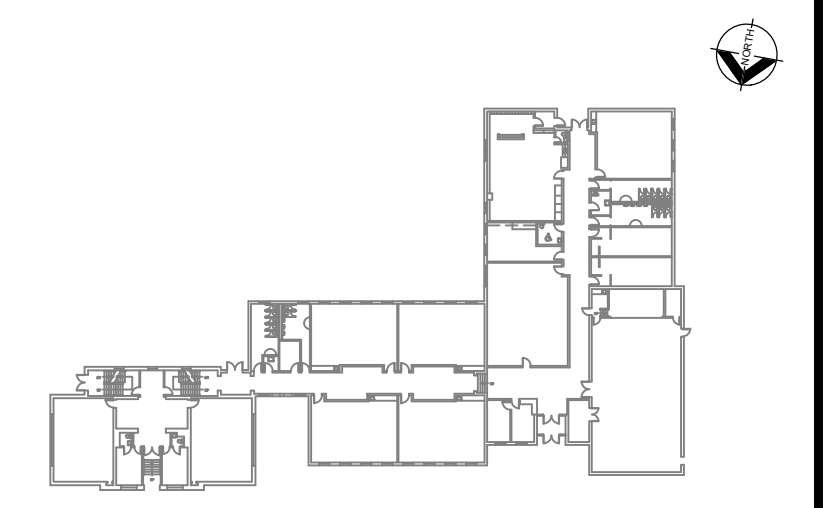
4. DEFECTIVE MATERIALS AND WORK
 - 4.1. WHERE EVIDENCE EXISTS THAT DEFECTIVE WORK HAS OCCURRED OR THAT WORK HAS BEEN CARRIED OUT INCORPORATING DEFECTIVE MATERIALS, THE CONSULTANT MAY HAVE TESTS, INSPECTIONS OR SURVEYS PERFORMED, ANALYTICAL CALCULATIONS OF STRUCTURAL STRENGTH MADE, AND THE LIKE, IN ORDER TO HELP DETERMINE WHETHER THE WORK MUST BE CORRECTED OR REPLACED. TESTS, INSPECTIONS OR SURVEYS OR CALCULATIONS CARRIED OUT UNDER THESE CIRCUMSTANCES WILL BE MADE AT THE CONTRACTOR'S EXPENSE, REGARDLESS OF THEIR RESULTS, WHICH MAY BE SUCH THAT, IN THE CONSULTANT'S OPINION, THE WORK MAY BE ACCEPTABLE.
 - 4.2. ALL TESTING SHALL BE CONDUCTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE 2012 BUILDING CODE (ONTARIO REGULATION 332/12, EXCEPT WHERE THIS WOULD, IN THE CONSULTANT'S OPINION, CAUSE UNDUE DELAY OR GIVE RESULTS NOT REPRESENTATIVE OF THE REJECTED MATERIAL IN PLACE. IN THIS CASE, THE TESTS SHALL BE CONDUCTED IN ACCORDANCE WITH THE STANDARDS GIVEN BY THE CONSULTANT.
 - 4.3. MATERIALS OR WORK, WHICH FAIL TO MEET SPECIFIED REQUIREMENTS, MAY BE REJECTED BY THE CONSULTANT WHENEVER FOUND AT ANY TIME PRIOR TO FINAL ACCEPTANCE OF THE WORK REGARDLESS OF PREVIOUS INSPECTION. IF REJECTED, DEFECTIVE MATERIALS OR WORK SHALL BE PROMPTLY REMOVED AND REPLACED OR REPAIRED TO THE SATISFACTION OF THE CONSULTANT, AT NO EXPENSE TO THE OWNER.

LIST OF STRUCTURAL DRAWINGS

SHEET NO.	SHEET TITLE
S101	GENERAL NOTES
S102	TYPICAL DETAILS
S201	PART ROOF FRAMING PLAN
S401	SECTIONS AND DETAILS

DESIGN AND DETAILS SHOWN ON THIS DRAWING OR ASSOCIATED DOCUMENTATION ARE PRODUCED BY AND THE PROPERTY OF DURHAM ENERGY SPECIALIST LTD. COPY IN WHOLE OR PART IS PROHIBITED. THE CONTRACTOR MUST CHECK AND BE RESPONSIBLE FOR SITE CONDITIONS THAT NOVEMBER DIFFER FROM THESE PLANS AND NOTIFY DURHAM ENERGY SPECIALIST LTD. OF SAME.

ISSUES/REVISIONS		
No.	DESCRIPTION	DATE
1	ISSUED FOR COORDINATION	FEB 11, 2022
2	ISSUED FOR PERMIT AND TENDER	FEB 15, 2022



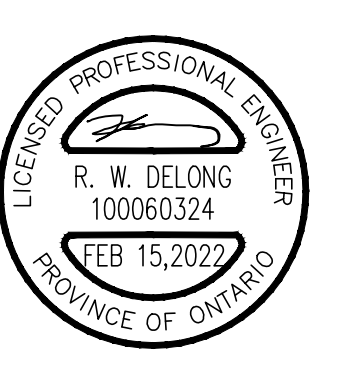
KEY PLAN

ADDITIONAL MEASURES TO SUIT COVID-19
ANY OPERATING COSTS OR OTHER COSTS RELATED TO COVID-19 SHALL BE A PART OF YOUR TENDERED PRICE (AS PART OF YOUR GENERAL CONDITIONS AND OVERHEAD)

engineeringlink
building envelope & structure

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Project No. 22-1752

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DURHAM DISTRICT SCHOOL BOARD

CLAREMONT PS VENTILATION UPGRADES

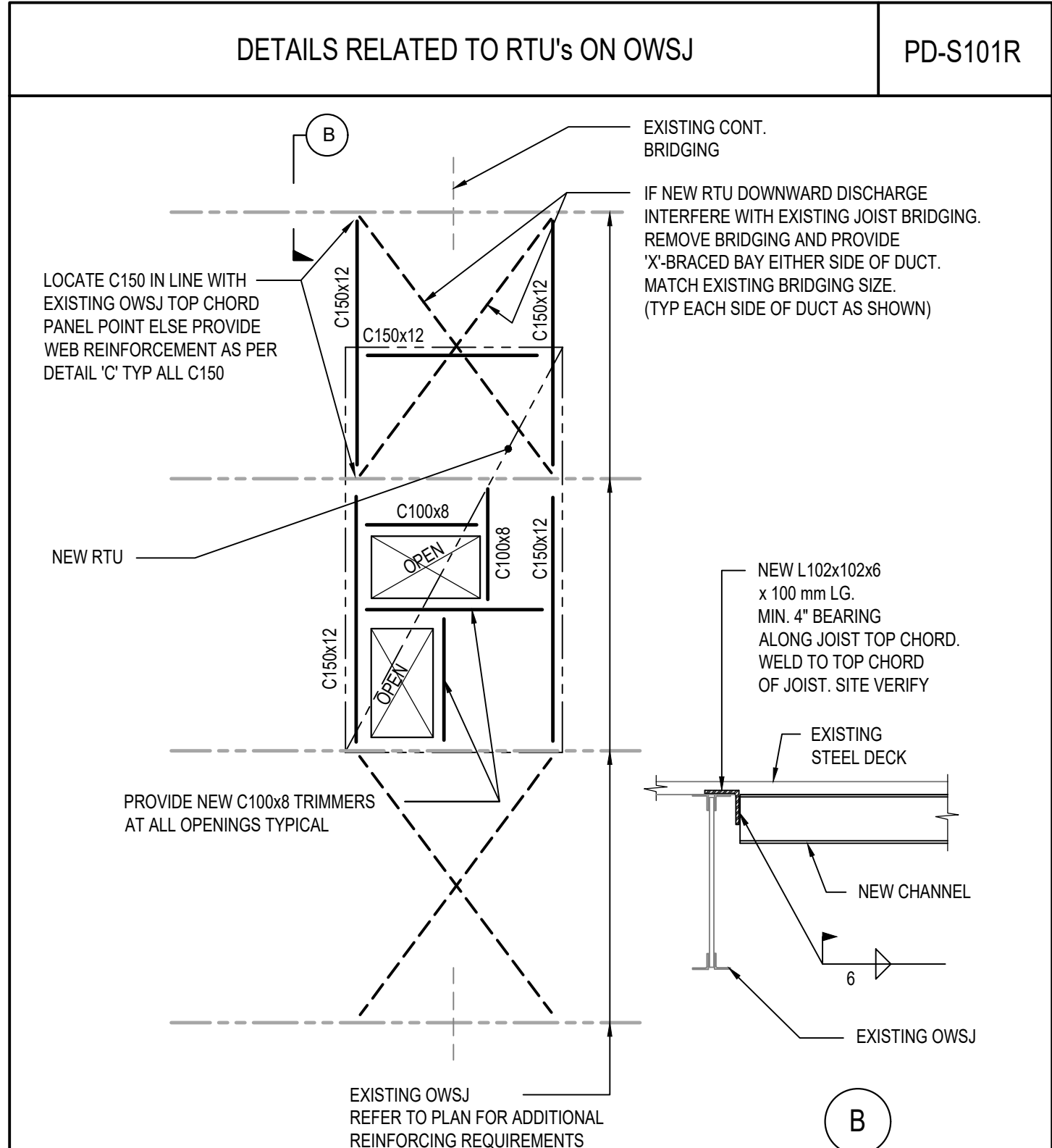
1675 CENTRAL STREET
CLAREMONT, ONTARIO

DATE: FEBRUARY 2022	SCALE: N/A
DRAWN BY: JRP	CHECKED BY: RAD/MH
DES PROJECT NUMBER: 22-549	SHEET SIZE: D

GENERAL NOTES

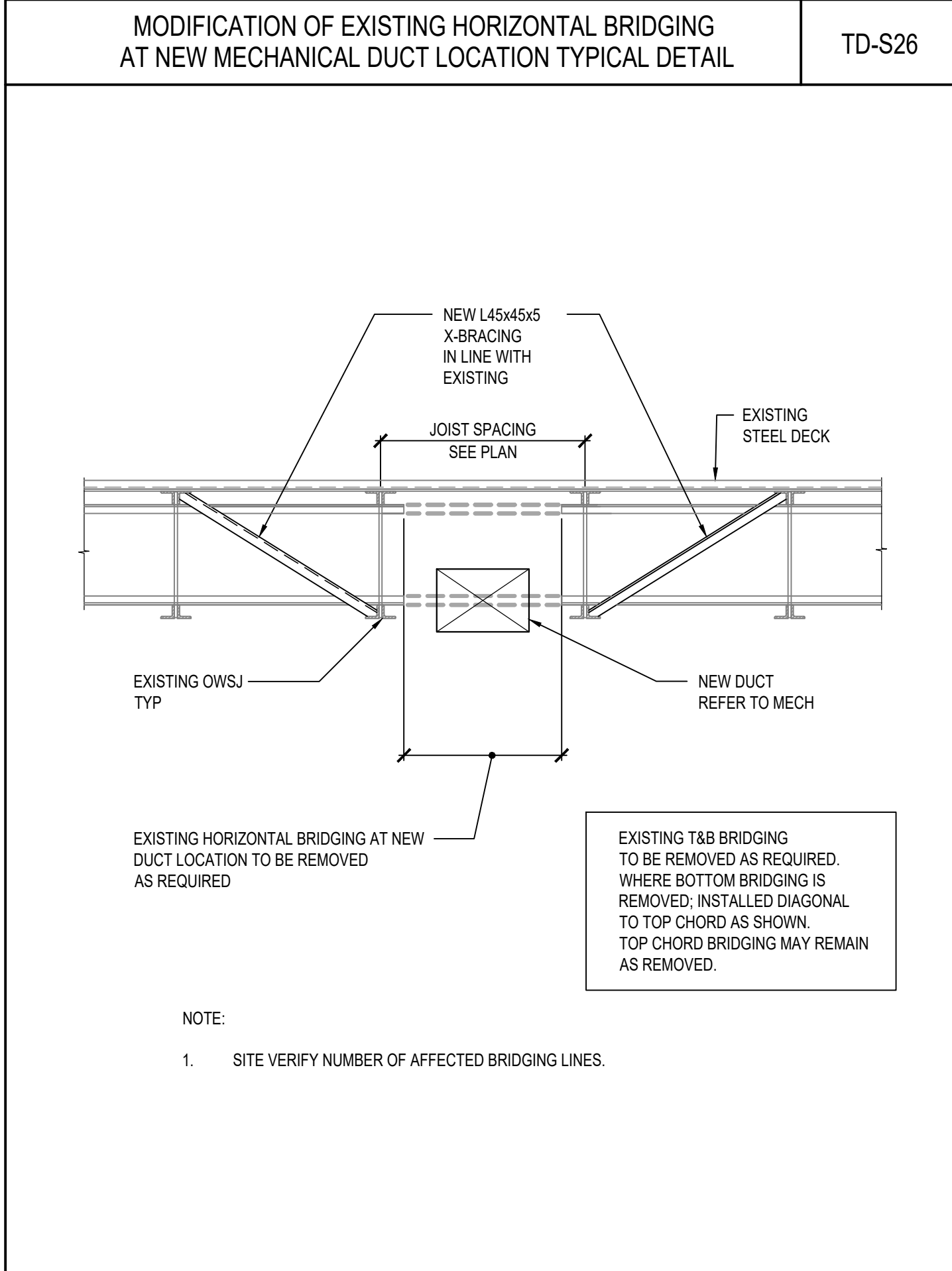
S101

STRUCTURAL ABBREVIATIONS		TD-G01	
A BOLT	ANCHOR BOLT	E-W	EAST WEST
ADJ	ADJUSTABLE	EW	EACH WAY
AESS	ARCHITECTURAL EXPOSED	EXT	EXTERIOR
AF	ABOVE FINISHED FLOOR	fc	28 DAYS CONCRETE COMPRESSIVE STRENGTH
AFB	ASPHALT IMPREGNATED FIBREBOARD	FDN	FOUNDATION
ALT	ALTERNATE	FF	FAR FACE
ARCH	ARCHITECTURAL	FIN	FINISHED
ASL	ADDITIONAL ACCUMULATED SNOW LOAD	FL	FLOOR
@	AT	FTG	FOOTING
B, BOTT	BOTTOM	Fy	YIELD STRENGTH
B/B	BACK TO BACK	GA	GAUGE
BEW	BOTTOM EACH WAY	GALV	GALVANIZED
BH	BORHOLE	GEN	GENERAL
BLL	BOTTOM LOWER LAYER	HF	HORIZONTAL EACH FACE
BLDG	BUILDING	HH	HORIZONTAL FORCE (FACTORED)
BM	BEAM	HH	HOOK EACH END
BPL	BEARING/BASE PLATE	HIF	HORIZONTAL INSIDE FACE
BRDG	BRIDGING	HOF	HORIZONTAL OUTSIDE FACE
BUL	BOTTOM UPPER LAYER	H. HORZ	HORIZONTAL
c	CAMBER	HSC	HORIZONTALLY SLOTTED CONNECTION
C	EPOXY COATED	HSS	HOLLOW STEEL SECTION
cc, c/c	CENTRE TO CENTRE	IF	INSIDE FACE
CA	COLUMN ABOVE	IN	INCHES
CB	COLUMN BELOW	INT	INTERIOR
CANT	CANTILEVER	JT	JOINT
CT	COMPRESSIVE FORCE (FACTORED)	K	KIP, 1000 LBS
CJ	CONTROL JOINT	KIP-FEET	KIP FEET
CL	CLEAR	kg	KILOGRAM(S)
CL, &	CENTRELINE	KLF	KIPS PER LINEAR FOOT
COL	COLUMN	kN	KILONEWTON
COMP	COMPOSITE	kN-m	KILONEWTON METRE
CONC	CONCRETE	kN/m	KILONEWTON PER METRE
CONT	CONTINUOUS	kPa	KILOPASCAL
CW	COMPLETE WITH	KSF	KIPS PER SQUARED FOOT
DEMO	DEMOLITION	KSI	KIPS PER SQUARED INCH
DET	DETAIL	L	LEFT END
DIAM, Ø	DIAMETER	LE	LONG
DIAG	DIAGONAL	LL	LIVE LOAD, LOWER LAYER
DIM	DIMENSION	LLH	LONG LEG HORIZONTAL
DL	DEAD LOAD	LLV	LONG LEG VERTICAL
DP	DEEP	m	METRE
DWG(S)	DRAWING(S)	MC	MOMENT CONNECTION (FULL MOMENT UNLESS NOTED)
DWL(S)	DOWEL(S)	MECH	MECHANICAL
DN	DOWN	ML	MOMENT (FACTORED)
EA	EACH	MM	MIDDLE LAYER
EE	EACH END	mm	MILLIMETRE
EF	EACH FACE	Mpa	MEGAPASCAL
ELEC	ELECTRICAL	Mxf	BENDING MOMENT
EL	ELEVATION	Myf	BENDING MOMENT ABOUT yy AXIS (FACTORED)
ELEV	ELEVATOR	NF	NEAR FACE
EMBED	EMBEDMENT	NIC	NOT IN CONTRACT
EQ	EQUAL	N-S	NORTH-SOUTH
ES	EACH SIDE	NTS	NOT TO SCALE
EX, EXIST	EXISTING	OF	OUTSIDE FACE
EJ, EXP JT	EXPANSION JOINT	OPEN	OPENING
		OWSJ	OPEN WEB STEEL JOIST
		PI	PI AXIAL FORCE (FACTORED)
		PC	PRECAST
		PL	PLATE
		PLF	POUNDS PER LINEAR FOOT
		PROJ	PROJECTION
		PSF	POUNDS PER SQUARE FOOT
		PT	PRESSURE TREATED
		RD	ROOF DRAIN
		RF	REACTION (FACTORED)
		RAD	RADIUS
		REIN	REINFORCED, REINFORCEMENT
		REF	REFERENCE
		RE	RIGHT END
		REQD	REQUIRED
		REV	REVISION, REVISED
		RW	REINFORCED WITH
		SDF	STEP DOWN FOOTING
		SECT	SECTION
		SIM	SIMILAR
		SL	SLAB
		SOG	SLAB ON GRADE
		SPDD	STANDARD PROCTOR DRY DENSITY
		ST	STRAIGHT
		STIFF	STIFFENER
		STR	STIRRUP
		STRUCT	STRUCTURAL
		STD	STANDARD
		SQ	SQUARE
		T	TOP
		TI	TENSILE FORCE (FACTORED)
		TEMP	TEMPORARY, TEMPERATURE
		TEW	TOP EACH WAY
		TJ	TIE JOIST
		TLL	TOP LOWER LAYER
		TML	TORSIONAL MOMENT (FACTORED)
		TOD	TOP OF DECK
		TOS	TOP OF STEEL/SLAB
		TRANS	TRANSVERSE
		TUL	TOP UPPER LAYER
		TYP	TYPICAL
		UL	UPPER LAYER
		UN	UNLESS NOTED OTHERWISE
		UIS	UNDERSIDE
		V, VERT	VERTICAL
		V, VERT	VERTICAL SHEAR FORCE (FACTORED)
		VBF	VERTICAL BRACED FRAME
		VEF	VERTICAL EACH FACE
		VIF	VERTICAL INSIDE FACE
		VOF	VERTICAL OUTSIDE FACE
		VSC	VERTICALLY SLOTTED CONNECTION
		W	WIDE FLANGE BEAM
		WT	WEIGHT, STRUCTURAL TEE
		WWF	WELDED WIRE FABRIC OR WELDED WIDE FLANGE
		W.P.	WORKING POINT

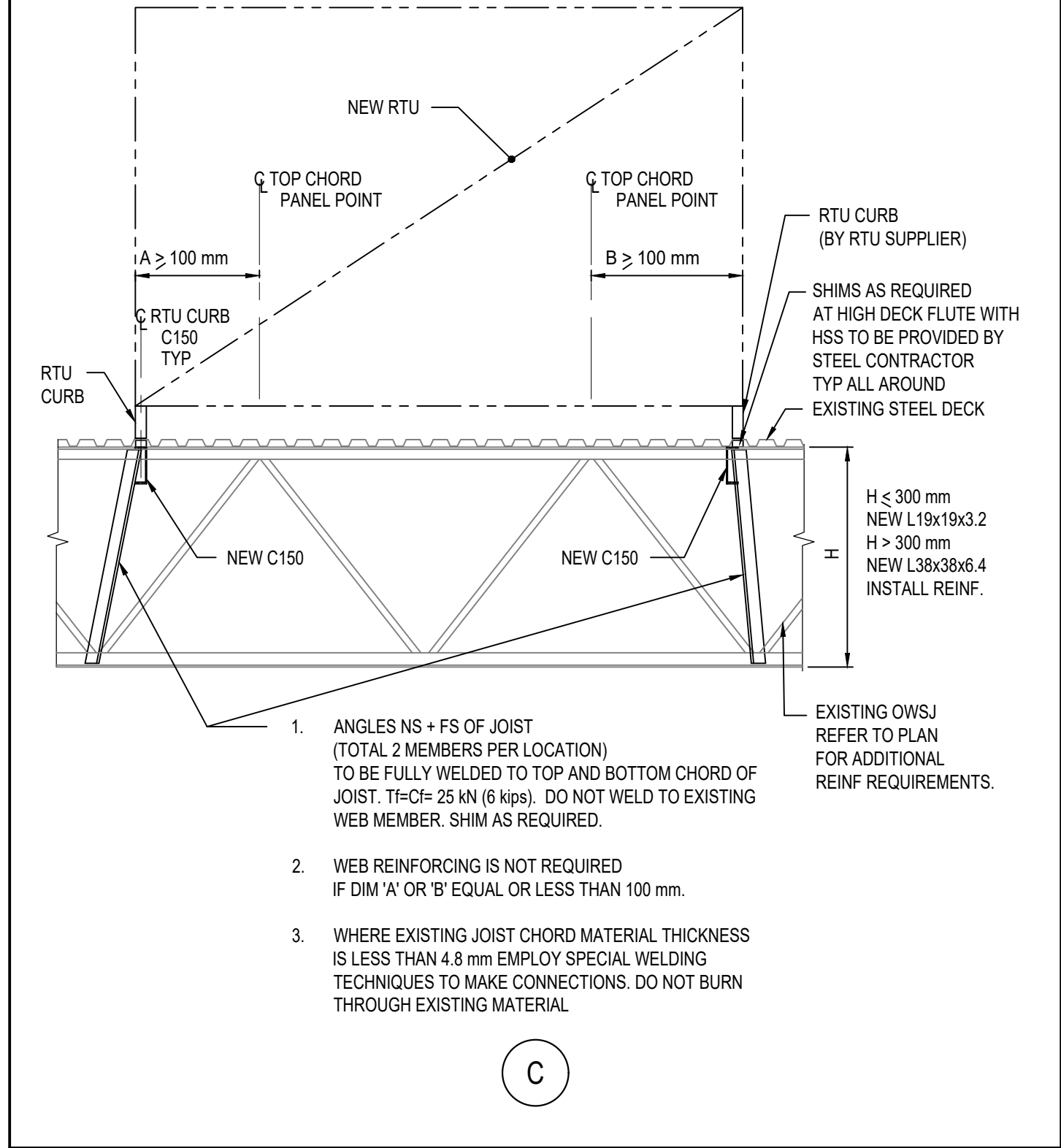


A TYPICAL RTU FRAMING PLAN

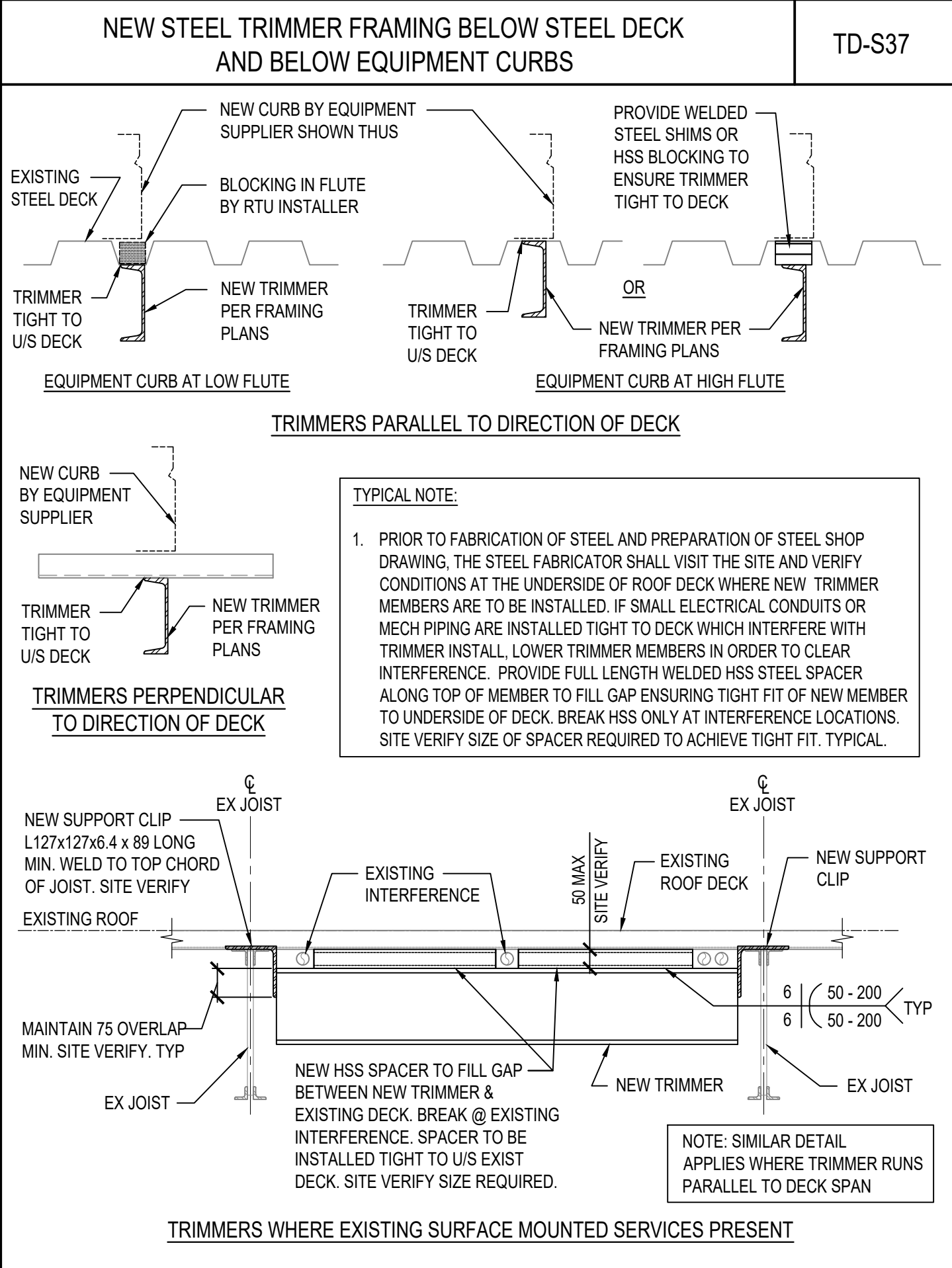
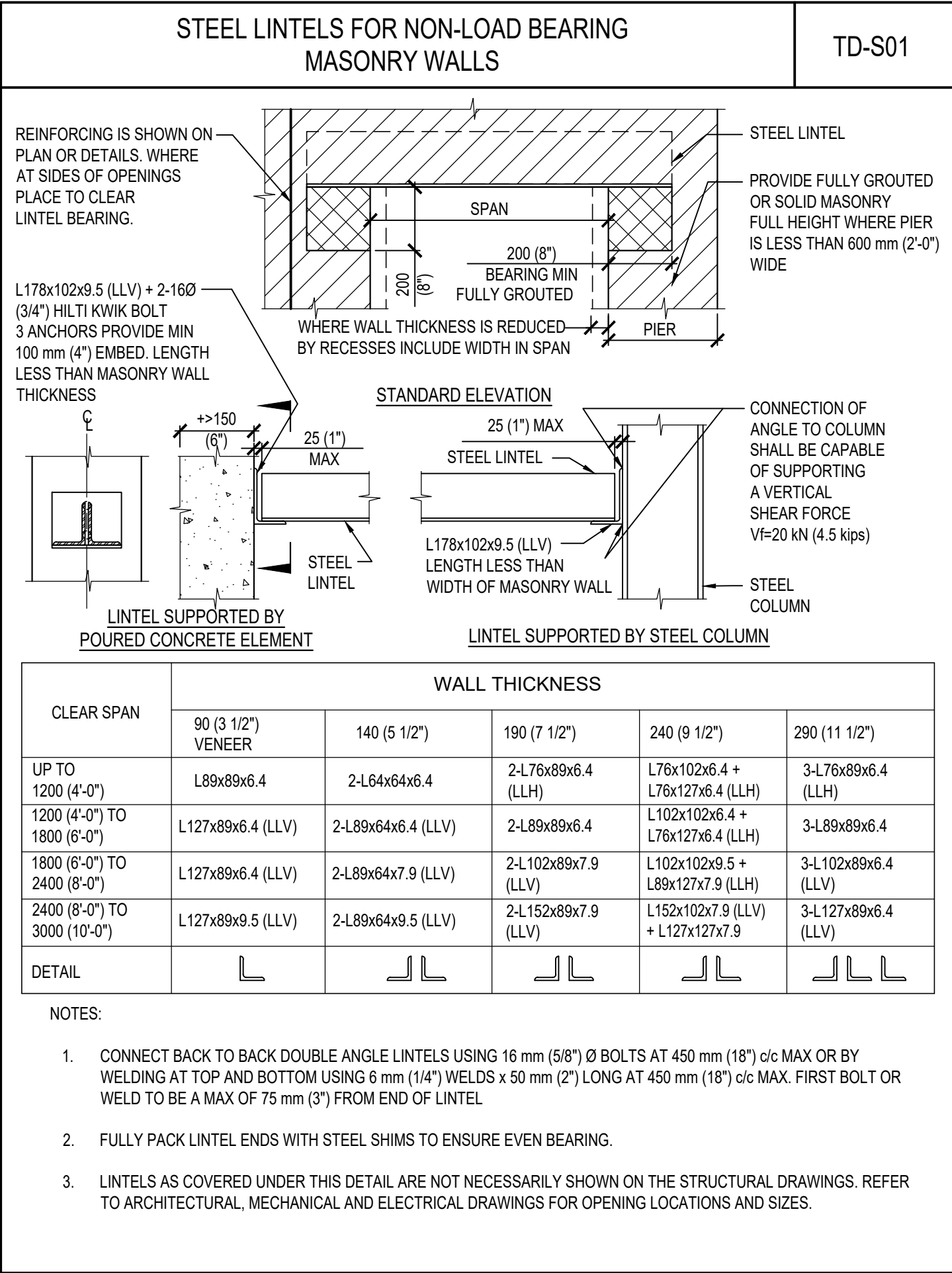
- NOTES:
- CENTRE ALL NEW C150x12 DIRECTLY BELOW UNDERSIDE OF RTU CURB. LOCATE TIGHT TO UNDERSIDE OF ROOF DECK. IF C150 LOCATED BELOW HIGH DECK FLUTE PROVIDE STEEL SHIMS OR FULLY DRY PACK TIGHT TO FILL GAP AS PER DETAIL 'C'. SITE VERIFY REQUIREMENT.
 - REFER TO PLAN FOR ADDITIONAL REINFORCING REQUIREMENTS.
 - CONNECT RTU TO CURB AND CURB TO BASE STRUCTURE AS PER MANUFACTURER'S SPECIFICATIONS.
 - REFER TO RTU SHOP DWGS FOR ROOF OPENING REQUIREMENTS.



- NOTE:
- SITE VERIFY NUMBER OF AFFECTED BRIDGING LINES.



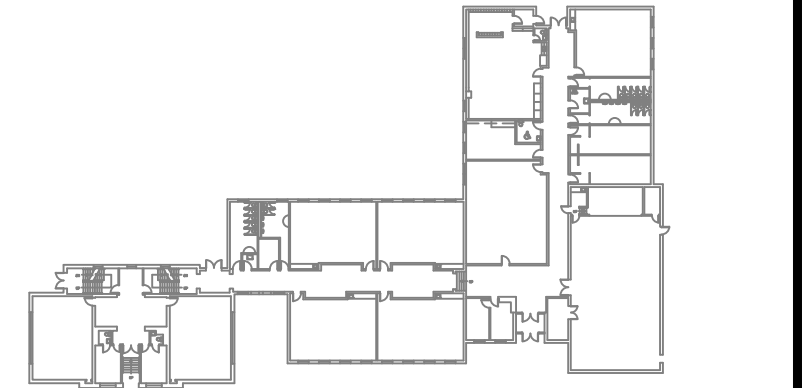
- ANGLES NS + FS OF JOIST (TOTAL 2 MEMBERS PER LOCATION) TO BE FULLY WELDED TO TOP AND BOTTOM CHORD OF JOIST. T_f-C_f= 25 kN (6 kips). DO NOT WELD TO EXISTING WEB MEMBER. SHIM AS REQUIRED.
- WEB REINFORCING IS NOT REQUIRED IF DIM 'A' OR 'B' EQUAL OR LESS THAN 100 mm.
- WHERE EXISTING JOIST CHORD MATERIAL THICKNESS IS LESS THAN 4.8 mm EMPLOY SPECIAL WELDING TECHNIQUES TO MAKE CONNECTIONS. DO NOT BURN THROUGH EXISTING MATERIAL.



- TYPICAL NOTE:
- PRIOR TO FABRICATION OF STEEL AND PREPARATION OF STEEL SHOP DRAWING, THE STEEL FABRICATOR SHALL VISIT THE SITE AND VERIFY CONDITIONS AT THE UNDERSIDE OF ROOF DECK WHERE NEW TRIMMER MEMBERS ARE TO BE INSTALLED. IF SMALL ELECTRICAL CONDUITS OR MECH PIPING ARE INSTALLED TIGHT TO DECK WHICH INTERFERE WITH TRIMMER INSTALL, LOWER TRIMMER MEMBERS IN ORDER TO CLEAR INTERFERENCE. PROVIDE FULL LENGTH WELDED HSS STEEL SPACER ALONG TOP OF MEMBER TO FILL GAP ENSURING TIGHT FIT OF NEW MEMBER TO UNDERSIDE OF DECK. BREAK HSS ONLY AT INTERFERENCE LOCATIONS. SITE VERIFY SIZE OF SPACER REQUIRED TO ACHIEVE TIGHT FIT. TYPICAL.

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No.	DESCRIPTION	DATE
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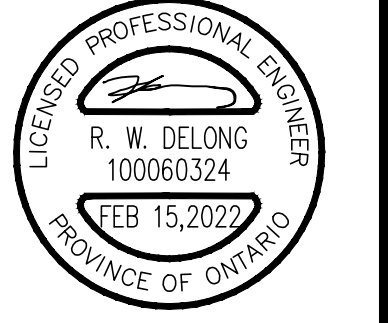


KEY PLAN

ADDITIONAL MEASURES TO SUIT COVID-19 ANY OPERATING COSTS OR OTHER COSTS RELATED TO COVID-19 SHALL BE A PART OF YOUR TENDERED PRICE (AS PART OF YOUR GENERAL CONDITIONS AND OVERHEAD)

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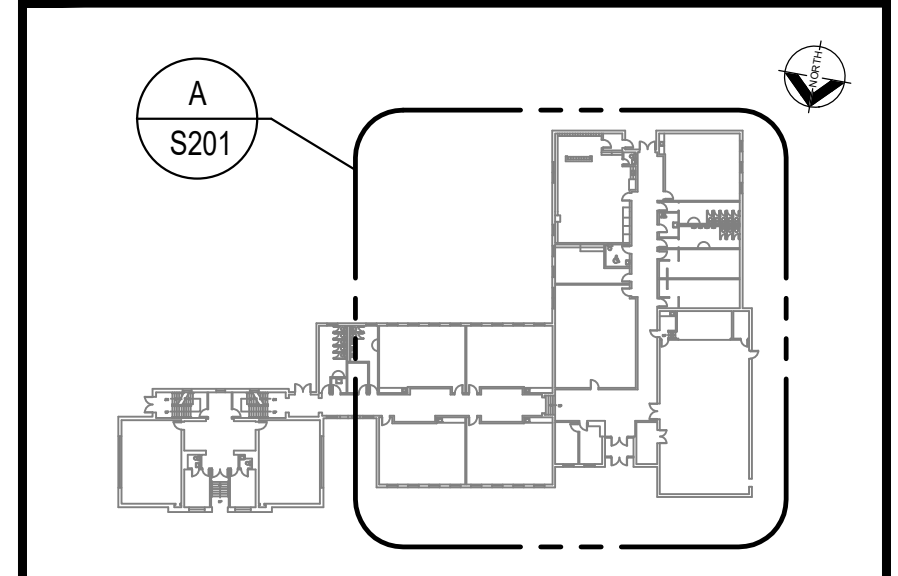
DURHAM DISTRICT SCHOOL BOARD
CLAREMONT PS
VENTILATION UPGRADES
1675 CENTRAL STREET
CLAREMONT, ONTARIO

DATE:	FEBRUARY 2022	SCALE:	NTS
DRAWN BY:	JRP	CHECKED BY:	RAD/MH
DES. PROJECT NUMBER:	22-549	SHEET SIZE:	D

TYPICAL DETAILS

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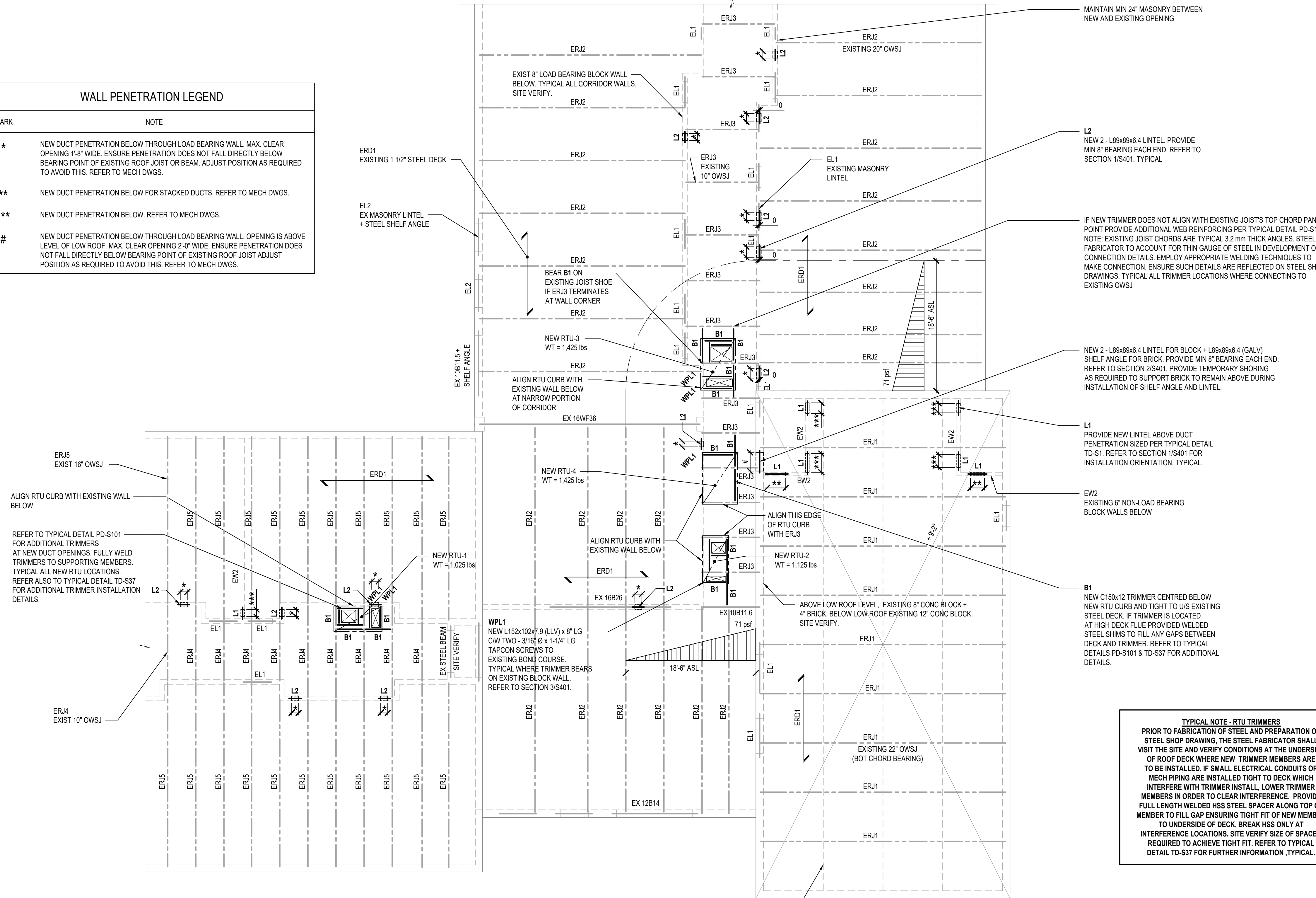
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WALL PENETRATION LEGEND	
MARK	NOTE
*	NEW DUCT PENETRATION BELOW THROUGH LOAD BEARING WALL. MAX. CLEAR OPENING 1'-8" WIDE. ENSURE PENETRATION DOES NOT FALL DIRECTLY BELOW BEARING POINT OF EXISTING ROOF JOIST OR BEAM. ADJUST POSITION AS REQUIRED TO AVOID THIS. REFER TO MECH DWGS.
**	NEW DUCT PENETRATION BELOW FOR STACKED DUCTS. REFER TO MECH DWGS.
***	NEW DUCT PENETRATION BELOW. REFER TO MECH DWGS.
#	NEW DUCT PENETRATION BELOW THROUGH LOAD BEARING WALL. OPENING IS ABOVE LEVEL OF LOW ROOF. MAX. CLEAR OPENING 2'-0" WIDE. ENSURE PENETRATION DOES NOT FALL DIRECTLY BELOW BEARING POINT OF EXISTING ROOF JOIST ADJUST POSITION AS REQUIRED TO AVOID THIS. REFER TO MECH DWGS.



A
S201
PART ROOF FRAMING PLAN
 1/8"=1'-0"

- NOTES:
- UNDERSIDE OF EXISTING ROOF DECK IS 0'-0" BELOW ROOF HIGH POINT DATUM ELEVATION +11'-6". EXCEPT AS CROSSED AND NOTED ON PLAN, AREAS CROSSED AND NOTED TO BE READ FROM ELEVATION +11'-6". PRIOR TO THE START OF CONSTRUCTION SHALL VERIFY THE EXISTING ELEVATION.
 - TOP OF EXISTING STEEL IS 0'-0" BELOW UNDERSIDE OF ROOF DECK UNLESS SHOWN THUS ON PLAN WHERE ELEVATIONS NOTED ON STEEL BEAMS ARE REFERENCED TO UNDERSIDE OF ROOF DECK.
 - EXISTING STRUCTURE HAS BEEN CHECKED FOR NEW LOADS IMPOSED BY THE PROPOSED RTU AND WAS FOUND TO HAVE SUFFICIENT CAPACITY TO SUPPORT THIS LOAD WITHOUT REINFORCING, EXCEPT WHERE SHOWN OTHERWISE ON PLAN.
 - SNOW LOADS ARE AS FOLLOWS

PICKERING (ZONE 3)	40 psf + ASL
--------------------	--------------
 - SUPER IMPOSED DEAD LOADS ARE AS FOLLOWS, UNLESS NOTED OTHERWISE ON PLAN

ROOFING	10 psf
SUSPENDED CEILING AND MECHANICAL	10 psf
 - STEEL BEAM CONNECTIONS ARE TO BE DESIGNED FOR THE FACTORED FORCES INDICATED ON PLAN. WHERE NO FORCE IS INDICATED, DESIGN STEEL CONNECTIONS FOR A FACTORED VERTICAL FORCE OF 18 kips. PROVIDE MINIMUM 2 BOLTS AT ALL CONNECTIONS.
 - BASED ON RTU DIMENSIONS AND USE OF FIGURE G9 FROM THE "USERS GUIDE - NBCC 2015 STRUCTURAL COMMENTARIES (PART 4 OF DIVISION B)" AND CLAUSE 4.1.8.7 (3) OF ONTARIO REGULATION 88/19, NO SNOW ACCUMULATION IS DIRECTLY CAUSED BY THE NEW UNIT.
 - CONNECT THE RTU TO ITS ROOF CURB AND THE ROOF CURB TO THE STRUCTURE PER MANUFACTURER'S REQUIREMENTS.
 - EXISTING BRIDGING AND BRACING WHICH INTERFERES WITH NEW STRUCTURAL TO BE REMOVED AND REINSTATED AFTER INSTALLATION OF NEW STRUCTURAL IS COMPLETE. THE CONTRACTOR SHALL INCLUDE NOTED WORK INTO PRICE. REFER TO TYPICAL DETAIL TD-S26 FOR NEW BRIDGING AND REPLACEMENT OF BRIDGING.
 - AS EXISTING ROOF JOIST CHORDS HAVE THICKNESS OF LESS THAN 4.8 mm CONTRACTOR MUST IMPLEMENT SPECIAL WELDING PROCEDURES AS NECESSARY TO WELD "THIN" MEMBERS WITHOUT DAMAGING EXISTING. REFLECT DETAILS ON SHOP DRAWING. ONLY A WELDER QUALIFIED TO PERFORM THIS WORK MAY COMPLETE WELDS. USE APPROPRIATE WELDING EQUIPMENT & MATERIALS TO ACHIEVE 3.0 mm WELD.
 - ALL FIELD WELDS MUST BE REVIEWED BY AN INDEPENDENT INSPECTION & TESTING COMPANY. SUBMIT COPIES OF ALL TESTING REPORTS TO THE CONSULTANT.
 - ALL FIELD WELDING TO BE PERFORMED OUTSIDE OF REGULAR SCHOOL HOURS.

TYPICAL NOTE - RTU TRIMMERS
 PRIOR TO FABRICATION OF STEEL AND PREPARATION OF STEEL SHOP DRAWING, THE STEEL FABRICATOR SHALL VISIT THE SITE AND VERIFY CONDITIONS AT THE UNDERSIDE OF ROOF DECK WHERE NEW TRIMMER MEMBERS ARE TO BE INSTALLED. IF SMALL ELECTRICAL CONDUITS OR MECH PIPING ARE INSTALLED TIGHT TO DECK WHICH INTERFERE WITH TRIMMER INSTALL, LOWER TRIMMER MEMBERS IN ORDER TO CLEAR INTERFERENCE. PROVIDE FULL LENGTH WELDED HSS STEEL SPACER ALONG TOP OF MEMBER TO FILL GAP ENSURING TIGHT FIT OF NEW MEMBER TO UNDERSIDE OF DECK. BREAK HSS ONLY AT INTERFERENCE LOCATIONS. SITE VERIFY SIZE OF SPACER REQUIRED TO ACHIEVE TIGHT FIT. REFER TO TYPICAL DETAIL TD-S37 FOR FURTHER INFORMATION, TYPICAL.

DURHAM DISTRICT SCHOOL BOARD

CLAREMONT PS VENTILATION UPGRADES

1675 CENTRAL STREET
 CLAREMONT, ONTARIO

DATE: FEBRUARY 2022 SCALE: AS NOTED
 DRAWN BY: JRP CHECKED BY: RAD/MH
 DES PROJECT NUMBER: 22-549 SHEET SIZE: D

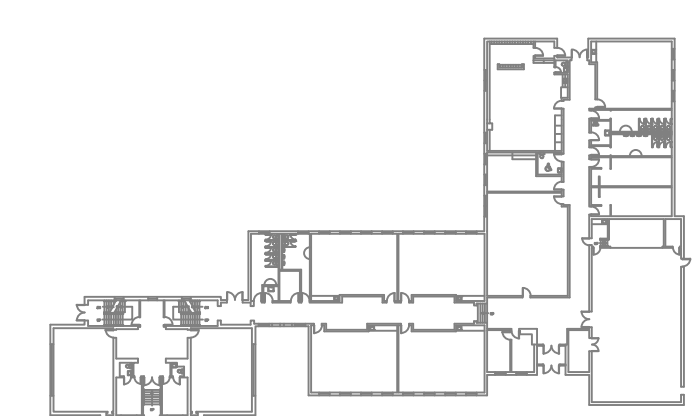
PART ROOF FRAMING PLAN

S201

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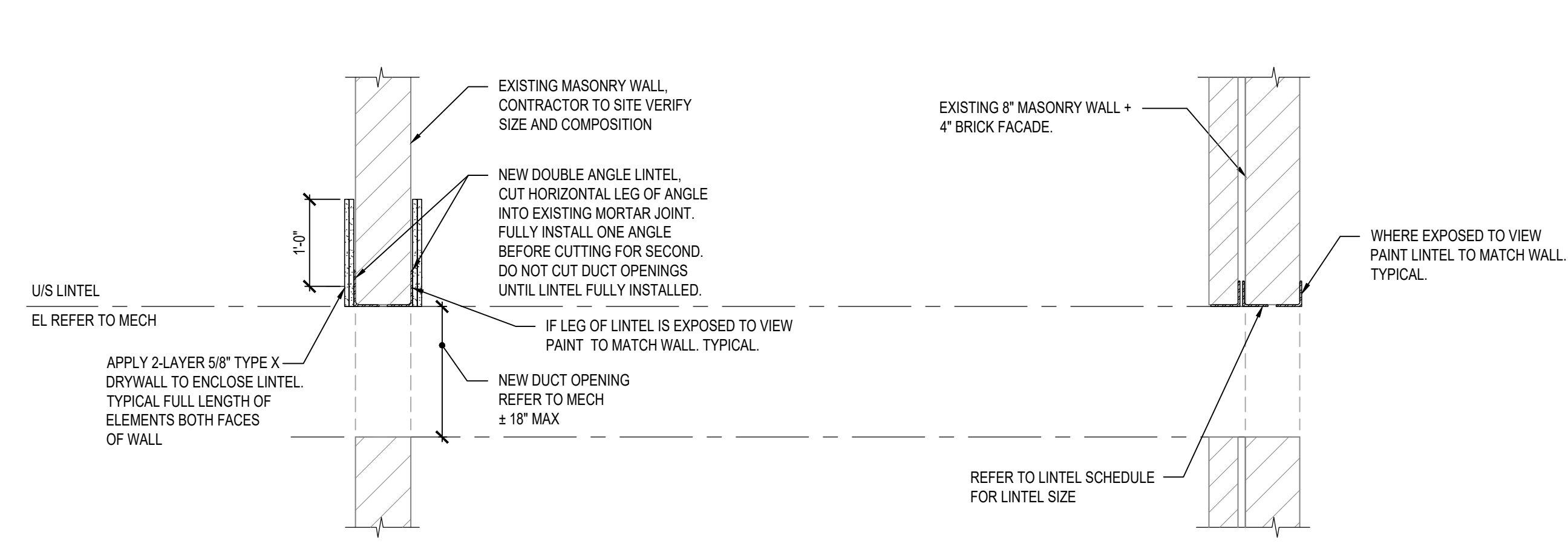
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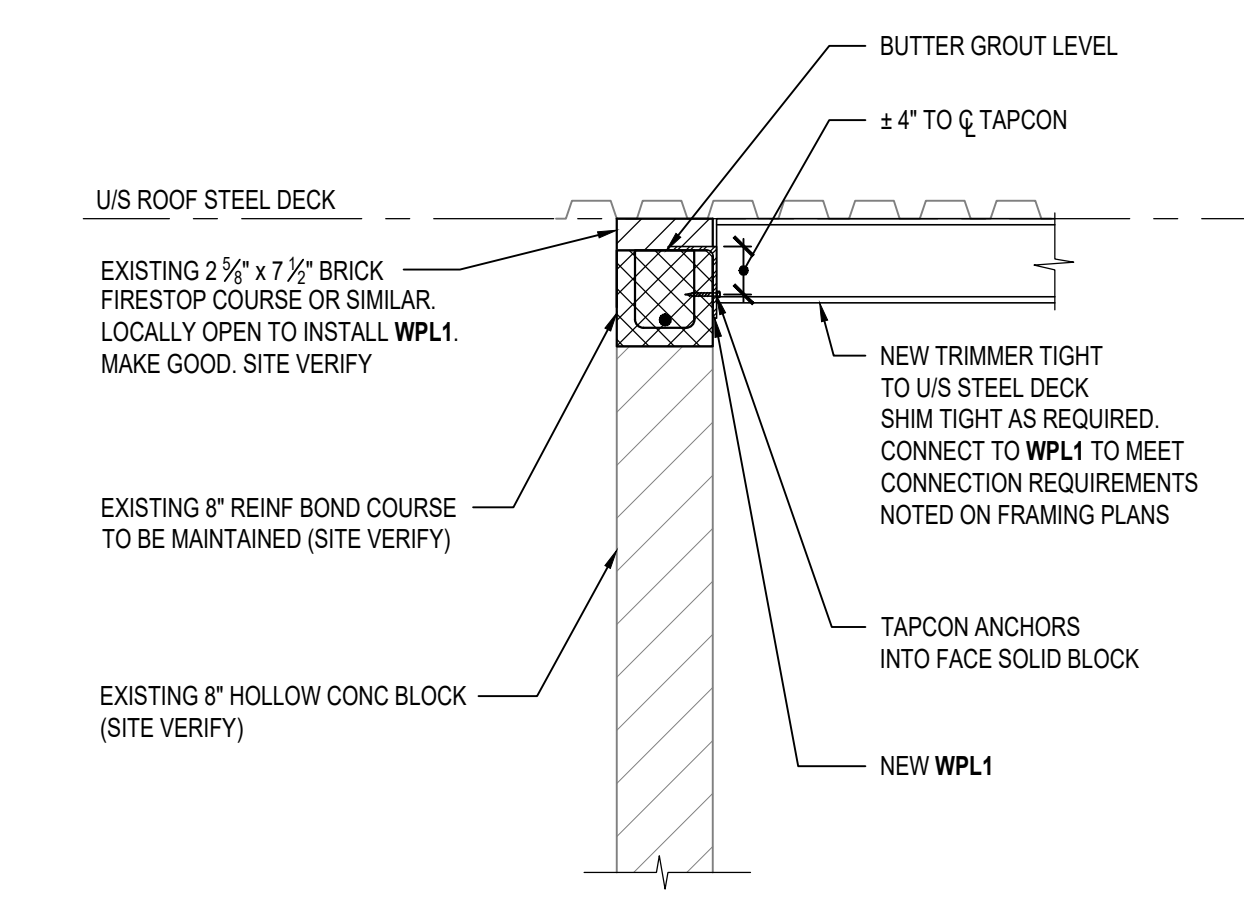
SECTIONS AND DETAILS

S401



1 SECTION - TYPICAL L2 LINTEL (L1 SIMILAR)
 S401 3/4"=1'-0"

2 LINTEL THROUGH FAN ROOM / GYM WALL
 S401 3/4"=1'-0"



3 TYPICAL SECTION WPL1
 S401 3/4"=1'-0"