



**Request for Tender
RFT 21-257**

**Interior Renovations
at Joseph Gibbons Public School**

Closing Date: August 18, 2021

Closing Time: 2:00 p.m.

Sealed RFTs will be received **via email to chatelaina@hdsb.ca**
on or before 2:00 p.m., Eastern Daylight Time

Late or Facsimile Bids will not be considered

July 29, 2021

Amanda Chatelain, CPPB
Senior Officer – Purchasing

Communications Notice

To obtain documents online please visit: <https://hdsb.bidsandtenders.ca>

If you subscribe to bids & tenders you can login to your account to download the document(s) without the preview watermark. You may also opt to purchase a one-time download for this opportunity. Documents are not provided in any other manner.

All proponents shall be registered as a Plan Taker for this opportunity, which will enable the proponent to download the Request for Proposal (RFP) without the watermark preview, to receive addenda email notifications, and to download addenda.

Should the HDSB receive a proposal that is subsequently found to be from a bidder that is not registered with bids & tenders and the bidder did not obtain the proposal document from <https://hdsb.bidsandtenders.ca> the HDSB reserves the right to remove the proposal from further consideration.

To ensure receipt of the latest information and updates via email regarding this opportunity, the onus is on the proponent to register as a Plan Taker for this opportunity at <https://hdsb.bidsandtenders.ca>.

The following documents form part of all HDSB competitive proposal documents:

HDSB Procurement Administrative Procedure:

<https://www.hdsb.ca/our-board/Policy/Procurement.pdf>

HDSB Asbestos Management in Facilities Administrative Procedure:

<https://www.hdsb.ca/our-board/Policy/AsbestosManagementInFacilities.pdf>

HDSB Vendor Performance Management Administrative Procedure:

<https://www.hdsb.ca/our-board/Policy/VendorPerformanceManagement.pdf>

Broader Public Sector Procurement Directive

[https://www.doingbusiness.mgs.gov.on.ca/mbs/psb/psb.nsf/Attachments/001-BPS_Procurement_Directive/\\$FILE/BPS_Procurement_Directive.pdf](https://www.doingbusiness.mgs.gov.on.ca/mbs/psb/psb.nsf/Attachments/001-BPS_Procurement_Directive/$FILE/BPS_Procurement_Directive.pdf)

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Part A – Outline and Instructions

1. Introduction and Board Profile

The Halton District School Board is composed of approximately 104 school locations (86 elementary and 18 secondary schools). These locations service approximately 64,300 regular day school students (Junior Kindergarten to Grade 12). The Board employs approximately 6,600 employees. Please visit our website <http://www.hdsb.ca> for additional information.

2. General Terms of the RFT

The Halton District School Board, hereinafter referred to as HDSB, is seeking qualified Contractors to complete Interior Renovations at Joseph Gibbons Public School located at 41 Moore Park Crescent, Georgetown, ON L7G 2T3, in accordance with the drawings and specifications provided. Specific details of the RFT are to be found in the attached Scope of Work.

3. Bid Security and Bonding Requirements

Any bid submission equal to or greater than \$500,000, must be submitted with a Bid Bond in the value of ten percent (10%) of the Total Cost and a Surety Consent in favour of the Halton District School Board. The Surety Consent shall cover a Performance Bond and a Labour & Materials Payment bond, each in the amount of fifty percent (50%) of the contract price as a guarantee that the Bidder shall execute the contract upon award.

The Bid Security so submitted shall be irrevocable and valid for 90 from closing date set for the submission of tender.

In order to be considered for award of a contract equal to or over \$500,000, the Bidder shall submit as part of their Submission, a Surety Consent, completed by a Bonding Company. Any others will not be accepted.

Upon receipt of written notice from the Halton District School Board that it has been awarded the Contract, the successful Bidder shall provide, within five (5) working days of such notice, an original Performance Bond and a Labour and Material Payment Bond, each for the amount of fifty per cent (50%) of the total lump sum price, to guarantee the performance of all obligations of the Contract.

4. RFT Closing Information

Bidders must submit their Submission **via email** on or before 2:00 p.m., Eastern Daylight Time on **August 18, 2021** (the “Closing Time”) to the following address:

chatelaina@hdsb.ca
Attention: Amanda Chatelain

Submissions will be deemed to be officially received by the time stamp issued by the HDSB's email server. Submissions received after the official closing time will be declared non-compliant and shall not be considered during the selection process. Electronic submission shall be no larger than 25MB. Proponents are responsible for confirming that their submission has been successfully received.

5. Accuracy of Information/Liability for Errors or Omissions

While the HDSB has used considerable efforts to ensure an accurate representation of information in this document, the information contained in it is supplied solely as a guideline for Bidders. Any data contained in this RFT or provided by way of Addenda are estimates only and are for the sole purpose of indicating to the Bidder the general size of what is being requested hereunder. The information is not guaranteed or warranted to be accurate by the HDSB, nor is it necessarily comprehensive or exhaustive. Nothing in this document is intended to relieve Bidders from forming their own opinions and conclusions with respect to the matters addressed in this RFT. It is the Bidder's responsibility to avail itself of all the necessary information to prepare a Submission in response to this RFT.

6. Communication After RFT Issuance

All Communications regarding any aspect of this RFT must be submitted via Bids and Tenders.

Bidders that fail to comply with the requirement to direct all communications to the RFT Authority via Bids and Tenders may be disqualified from this RFT 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 RFT:

- any employee or agent of the HDSB, other than the RFT Purchasing contact;
- any member of the HDSB governing body including, without limitation, the director, officers, trustees, superintendents, and any advisors thereto;

Bidders shall promptly examine this RFT and all Appendices, including the Form of Tender, and:

- shall report any errors, omissions or ambiguities; and
- may direct questions or seek additional information on or before the Deadline for Questions to the RFT Purchasing contact.

It is the responsibility of the Bidder to seek clarification, by submitting questions to the RFT Authority via Bids and Tenders, on any matter it considers to be unclear. The HDSB shall not be responsible for any misunderstanding on the part of the Bidder concerning this RFT or its process.

In the event a Bidder has any reason to believe that an error, omission or ambiguity exists, the Bidder must notify the RFT Authority via Bids and Tenders prior to submitting a Proposal.

If appropriate, the RFT Authority will then clarify the matter for the benefit of all Bidders by publication on the same public platform, its website or by notice to Bidders who have requested a copy of this RFT in the same manner as set out in section 6 below.

In answering a Bidder's questions, the HDSB will set out the question, without identifying the Bidder that submitted the question, and the HDSB may in its sole discretion:

- edit the question for clarity;
- answer similar questions from various Bidders only once.

Where an answer results in any change to the RFT, such answer will be formally evidenced through the issue of a separate addendum for this purpose.

7. Addenda

If the HDSB for any reason, determines that it is necessary to provide additional information relating to this RFT, such information will be communicated to all Bidders by addendum in the same manner the RFT was communicated. Each Addendum shall form an integral part of this RFT. This RFT may only be amended in accordance with this section.

All questions related to this Tender must be submitted in writing via bids and tenders prior to 2 p.m. on August 9, 2021. Any addendum will be posted no later than August 11, 2021.

Any amendment or supplement to this RFT made in any other manner will not be binding on the HDSB.

All Addenda shall become an integral part of this RFT and shall be incorporated into any content. Each Bidder shall be responsible for verifying before depositing its Proposal that it has received all Addenda that have been issued.

8. Planned Schedule of Events – Project Schedule

Event	Date
Release of RFT	July 29, 2021
Mandatory Site Meeting	August 5, 2021
Question Deadline	August 9, 2021
Issuance of Final Addendum	August 11, 2021

9. Bidder's Costs

Bidders shall bear all costs and expenses incurred relating to any aspect of its participation in this RFT process, including all costs and expenses relating to the Bidder's participation in:

- the preparation, presentation and receipt of its Submission;
- the Bidders attendance at any meeting in relation to the RFT process, including any presentation or interview;
- the conduct of any due diligence on its part, including any information-gathering activity;
- the preparation of the Bidder's own questions prior to the Deadline for Questions; and
- any discussion and/or finalization, if any, in respect of the Form of Agreement.

10. Bidding Format

Unless otherwise specified in these RFT documents or the final contract entered into between the HDSB and the successful Bidder, responses shall be for a stipulated sum without escalator clauses or other qualifications (when applicable). Bidders submitting a bid with escalator clauses or other qualifications that are not in accordance with the terms and conditions of this RFT may have their bid rejected.

All information entered on this RFT document must be type written or entered in ink. No pencil entries will be accepted.

Erasure(s), overwriting or strike-out(s) must be initialed in ink by the person signing this Submission.

Respondents will use the following format for their submission:

- Form of Tender (complete form must be included with your submission, including bonds and any other information as may be required herein)
- Appendix A - Signed Declaration Sheet (must be included with your submission)

11. Pricing

Please do not add tax to base (unit) price. (when applicable). Early payment discounts may be considered part of the Submission. Credit Card payment acceptance may be considered part of the Submission. All proposed pricing must include any delivery fees required to get the lighting requested delivered to Acton District HS.

12. Subcontractors

The General Contractor must select a subcontractor from the HDSB pre-qualified list of sub-contractors attached in Appendix B.

The Contractor agrees to preserve and protect the rights of the parties under the contract with respect to work performed under subcontract, and shall:

- enter into contracts or written agreements with their subcontractors to require them to perform their work in accordance with and subject to the terms and conditions of the contract. Further, the Contractor shall be fully responsible to the Owner for acts and omissions of their subcontractors and of any persons directly or indirectly employed by them as for acts and omissions of persons directly employed by them.
- therefore, agree that they will incorporate the terms and conditions of the Contract Documents into all Subcontractor Agreements they enter into with their subcontractors.

The HDSB reserves the right, at its discretion to waive the requirement to utilize the mandatory list of pre-qualified sub-trades at any time during the tendering process based on market conditions.

13. Mandatory Pre-Bid Site Meeting

There will be a **Mandatory Site Meeting** starting on August 5, 2021 at the main office of Joseph Gibbons Public School located at 41 Moore Park Crescent, Georgetown, ON L7G 2T3. The Mandatory Site Meeting will start at 11:00 a.m.

Bidders must sign in upon their arrival. Bidders arriving after the specified start time will not be permitted to participate in the meeting, will be disqualified from the project, and asked to remove themselves from the site. Failure to be present and to sign in at all site visits will result in the disqualification of your submission

Bidders shall follow Public Health and HDSB Covid-19 protocols while on site.

Part B – Standard Terms and Conditions

14. Scope

Unless otherwise expressly stated these Standard Terms and Conditions form a part of this document and apply in like force to contracts for the purchase of commodities as stated in this document. All Bidders will be bound by the terms and conditions set forth, except as specifically qualified in Special Terms and Conditions issued in connection with this document or any Addenda issued relating to this document.

15. Definitions

As used herein as well as in all RFSQ, RFQ, RFP, RFI, Tender or contract documents issued by the Halton District School Board, the following definitions will apply.

Addenda/Addendum	an addition/change made to this document, subsequent to its printing or publication.
Applicable Law and Applicable Laws	means any common law requirement and all applicable and enforceable statutes, regulations, directives, policies, administrative interpretations, orders, by-laws, rules, guidelines, approvals and other legal requirements of any government and/or regulatory authority in effect from time to time.
Bid/Submission/Proposal	an offer from a Bidder in response to a Proposal/Tender which is subject to acceptance or rejection.
Proponent	a legal entity, being a company, partnership or individual who submits a Bid, Proposal, or Submission in response to a formal request for Bid, Proposal, or Submission.
Board/HDSB	means the Halton District School Board.
Contract	means the agreement, in writing, governing the performance of the Work and/or the purchase and sale of commodities and includes, without limitation, the document (including standard terms and conditions), Bidder Submission and the written document accepting the Bidder Submission (including any notice of acceptance or award).

Document	means the document describing the Goods and/or Services to be purchased and the terms upon which the Goods and/or Services are to be purchased and includes, without limitation, those documents referenced on the index of the document and such Addenda as may be issued by the HDSB.
Goods or Services	product and/or any and all labour, vehicles or equipment used by a Bidder in fulfilling a Contract.
HST	means Harmonized Sales Tax.
Intellectual Property	means any trademark, copyright, moral right, patent, industrial design, trade name, domain name, trade secret, know how, integrated circuit topography or other intellectual property, industrial property or proprietary right owned by, licensed to, or used by any third person.
Mandatory Requirement	a minimum requirement – where the words “mandatory”, “must”, “required”, “shall” and/or “will” are referenced in this document and such requirement is identified as a Mandatory Requirement. Failure to comply will deem the submission non-compliant and the bid/submission will be disqualified.
Proposal/RFP	a sealed written offer to supply Goods and/or Services of any value, acceptance of which may be subject to negotiation.
Quotation/RFQ	a written offer to supply Goods and/or Services with a value that is less than \$100,000.
Response	the package submitted by a Bidder in response to an RFP or RFT.
Specifications	those stated requirements for the Goods and/or Services set out in the document.
Subcontractor	a person, firm or corporation having a direct contract with the contractor to perform a part or parts of the Work, or to supply Goods worked to a special design according to the contract documents, but does not include one who merely supplies Goods not so worked.
Tender/RFT	a sealed written offer to supply Goods and/or Services with a value that is greater than \$100,000.

Bidder Submission	means the document as completed by the Bidder for the purpose of offering to sell to the HDSB the services and/or goods specified in the document, and includes but is not limited to Quotations, Tenders and Proposals.
Work	means the Work to be undertaken by the Bidder pursuant to the provisions of the Contract.

16. Reserved Rights of the HDSB

The HDSB 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 Submission;
- (c) assess a Bidder's Submission on the basis of:
 - (i) a financial analysis determining the actual cost of the Submission 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;
 - (iii) the Bidder's past performance on previous contracts awarded by the HDSB;
 - (iv) the information provided by a Bidder pursuant to the HDSB exercising its clarification rights under this RFT process; or
 - (v) other relevant information that arises during this RFT process;
- (d) waive formalities and accept Submissions that substantially comply with the requirements of this RFT;
- (e) verify with any Bidder or with a third party any information set out in a Submission;
- (f) check references other than those provided by any Bidder;
- (g) disqualify any Bidder whose Submission contains misrepresentations or any other inaccurate or misleading information;
- (h) disqualify any Bidder or the Submission of any Bidder who has engaged in conduct prohibited by this RFT;

- (i) disqualify a Bidder for any conduct, situation or circumstance that constitutes a Conflict of Interest, as solely determined by the HDSB and at any time.
- (j) make changes, including substantial changes, to this RFT, provided that those changes are issued by way of addenda in the manner set out in this RFT;
- (k) select any Bidder other than the Bidder whose bid reflects the lowest cost to the HDSB;
- (l) review all Bidders utilizing the HDSB Vendor Performance Management Administrative Procedure, which can include suspension of Bidders who fail to meet the HDSB's expectations or who are involved in litigation or threatened litigation against HDSB. The HDSB Vendor Performance Management Administrative Procedure is found at the attached link

(www.hdsb.ca/our-board/Policy/VendorPerformanceManagement.pdf)
- (m) award to one or more bidders according to their requirements;
- (n) cancel this RFT process at any time and for any or no reason;
- (o) cancel this RFT process at any stage and issue a new RFT for the same or similar deliverables;
- (p) accept any Submission in whole or in part; or
- (q) award to multiple bidders if circumstances are warranted;
- (r) reject any or all Submissions;
- (s) to limit the number of pre-qualified Bidders eligible to submit proposals for any future projects. HDSB shall not be obligated to provide all pre-qualified Bidders with the same opportunity to bid on all future projects within each stated category. By participating in this RFT, Bidders acknowledge that there is no guarantee that a Bidder will receive any assignments, work or projects and that there is no expectation that any specified number of projects will be made available during the pre-qualification term;

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, the HDSB reserves the right at any time during normal business hours, and as often as the HDSB 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 Submission and any Contract. The successful Bidder shall permit the HDSB to audit, examine, and make copies, excerpts or transcripts from such records, and to make audits

of data relating to matters covered by a Submission, any purchase order and/or any Contract. The successful Bidder shall maintain and retain all records and other documents related to a Submission, 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 the HDSB.

17. Litigation with the HDSB

The HDSB may, in its absolute discretion, reject a Submission submitted by a Bidder **prior to or after a Submission opening, if the Bidder:**

- (a) is or has in the past 10 years been a party to litigation with the HDSB; or
- (b) directly or indirectly, including by common ownership or control or otherwise, is related to a party currently in litigation with the HDSB or a party that has in the past 10 years been in litigation with the HDSB; or
- (c) intends to use a subcontractor in respect of a specific project who is, or has in the past 10 years been a party to litigation with the HDSB, or who is related to a party currently in litigation with the HDSB or a party that has in the past 10 years been in litigation with the HDSB.

For the purposes hereof, the phrase “litigation with the HDSB” includes cases in which the Bidder or prospective Bidder or any of the parties named above, has advised the HDSB in writing of their intention to commence litigation, or have commenced or have advised the HDSB of their intention to commence an arbitral proceeding against the HDSB (excepting only construction lien demands, notices or proceedings or arbitrations under O. Reg 444/98 of the Education Act).

In determining whether or not to exercise its discretion as set out herein, the HDSB will consider whether the litigation (past or current) is likely to affect a Bidder’s ability to work with the HDSB, its consultants and representatives, and whether the HDSB’s experience with the Bidder, the related party or subcontractor, as the case may be, in the matter giving rise to the litigation, indicates that the HDSB is likely to incur increased staff and legal costs in the administration of the Contract if it is awarded to the Bidder.

18. Accessibility for Ontarians with Disabilities (AODA)

The HDSB is committed to accessibility and preventing and removing barriers for persons with disabilities. Where practicable, the HDSB will incorporate accessibility features and criteria when procuring or acquiring goods, services and facilities, in which case, a Bidder must be capable of recommending and delivering same in an inclusive and accessible manner, consistent with the Ontario Human Rights Code (“OHRC”), the Ontarians with Disabilities Act, 2005 (“AODA”) and its Regulations, in order to achieve accessibility for Ontarians with disabilities. If the HDSB determines that it is impractical to do so an explanation will be provided upon request.

In accordance with Ontario Regulation 429-07 made under the AODA, the HDSB has established policies, practices and procedures governing the provisions of its services to persons with disabilities, which may be found at:

<https://www.hdsb.ca/our-board/Pages/Accessibility.aspx>

19. Ability to Negotiate/Contract Negotiations

The HDSB reserves the right to enter into negotiations with any Bidder as it sees fit, or with another Bidder concurrently. The HDSB will not incur liability to any Bidder as a result of these negotiations.

The HDSB may, prior to and after Contract award, negotiate changes to the specifications, the type of materials or any conditions with the successful or preferred Bidder or one or more of the Bidders without having any duty or obligation to advise any other Bidder or to allow them to vary their bid prices as a result of such changes, and the HDSB shall have no liability to any other Bidder as a result of such negotiations or modifications.

20. Agree to Abide by the Established Process

It is vital to the HDSB that the process leading to the recommendation of a bidder(s) and the conclusion of an agreement for the provision of these services be, and be seen to be, open and fair and that each of the respondents is treated equally.

No respondent can be seen to be deriving, intentionally or otherwise, an advantage or information, which is not equally available to all other respondents. Nor is it acceptable that any advantage or information be sought or obtained from any unauthorized staff or representative of the HDSB, or any benefit derived from any special or personal relationships or contacts.

All communications, including requests for information, between respondents to this RFT and the HDSB should be between only the representative(s) of the HDSB who has been authorized and designated for that particular purpose. Bidders must not rely on information from any other source.

21. Assignment

Unless otherwise stated in this document, it is mutually agreed and understood that the successful Bidder will not assign, transfer, convey, sublet or otherwise dispose of the Contract (in whole or in part) or the right, title or interest therein, or the Bidder's power to execute such contract to any other person, firm, company or corporation without the previous written consent of the HDSB. Any act in derogation of the foregoing shall be null and void. For the purposes hereof, the transfer or issuance of shares by a Bidder of more than fifty (50%) percent of the voting securities of a Bidder 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 Bidder 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 this Agreement, be deemed to be an assignment of the Contract requiring the consent of the HDSB, unless such transfer or issuance of shares is made pursuant to an initial public offering of common shares under the Securities Act (Ontario).

22. Award

The final award will be based on (but not limited to) the best value for money and quality service delivery from a Bidder who complies with the provisions of this Submission solicitation, including specifications, contractual terms and conditions, who can reasonably be expected to provide satisfactory performance on the proposed Contract based on reputation, references, performance on previous contracts, and sufficiency of financial and other resources, and provides a solution that is a fit with the HDSB's requirements. The lowest price or bid shall not be the sole, determinative factor.

23. Breaking a Tie

In the event of a tie score, the HDSB will resolve same based on the earlier date/time stamp of when the bid was received by HDSB in accordance with this RFT.

24. Change Orders

A change order results when unforeseen conditions are identified from the original scope of work (Contract or Purchase Order) and is inextricably tied to the original scope.

The following steps should occur prior to issuance of a change order that does not originate from HDSB senior management:

- appropriate HDSB approval must be acquired prior to modifying any Contract or Purchase Order
- appropriate written HDSB approval must be obtained prior to commencing the work.

All requests or recommendations for Change Orders shall include the impact to both price and schedule for the work to be performed. HDSB shall have the right to retain consultants or experts to help identify the need or to verify the impact of the change order on the project.

No change in the work shall proceed without the written approval of the Owner. Any change shall be initiated by Owners "WORK ORDERS" which shall bear the change cost and the Contractor's and Owner's representative's signatures as an instruction to proceed. All changes shall be restricted to five percent (5%) overhead and five percent (5%) profit applied to the labour and material cost.

25. Conflict of Interest

For the purposes hereof, "Conflict of Interest" includes:

- (a) in relation to the Submission 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 Submission that is confidential to the HDSB and not available to other Bidders;
 - (ii) communicating with any person with a view to influencing preferred treatment in the Submission 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 Work, services or 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 Bidder's work, services or contractual obligations.

The Bidder shall:

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

In addition to all other contractual rights or rights available at law or in equity, the HDSB may immediately disqualify a Submission or terminate the Contract upon giving notice to the Bidder where:

- i. the Bidder fails to disclose an actual or potential Conflict of Interest;
- ii. the Bidder fails to comply with any requirements prescribed by the HDSB to resolve a Conflict of Interest; or
- iii. the Bidder's Conflict of Interest cannot be resolved.

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

26. HDSB Confidential Information

For the purposes hereof, "HDSB Confidential Information" means all information of the HDSB that is of a confidential nature, including all confidential information in the custody or control of the HDSB, regardless of whether it is identified as confidential or not, and whether recorded or not, and however fixed, stored, expressed or embodied, which comes into the knowledge, possession or control of the Bidder in connection with the Contract. For greater certainty, HDSB Confidential Information shall:

- (a) include:
 - (i) all new information derived at any time from any such information whether created by the HDSB, the Bidder or any third party;
 - (ii) all information (including Personal Information) that the HDSB is obliged or has the discretion not to disclose under provincial or federal legislation or otherwise at law; but
- (b) not include information that:
 - (i) is or becomes generally available to the public without fault or breach on the part of the Bidder of any duty of confidentiality owed by the Bidder to the HDSB or to any third party;
 - (ii) the Bidder can demonstrate to have been rightfully obtained by Bidder without any obligation of confidence, from a third party who had the right to transfer or disclose it to the Bidder free of any obligation of confidence;
 - (iii) the Bidder can demonstrate to have been rightfully known to or in the possession of the Bidder at the time of disclosure, free of any obligation of confidence when disclosed; or
 - (iv) is independently developed by the Bidder;

but the exclusions in this subparagraph shall in no way limit the meaning of Personal Information or the obligations attaching thereto under the Contract or at law.

During and following the term of the Contract, the Bidder shall:

- (a) keep all HDSB Confidential Information confidential and secure;
- (b) limit the disclosure of HDSB Confidential Information to only those of its directors, officer, employees, agents, partners, affiliates, volunteers or subcontractors who have a need to know it for the purpose of carrying out its obligations under the Contract and who have been specifically authorized to have such disclosure;
- (c) not directly or indirectly disclose, destroy, exploit or use any HDSB Confidential Information (except for the purpose of carrying out its obligations under the Contract or except if required by order of a court or tribunal), without first obtaining:
 - (i) the written consent of the HDSB; and
 - (ii) in respect of any HDSB Confidential Information about any third party, the written consent of such third party;
- (d) provide HDSB Confidential Information to the HDSB on demand; and
- (e) return all HDSB Confidential Information to the HDSB before the end of the Term, with no copy or portion kept by the Bidder.

27. Criminal Background Checks

The Bidder acknowledges that the HDSB must be in compliance with Regulation 521/01 of the Education Act (Ontario) - Collection of Personal Information with respect to criminal background checks and offence declarations. The Bidder covenants and agrees to assist the HDSB in complying with same by providing the HDSB, or such other entity as the HDSB may designate, with a criminal background check covering offences under the Criminal Code, the Narcotics Control Act, and any other offences which would be revealed by a search of the automated Criminal Records Retrieval System maintained by the RCMP or, in instances where the Bidder will have access to or is responsible for minors or vulnerable persons, a Vulnerable Persons Clearance certificate in addition to the above ("Criminal Background Check"), together with an Offence Declaration in HDSB approved form, for every individual or employee of the Bidder who may come into direct contact with students on a regular basis at a school site of the HDSB, or who may have access to student information.

For the purposes of this document, the HDSB shall determine in its sole and unfettered discretion whether an individual or employee of the Bidder may come into direct contact with students on a regular basis or may have access to student information. The Bidder agrees to indemnify and save harmless the HDSB from all claims, liabilities, expenses, and penalties to which it may be subjected on account of the Bidder's failure to provide a Criminal Background Check and an Offence Declaration, as aforesaid. This indemnity shall survive the expiration or sooner termination of the Contract. In addition, and

notwithstanding anything else herein contained, if the Bidder fails to provide a Criminal Background Check and an Offence Declaration for an individual or employee of the Bidder who may come into direct contact with students on a regular basis at a school site of the HDSB or who may have access to student information, then the HDSB shall have the right to forthwith terminate the Contract without prejudice to any other rights which it may have in the Contract, in law or in equity.

28. Debrief

The HDSB, at the written request of a Bidder will conduct a debriefing. Bidders must submit their request within sixty (60) days of Contract award notification. The HDSB will only identify any weaknesses or strengths in the Bidder's submission. No information regarding other Bidders' submissions will be disclosed. The intent of the debriefing information session is to assist a Bidder in presenting a better Submission in subsequent procurement opportunities. Any debriefing provided is not for the purpose of providing any opportunity to challenge the procurement process.

29. Dispute Resolution

In the event that a Bidder wishes to review the decision of the HDSB in respect of any material aspect of the RFT process, and subject to having attended a debriefing, the Bidder shall submit a protest in writing to the RFT Authority within ten (10) days from such a debriefing.

Any request that is not received in a timely manner will not be considered, and the Bidder will be notified in writing.

A protest in writing shall include the following:

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

For the purpose of a protest, the HDSB will review and address any protest in a timely and appropriate manner. HDSB's decision in this regard is final.

30. Environmental Statement

The Board, when practically and financially feasible, will consider the acquisition of goods and services that will reduce the environmental footprint of the Board.

31. Force Majeure

Delays in or failure of performance by either party under the Contract shall not constitute default thereunder or give rise to any claim for damages if caused by occurrences beyond the control of the party affected, including but not limited to, decrees of Governments, acts of God, fires, floods, riots, wars, rebellion, sabotage, and atomic or nuclear incidents. Lack of finances, strikes, lockouts or other concerted acts by workers shall not be deemed to be a cause beyond a party's control.

In the event that performance of the Contract in the reasonable opinion of either party is made impossible by an occurrence beyond the control of the party affected, then either party shall notify the other in writing. The HDSB shall either terminate the Contract forthwith and without any further payments being made, or authorize the Bidder to continue the performance of the Contract with such adjustments as may be required by the occurrence in question and agreed upon by both parties. In the event that the parties cannot agree upon the aforementioned adjustment, it is agreed by the parties that the Contract shall be terminated.

32. Guarantees and Warranties

All Work shall be done in a good and workmanship like manner. All materials, goods and services must meet the applicable specifications, either by the HDSB, its consultant on the project or the manufacturer. The Bidder warrants and guarantees that all materials, Goods; Services and workmanship will be free from defects and fit for the purpose intended by the HDSB. All Goods delivered by the Bidder must be new, in good working order and of the latest model possessing all accessories standard to the manufacturer's stock model. The Goods and/or Services must be covered by written guarantees and warranties acceptable to the HDSB.

33. Health & Safety / WHMIS

Bidders and/or contractors must comply with the Occupational Health and Safety Act and its regulations. All Bidder's contractors and sub-contractors and their respective employees will have received health and safety training appropriate to their trade, and will be able to provide proof thereof to the HDSB upon request. Contractors shall be held responsible for any sub-contractors where such are permissible by the HDSB. The HDSB may request and suppliers/contractors/sub-contractors will provide evidence of such training at any time.

Suppliers/contractors/sub-contractors shall comply with the HDSB policies, programs and procedures at all times while on site. All suppliers/contractors/sub-contractors are

required to sign in upon arrival/exit at a HDSB location prior to beginning and at completion of Work.

Suppliers and/or contractors/sub-contractors shall be held responsible for all fines and/or contraventions of legislation which have been incurred by the HDSB.

As per Ontario regulation 278/05 section 10 (5) the HDSB will provide contractors/sub-contractors performing work in HDSB buildings access to the site-specific asbestos inventory. Site specific asbestos inventories are available at each HDSB site. Contractors/sub-contractors shall review the site-specific asbestos inventory in relation to the scope of work they are undertaking, prior to the commencement of work. The requirements of the HDSB's Asbestos Management Administrative Procedure are to be adhered to at all times. A copy of the HDSB's Asbestos Management Administrative Procedure can be found at:

<http://www.hdsb.ca/our-board/Policy/AsbestosManagementInFacilities.pdf>.

All Work is subject to prior approval by the appropriate HDSB department.

Contractors shall examine carefully the HDSB's Asbestos Register for the Work site, in addition to examining existing conditions for suspected Asbestos Containing Materials (ACM), on which completion of Work is dependent.

Upon discovery of unforeseen suspected ACM affecting completion of the Work, the Contractor shall cease any operations that may disturb said materials and notify the Owner immediately.

The Contractor shall arrange for removal of ACM affecting completion of Work through a HDSB-approved ACM abatement contractor, and arrange for coordination of testing through HDSB Facility Services, if required.

Contractors shall be responsible for any sub-contractors in their employ with respect to the aforementioned requirements.

34. Indemnification and Liability

The Bidder hereby agrees to indemnify and hold harmless the HDSB, its directors, officers, trustees, employees and agents from and against all liability, loss, costs, damages and expenses (including legal, expert and consultant fees), causes of actions, actions, claims, demands, lawsuits or other proceedings, by whomever made, sustained, incurred, brought or prosecuted if:

- (a) resulting from the Bidder's failure to observe and conform to the standards established by law or by any other association which has established standards recognized by the Province of Ontario;

- (b) relating to labour and equipment furnished for the Work; and
- (c) involving inventions, copyrights, trademarks or patents, and rights thereto, used in doing the Work and in the subsequent use and operation of the Work or any part thereof upon completion.

35. Insurance and Liability

The successful bidder must indemnify the HDSB from any and all manner of damage or injury, risk, claims, demands, actions, penalties, causes of action, damages and any and all costs arising out of, or incurred by reason of provision of goods and/or services by the bidder. The cost of such insurance will be the responsibility of the Bidder.

The successful bidder(s) will obtain and provide current proof of insurance upon the award, that the successful Bidder will be covered by:

at least Two Million Canadian Dollars (C\$2,000,000.00) of comprehensive commercial general liability insurance for bodily injury, property damage, operations liability, contractual liability and tenant's legal liability, including umbrella liability insurance covering liability arising from premises, operations, independent contractors, products-completed operations, personal injury and liability assumed under the Contract;

at least One Million Canadian Dollars (C\$1,000,000.00) of business automobile liability insurance and, if necessary, umbrella liability insurance for owned, hired and non-owned vehicles covering bodily injury and property damage: and with an insurer licensed to carry on business in the Province of Ontario.

In the case of multi-year contracts, a copy of a valid certificate must be provided to the Halton District School HDSB annually thereafter, at least thirty (30) days prior to the anniversary date of the contract commencement date. At commencement of the Contract and throughout the Contract duration, certification shall be submitted on a Certificate of Insurance form with the above-mentioned coverage, thereby protecting the Halton District School Board against claims for property damage and bodily injuries, including accidental death, caused by the successful Bidder(s) or its employees and/or Sub-contractors during the performance of its obligations under the Contract.

The Halton District School Board must be named as additional insured, and the policy must contain a cross liability clause, and thirty (30) day prior notice clause of any cancellation, non-renewal or product change in coverage, terms or conditions.

As a condition precedent to contract award, Certificates of all such insurance policies shall be filed with the HDSB by the successful Bidder and shall be subject to the HDSB's approval as to the adequacy of protection.

All the above-mentioned insurance shall be maintained until the HDSB certifies that the work is complete.

36. Invoicing/Payment/EFT

To ensure that payment is not deferred, the following information shall be on all invoices:

- Bidder's Name or Business Number, Address, Telephone Number and HST registration number
- Invoice Date
- Invoice Number
- Purchase Order Number, Name of Requester, Shipment Destination
- Name of Halton District School Board staff that issued this order
- Complete Good/Service Description (including hourly rates, service/delivery dates, service location)
- Attach Copy of Service Report/Work Order Completed
- Terms of payment
- Total of HST where applicable
- Total Amount Payable

The HDSB's method of payment is by Electronic Funds Transfer (EFT). If the Bidder is a new vendor or current vendor who has not previously utilized the EFT payment service or has banking information which has changed, then an "Application of Vendor Direct Deposit" form is required to be completed, which is available through the Purchasing contact for this document. This form along with a voided cheque or letter from the Bidder's bank should be sent to:

Halton District School Board
Attention: Accounts Payable Department
J.W. Singleton Centre,
PO Box 5005 Stn LCD 1,
Burlington ON L7R 3Z2 or

electronically to: apeft@hdsb.ca before any invoices are submitted to the HDSB for payment.

Payment terms are Net 28. Early payment discounts may be considered.

37. Irrevocability

The Submission will be open for acceptance by the HDSB and irrevocable by the Bidder for a period of one hundred and twenty (120) calendar days from the Closing Date.

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

- (a) The Bidder acknowledges and agrees that the HDSB is subject to MFIPPA. The Bidder further expressly acknowledges and agrees that, upon the acceptance of a

successful Submission and conclusion of this process (including execution and delivery of the Contract between the HDSB and the successful Bidder), subject to subsection (b) below, the Submission shall not be considered confidential for the purposes of Section 10 of MFIPPA and, in the event of an access request or at the discretion of HDSB, shall be subject to release in its entirety without redaction.

- (b) Notwithstanding paragraph (a) above, the Bidder and the HDSB acknowledge and agree that the information listed below is considered to be supplied by the Bidder to the HDSB in confidence:
1. For Services: Hourly rates/fees and information from which such rates/fees could be reasonably deduced.
 2. For Goods: Unit costs and information from which such unit costs could be reasonably deduced.
- (c) Notwithstanding the foregoing, the Bidder acknowledges and agrees that, because the HDSB is subject to MFIPPA, all or part of any Submission, including information supplied in confidence, may be subject to release in response to an access request submitted pursuant to MFIPPA. In the event that the HDSB receives a request for access to all or part of a Submission supplied in confidence, the HDSB shall deliver the relevant notice to the Bidder, who shall bare all costs, legal or otherwise, with respect to any objection the Bidder may have in respect of the release of any or all parts of the Submission pursuant to MFIPPA.

39. No Guarantee of Work or Exclusivity of Contract

The HDSB makes no guarantee of the value or quality of goods or services or volume of work to be assigned to the successful Bidder. Any Contract executed with a successful Bidder may not be an exclusive Contract for the provision of the requested Goods or Services. Quantity where specified more or less, are estimates of previous consumption and are furnished without liability to the HDSB.

40. Non-Performance/Termination of Contract

If the Bidder delivers substandard, unapproved or defective items, which are rejected by the HDSB, the Bidder agrees to replace these items at the Bidder's expense with items of a quality deemed acceptable to the HDSB within a 48-hour period of the mutual satisfactory agreement being reached. If the Bidder fails to replace the items within this 48-hour period, the parties agree that the HDSB may purchase substitutes for the rejected items in the open market at no additional cost or liability to the HDSB.

Where at any time the quality of the Goods or Service supplied by the successful Bidder is not of a satisfactory standard, the HDSB may issue a verbal warning outlining the deficiency in supply or other aspects of performance and requiring the successful Bidder to correct those deficiencies within such period of time as stated. If the deficiency is not

corrected within the time specified, or having been corrected, there is a further instance of deficient performance, the HDSB may issue a written notice to the successful Bidder, identifying the deficiency in performance and setting a final date or time period for its correction, and advising that if corrective steps are not taken by that date or within that time, the HDSB may terminate the Contract and take corrective action itself.

Until the HDSB is satisfied that the unsatisfactory performance has been corrected, the HDSB may hold back from any payment an amount sufficient to rectify the unsatisfactory performance until its requirements have been met.

The HDSB reserves the right, in its absolute discretion, to terminate a Contract immediately without penalty, costs or damages of any kind whatsoever, where the Bidder has violated any laws or performed any of the following acts while performing work with the HDSB and further reserves the right to take that failure into account with respect to the award of any future contract.

- a) over-billing or duplicate billing;
- b) splitting of invoices;
- c) charging for items not supplied;
- d) charging for items not approved prior to invoicing;
- e) charging for items of one grade, while supplying items of an inferior grade;
- f) Misrepresentation as to the quality or origin of goods, their functionality or suitability for a purpose, or their performance characteristics;
- g) not responding to the HDSB or, failure to complete contract.

41. Ownership

The Submission, along with all correspondence, documentation and information provided to the HDSB by any Bidder in connection with or arising out of the Submission, once received by the HDSB, shall become the property of the HDSB and may be appended to any Contract and/or purchase order with the successful Bidder.

42. Permits, Licenses and Approvals

Bidders shall obtain all permits, licences and approvals required in connection with the supply of the Goods and/or Services. The costs of obtaining such permits, licences and approvals shall be the responsibility of, and shall be paid for by the Bidder.

Where a Bidder is required by any Applicable Law to hold or obtain any such licence, permit, or approval to carry on an activity contemplated in its Submission or in the

Contract, neither the acceptance of the Submission nor the execution of the Contract by the HDSB shall be considered an approval by the HDSB for the Bidder to carry on such activity without the requisite licence, permit, consent or authorization.

Without in any way limiting the generality of the foregoing, any electrical Goods being proposed for consideration pursuant to this RFT must be authorized or approved in accordance with the Electrical Safety Code or by a certification organization accredited with the Standards Council of Canada Act (Canada), and shall bear the certification organization's mark identifying the Goods certified for use in Canada. Certification shall be to the standard that is appropriate for the intended use of the electrical Goods at any of the HDSB's schools or facilities.

43. Co-operative Purchasing Provisions

This document is being issued by the HDSB to meet the HDSB's requirements. The successful Bidder acknowledges that the Provincial Government encourages cooperative procurement initiatives by School HDSBs. Bidders shall indicate on the Form of Quotation if they are willing to extend pricing and submission terms to other District School Boards in the province of Ontario where the scope of work is deemed similar or the same and where both parties are in agreement, in which case they shall be deemed to have granted consent to the HDSB to share the Submission with such HDSBs, subject to such HDSBs agreeing to receive the Submission in confidence on the understanding that the Submission contains financial, commercial, technical and other sensitive information of the Bidder. The Bidder will not be penalized if it does not agree to this provision. The HDSB will not incur any financial responsibility in connection with any purchase by another School Board. Each School Board shall accept sole responsibility for its own contract management such as placing orders and making payments to the successful Bidder.

44. Proof of WSIB Coverage

If the Bidder is subject to the Workplace Safety and Insurance Act ("WSIA") or the Workplace Safety and Insurance Amendment Act, 2008 ("WSIAA"), the Bidder shall submit a valid clearance certificate of Workplace Safety and Insurance Board ("WSIB") coverage to the HDSB before commencing the performance of any work or services. In addition, the Bidder shall, from time to time during the term of the Contract and at the request of the HDSB, provide additional WSIB clearance certificates. The Bidder covenants and agrees to pay when due, and to ensure that each of its subcontractors pays when due, all amounts required to be paid by it or its subcontractors, from time to time during the term of the Contract, under the WSIA and/or the WSIAA, failing which the HDSB shall have the right, in addition to and not in substitution for any other right it may have pursuant to the Contract or otherwise at law or in equity, to pay to the WSIB any amount due pursuant to the WSIA or the WSIAA unpaid by the Bidder or its subcontractors and to deduct such amount from any amount due and owing from time to time to the Bidder pursuant to the Contract together with all costs incurred by the HDSB in connection therewith.

45. Right to Withdraw

Submissions may be withdrawn prior to the Closing Time. Following Closing, no Submission may be withdrawn. Any Bidder who attempts to do so may have a negative Performance Evaluation placed on record with the HDSB in accordance with the Vendor Performance Management Administrative Procedure

www.hdsb.ca/our-board/Policy/VendorPerformanceManagement.pdf

46. Smoking on HDSB Property

Smoking of any substance and in any manner is prohibited in all HDSB buildings and on all HDSB property. This includes, without limitation, tobacco, cannabis in any form and vaping.

47. Vehicle Operation on HDSB Property

The successful Bidder shall use due care and caution when motorized vehicles are in operation on school property while students are expected to enter or exit the school building and/or are visible outside the school building on school property or adjacent property, particularly during recess, lunch period and preceding and following the end of the school day. Vehicles operated in parking lot and driveway areas shall not be driven at a speed in excess of 8-kilometers/per hour.

Further, on school property drivers must turn off vehicles and remove the keys during any stop. At no time are vehicles to be left running while unattended. It is recommended that the vehicle be locked when left unsupervised. The HDSB will not be responsible for any theft of, or any theft from, vehicles operated by the successful Bidder.

Asphalt play areas around the exterior of the school building are not constructed to handle heavy vehicles. Bidders will be held responsible for any damage to HDSB property including but not limited to asphalt or natural surfaces as a result of using them for access of heavy vehicles. Making good of natural surfaces or asphalt areas that are damaged in the course of the work shall be to the original (new) condition irrespective of their condition prior to commencement of the work, or the condition of the adjacent unaffected areas. Vehicles are only permitted to access, stand or be parked in areas designated by administrative staff of HDSB, which for the purposes of this provision does not include principals of schools.

48. Bidder Conduct

When on HDSB property, the Bidder and its employees must:

- have proper identification (name badge, uniform with logo, photo I.D. etc).

- be dressed appropriately (the following are not appropriate: clothing that fails to contain the anatomy when the person is carrying out normal duties; clothing with printed slogans, advertising or designs that are obscene or could have a double meaning).
- use appropriate language.
- refrain from wearing scented products or fragrances such as perfume, cologne, after shave, shampoos (as required).
- work with dignity, courtesy and respect for self and others.
- not make noise or move in corridors during morning announcements, and playing of the national anthem.
- observe procedures during fire evacuation and lockdowns, whether they are actual or test (drills).
- park in spots designated by the Principal.

The Bidder must observe all HDSB policies and procedures including but not limited to: Smoke-Free Environment; Sexual, Racial and Ethno Cultural Harassment, etc.

The Bidder will ensure that the education program is not interrupted and that the health and safety of the students and staff is not compromised.

No person who is impaired by alcohol or drugs will enter and/or remain on HDSB property.

The Bidder agrees that its employees and sub-contractors will observe and comply with all standards, procedures, policies, rules and regulations of the HDSB, including but not limited to privacy, use of facilities, equipment, building security and computer technology.



FORM OF TENDER

Project: Interior Renovations – Joseph Gibbons Public School
Project Reference #: RFT 21-257

From (Bidder): _____
Company Name

Street Address

City, Province and postal code

Phone Number Email Address

To (Owner): Halton District School Board
2050 Guelph Line
Burlington, Ontario L7P 5A8

We, the undersigned, having examined the Tender Documents for the above-named Project, including Addenda, hereby offer to perform the Work in accordance with the Tender Documents, for the Stipulated Price of:

Base Bid Amount	\$
Cash Allowance	\$200,000
Contingency Allowance	\$250,000
Total Bid (Excluding HST)	\$

Proposed Sub-Contractors:

Electrical: _____

Mechanical: _____

FORM OF TENDER CONTINUED
RFT 21-257 Interior Renovations – Joseph Gibbons Public School
Page 2 of 2

We, the undersigned, declare that:

- a. We agree to perform the Work within the required completion time specified in the Tender Documents,
- b. We have arrived at the Tender without collusion with any competitor,
- c. This Tender is open to acceptance by the Owner for a period of 90 days from the date of Tender Closing,
- d. All Form of Tender supplements called for by the Tender Documents form an integral part of this Tender.

Signature: _____
LEGAL NAME OF BIDDER DATE

AUTHORIZED SIGNATURE OF BIDDER & TITLE PRINTED NAME
I have the authority to bind the Bidder



APPENDIX A - DECLARATION SIGNATURE SHEET

1. I/WE DECLARE that this Submission is made without collusion, knowledge, and comparison of figures or arrangement with any other company, firm or person submitting a Submission for the same work.
2. I/WE DECLARE that to our knowledge no member of Halton District School Board is, will be or has become financially interested, directly or indirectly, in any aspect of the Contract other than in the appropriate discharge of his/her obligations as an employee/officer of Halton District School Board.
3. I/WE HAVE READ, Understood and agree to abide by the Agreement to Abide by the Established Process.
4. I/WE HAVE CAREFULLY examined the RFT documents, and have a clear and comprehensive knowledge of what is being requested hereunder. By submitting the Submission, the Bidder agrees and consents to the administrative procedures of the Board, as well as the procedures, terms, conditions and provisions of the RFT, including the Form of Tender.
5. I/WE have carefully examined all of the Proposal Documents, and that we have thoroughly reviewed all proposal documentation and addenda number _____ to _____, and hereby accept and agree to same as forming part and parcel of the proposed Contract.
6. I/WE ARE AUTHORIZED BY and have the authority to bind the Bidder.

DATE: _____

NAME: _____

Please Print

SIGNATURE: _____

TITLE: _____

COMPANY NAME: _____

ADDRESS: _____

PHONE NUMBER: _____

E-MAIL ADDRESS: _____

E-MAIL to Send PO: _____

**APPENDIX B – HDSB LIST OF
PRE-QUALIFIED SUB-CONTRACTORS**

ELECTRICAL

Arcadian Projects Inc.	Jeff Vidmar	jeff@arcadianprojects.ca	519-804-9697
Best Electric	Gurmukh Sehmbi	gsehmbi@bestelectric.ca	905-415-2378
Black & McDonald Limited	Brian Mino	bmino@blackandmcdonald.com	905-560-3100
Bradco Electrical Services Ltd	Brad Groulx	info@bradcoelectric.com	905-890-0506
Cahill Electric Inc.	Chris Cahill	estimating@cahillelectric.ca	905-388-0515
CEC Services Limited (Aurora)	Kyle Feinstein	estimating@beswickgroup.com	905-713-3711
Gremer Electric Ltd	Gennaro Di Gregorio	gennaro@gremer.ca	416-674-1442
Kraun Electric Inc.	Kevin Krause	estimating@kraun.ca	905-684-6895
McCleary Electric Ltd.	Ron VanderMeulen	mcclearyelectric@bellnet.ca	905-634-7634
North Star Electric	Greg Harris	estimating@northstarelectric.ca	905-845-9063
Star Electrical Services Inc.	Harvinder Kahlon	info@starelectrical.ca	905-799-3883
Superior Boiler Works	Domenic Settimi	dsettimi@sbww.com	905-643-6628

MECHANICAL

Airon HVAC and Control Ltd.	Ryan Haan	info@airongroup.ca	905-331-6555
Anvi Services Ltd	Amit Bamba	office@anviservices.com	905-997-3895
B & B Mechanical Service	Harmanpreet Swaich	harman@bbmechanicalservices.ca	905-696-9991
L.J. Barton Mechanical Inc.	Jim Barton	estimating@ljbarton.com	905-304-1976
Besseling Mechanical Inc	Cameron Besseling	cameron@besselingmechanical.com	905-560-0200
Black & McDonald Limited	Simon Watson	swatson@blackandmcdonald.com	289-919-1209
Bruno Plumbing & Contracting Inc	John Bruno	john@brunoplumbing.ca	905-660-6163
CEC Mechanical Ltd.	Mike Manner	mmanner@beswickgroup.com	905-713-3711
Keith's Plumbing & Heating Inc.	Morgan	morgan@keithsph.com	905-544-8118
Kirk Mechanical Limited	Robert Kirk	kirkmech@bellnet.ca	905-681-0140
Lancaster Group Inc.	Jason Gray	jgray@lancastergroup.ca	905-388-3800
Mattina Mechanical Limited	Domenic Mattina	info@mattina.ca	905-544-6380
Naylor Building Partnerships	Daniel Guidoni	DGuidoni@naylorbp.com	905-338-8000
Nutemp Mechanical Systems Ltd.	David McMichael	info@nutemp.ca	905-338-5603
EAMA (Electrical and Mechanical Alliance)	Veronica Johnson	service@eama.ca	416-798-2006
Soan Mechanical Ltd.	Andy Soan	andy@soanmechanical.com	519-455-1530
Superior Boiler Works	Domenic Settimi	dsettimi@sbww.com	905-643-6628
Union Boiler Company of Hamilton	David Aldighieri	unionboilerco@bellnet.ca	905-528-7977



NGA ARCHITECTS

RFT

TENDER FOR

INTERIOR RENOVATION PROJECT

AT

JOSEPH GIBBONS PUBLIC SCHOOL

41 Moore Park Crescent, Georgetown ON L7G 2T3

Contractors shall carefully examine and study all of the Contract Documents and shall visit the site(s) of proposed work in order to satisfy themselves by examination as to all conditions and dimensions.

PROJECT

Halton District School Board
Joseph Gibbons Public School
Interior Renovation Project

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10 99 00	Manufactured Specialties	3

DIVISION 21 MECHANICAL (See Appendix 3)**DIVISION 26 ELECTRICAL (See Appendix 4)****DIVISION 32 EXTERIOR IMPROVEMENTS**

32 22 00	Grading	3
32 92 33	Sodding	3

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SCOPE OF WORK

Work shall be completed in accordance with the attached specifications and following drawings:

Architectural

	Cover Sheet
A001	Drawing List, Site Key Plan
A100	Overall Floor Plan
A101	Ground Floor Plan - Demo
A102	Ground Floor Plan - New
A103	Reflected Ceiling Plan - Demo
A104	Reflected Ceiling Plan - New
A105	Floor Finish Plan – Demo
A106	Floor Finish Plan – New
A200	Interior Elevations
A201	Interior Elevations
A202	Interior Elevations
A203	Interior Elevations
A300	Millwork Details
A301	Millwork Details
A400	Room Finishes Schedule
A401	New Door and Frame Schedule

Structural Drawings

S1	Ground Floor Infill Slab
S2	Ground Floor Infill Slab

Mechanical Drawings

M1.1	Mechanical Specification
M1.2	Mechanical Legend and Drawing List
M1.3	Mechanical Schedules and Details
M1.4	Key Plan
M3.1	Mechanical HVAC Demo Area '1C' Part Ground Floor Area
M3.2	Mechanical HVAC Demo Area '1D' Part Ground Floor Area
M3.3	Mechanical HVAC Demo Area '1E' Part Ground Floor Area
M3.4	Mechanical HVAC Demo Area '1F' Part Ground Floor Area
M3.5	Mechanical HVAC New Area '1C' Part Ground Floor Area
M3.6	Mechanical HVAC New Area '1D' Part Ground Floor Area
M3.7	Mechanical HVAC New Area '1E' Part Ground Floor Area
M3.8	Mechanical HVAC New Area '1F' Part Ground Floor Area

Interior Renovation**LIST OF DRAWING SHEETS**

M4.1	Mechanical Fire New Area '1A' Part Ground Floor Area
M4.2	Mechanical Fire New Area '1B' Part Ground Floor Area
M4.3	Mechanical Fire New Area '1C' Part Ground Floor Area
M4.4	Mechanical Fire New Area '1D' & 'E' Part Ground Floor Area

Electrical Drawings

E2.1	Key Plan
E2.2	Fire Alarm Riser
E3.1	Lighting Demolition Area '1A'
E3.2	Lighting Demolition Area '1B'
E3.3	Lighting Demolition Area '1C'
E3.4	Lighting Demolition Area '1D' & '1E'
E3.5	Power and System Demolition Area '1A'
E3.6	Power and System Demolition Area '1B'
E3.7	Power and System Demolition Area '1C'
E3.8	Power and System Demolition Area '1D' & '1E'
E4.1	New Lighting Area '1A'
E4.2	New Lighting Area '1B'
E4.3	New Lighting Area '1C'
E4.4	New Lighting Area '1D' & '1E'
E4.5	Power and System New Area '1A'
E4.6	Power and System New Area '1B'
E4.7	Power and System New Area '1C'
E4.8	Power and System New Area '1D' & '1E'

Site Servicing Drawings

SS-1	Partial Site Servicing Plan (Water Service Replacement)
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END OF SECTION

1 GENERAL

- 1.1 Comply with Division 1 requirements and documents referred to therein.
- 1.2 In addition to the General Conditions of the contract, the Contractors shall familiarize themselves with all Section of the Specifications.
- 1.3 Contractor shall include in contract Price all Contingency Allowances specified therein.

2 CASH ALLOWANCES

- 2.1 Include in the Contract Price, a stipulated sum Cash Allowance in the amount of **\$200,000.00 (Two Hundred Thousand Dollars)**.
- 2.2 Cash Allowances, unless otherwise specified, cover the net cost to the General Contractor of services, products, construction, machinery and equipment, freight, handling, unloading, storage installation and other authorized expenses incurred in performing the Work.
- 2.3 The Contract Price, *and not the Cash Allowance*, includes the General Contractor's profit in connection with such cash allowance.
- 2.4 The Contract Price will be adjusted by written order by the Consultant to provide for an excess or deficit to each Cash Allowance. Any unused portions of these allowances shall be returned to the Board on the conclusion of the Contract.
- 2.5 Expend Cash Allowances as directed by the Consultant in writing. Allowances will be adjusted to actual cost with no adjustment to Contractor's charges. Cash expenditure must identify the H.S.T. separately.
- 2.6 The following is a summary of the cash allowances to be included in the contract.
 - Testing and Inspection
 - Signage
 - P/A, CCTV and Clocks
 - IT/Network
 - Painting to Existing Services Only

Total: \$ 200,000.00

3 CONTINGENCY ALLOWANCE

- 3.1 Refer also to General Conditions of the Contract.
- 3.2 Expend Contingency Allowance as directed by the Consultant, in writing, in accordance with the Board's *RFT, changes in Work and Contingency Allowance*.
- 3.3 Contractor's charges for expenses and profit on Contingency Allowance expenditure shall not be included in Contract Price. Refer to *Board's RFT* for percentages of mark-ups.
- 3.4 Such charges shall be added to the net trade cost of each expenditure from the Contingency Allowance at the percentage rates noted in the *Board's RFT*.

- 3.5 Changes to the Work shall be added to, or deducted from, the Contingency Allowance, not from the Board approved Contract. The Contract shall be adjusted by Board approval, only once – at the end of the Project. Credit the Contract with any unused portion of the Contingency Allowance only in the final payment statement.
- 3.6 In submitting final adjustments of Contingency Allowances, include duplicate, summary statements and copies of receipted invoices substantiating purchases under Contingency Allowances.

Description	Contingency Allowance
Existing Condition	<u>\$ 250,000.00</u>
Total:	\$ 250,000.00

END OF SECTION

1 GENERAL

1.1 Definition

1.1.1 Warranty = guarantee dated from date of Substantial completion.

1.2 Submission Requirements

1.2.1 Submit warranties as part of "Operating and Maintenance Manuals" in accord with requirements of Section 01 78 00.

1.2.2 Arrange warranties in systematic order matching Specification format. Include a table of contents listing warranties in same order.

1.2.3 Each warranty must show:

- .1 Name and address of project.
- .2 Name of Owner
- .3 Section Number and Title

1.2.4 All warranties issued by the manufacturer must be presented under the Contractor's letterhead, seal and signature and must bear the wording specified in Contract Documents.

1.3 List of Warranties

1.3.1 The following list of extended warranties is shown here for convenience only.

Item	Period
Entire Building, General Contract	1 year
Sealant	5 years
Caulking	5 years
Finish Hardware	3 years
Acoustic Ceilings	2 years
Paint and Finishing	2 years
Toilet Partitions	25 years
Mechanical	As specified under respective section
Electrical	As specified under respective section

1.3.2 Refer to Divisions 21 and 26 for Mechanical and Electrical warranty requirements.

END OF SECTION

1 GENERAL

1.1 General Instructions

- 1.1.1 Unless specified otherwise, make all submissions to the Consultant at his office, with additional submissions made as directed by the Consultant to other parties involved in the construction.
- 1.1.2 Make all submissions required by the Contract Documents with reasonable promptness and in orderly sequence so as to cause no delay in the work.

1.2 Project Schedule

- 1.2.1 The Contractor shall submit a detailed Project Schedule in Gantt Format to the Owner for review. The Contractor shall make all changes to the schedule requested by the Owner.
- 1.2.2 Provide schedule updates on a monthly basis for duration of Contract.

1.3 Cash Flow Chart and Contract Breakdown

- 1.3.1 The Contractor shall submit an estimated cash flow chart broken down on a monthly basis. Cash flow chart shall indicate anticipated Contractor's estimated monthly progress billings from commencement of work until completion.
- 1.3.2 The Contractor shall update cash flow chart whenever changes occur to scheduling.

1.4 Mock-ups

- 1.4.1 Where required by the Performance Specifications, construct mock ups of the work in a location approved by the Consultant.
- 1.4.2 Construct mock-ups from the specified materials and assemblies for the review of the Consultant.
- 1.4.3 Make any revisions required by the Consultant.
- 1.4.4 Mock-ups reviewed and approved by the Consultant shall become the standard against which installed work will be evaluated.
- 1.4.5 Mock-ups, on the approval of the Consultant, may be incorporated into the finished work.
- 1.4.6 Do not proceed with the Work until the associated mock up has been approved.

1.5 Samples

- 1.5.1 Submit 2 sample boards of all finishes to be used. The Owner and Consultant will review samples.
- 1.5.2 Submit samples with identifying labels bearing material or component description,

manufacturer's name and brand name, project name, location in which material or component is to be used, and date.

1.5.3 No work requiring a sample submission shall be commenced until the submission has received Consultant's final review.

1.5.4 Within the project schedule allow ten (10) working days for the review and approval of samples by the Owner and the Consultant.

1.6 Maintenance and Operating Manuals

1.6.1 Submit in accordance with Section 017800 Contract Closeout.

1.7 Replacement Material

1.7.1 Supply replacement material at completion of the project for the following products:

Paint - one full liter can of each colour

1.7.2 Turn over all material to the Owner and obtain a signed receipt for same.

1.8 Schedule of Submittals

1.8.1 Submit detailed schedule of submittals for shop drawings, samples, list of materials for review by the Consultant.

1.8.2 Indicate the date of submission and time limit for review of each item.

1.8.3 Schedule submissions to allow adequate time for review and resubmission if necessary.

1.9 Shop Drawings

1.9.1 Submit shop drawings based on metric measurements: 3 prints for architectural shop drawings and 4 prints each for structural, electrical and mechanical shop drawings.

1.9.2 No work requiring shop drawing submission shall commence until final review has been obtained from the Consultant.

1.9.3 Review of shop drawings by the Owner and Consultant does not relieve the Contractor of this responsibility for detail design inherent in the shop drawing. The Contractor is responsible for all dimensions and coordination pertinent to the fabrication and/or construction and installation techniques and coordination of work of all sub-trades.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- 1.1.1 Comply with all Sections of Division 1, General Requirements and all documents referred to therein.
- 1.1.2 Provide all labour, materials, products, equipment and services required to complete the work of alterations and make good to existing building according to the Specifications and/or Drawings.

1.2 PERMITS AND REGULATIONS

- 1.2.1 Arrange and pay for all permits, notices and inspections necessary for the proper execution and completion of the alteration work.
- 1.2.2 Follow Ontario Office of the Fire Marshall "Guidelines for Maintaining Fire Safety During Construction in Existing Buildings".

1.3 EXISTING BUILDING

- 1.3.1 Visit the site and become fully knowledgeable of existing building drawings and specifications and of conditions affecting the Work.
- 1.3.2 Ensure the operations of the existing building, the existing tenants' premises and access to the existing building areas, are not restricted or disrupted.
- 1.3.3 Before any work is commenced in any portion of the existing building, the Owner will remove all furnishing and movable furniture that do not require disconnecting from services, storing same in some other portion of the building or off the premises. All other items not removed from any section of the building being renovated, shall be removed from the premises by the Contractor.
- 1.3.4 Obtain Owner's approval to commence alterations in existing building.
- 1.3.5 The removal of hazardous and asbestos-containing materials is part of the contract and shall have been completed before any other work of this Contract is commenced.

PART 2 - PRODUCTS

2.1 SALVAGE MATERIALS

- 2.1.1 Salvage materials, products, and equipment indicated. Carefully remove items to be salvaged, protect during alteration and reinstall in locations indicated.
- 2.1.2 Refer to sprinkler, mechanical and electrical Drawings and specifications for sprinkler, mechanical and electrical work to be reused.

- 2.1.3 Salvage the items as indicated on the Drawings for reuse and return to the Owner in an adequately preserved and usable condition on date of Substantial Performance or other mutually agreed date:
- 2.1.4 All materials and products from the alteration not required for reuse shall become the property of the Contractor. Remove all material and debris from the site as quickly as possible and dispose of legally. Burning of debris on the site will not be permitted.

PART 3 - EXECUTION

3.1 SCREENS

- 3.1.1 Provide temporary fire rated partitions, screens, enclosures, tarpaulins etc., as may be required to enclose work areas from other areas of the building, to maintain security and to confine dust, noise and workmen to the work area. Locate screens as directed by the Consultant.
- 3.1.2 It is essential that the existing building be maintained weather-tight at all times. Provide temporary protection, enclosures, tarpaulins, etc., as may be required to weatherproof any openings made in the Work.
- 3.1.3 Construct fire rated, dust proof and wind-proof screens as required to completely enclose the work areas and the access passages to the work areas from the other areas of the existing building. Locate partitions as directed by the Consultant.
- 3.1.4 Build screens of 3-5/8" metal studs at 16" centres sheathed with sheets of 5/8" sheetrock firecode 'c' panels on both sides with close joints smoke and fire sealed at junctions typical. Where exposed to the weather, fully cover screens with a heavy waterproof and dustproof paper with lapped and sealed joints. Fill spaces between studs with 4" fibrous glass or mineral wool insulation batts to deaden sound.
- 3.1.5 Thoroughly pack framing and sealed at junctions of screens with floors, walls and ceilings with batt insulation in a manner to prevent infiltration of smoke, dust, dirt, etc. Over all junctions of screens with floors, walls and ceilings, apply continuous 1-1/2" wide strips of masking tape both sides of screen to ensure that rooms within closed off areas which are not being altered are kept dust free.

3.2 SEQUENCE OF ALTERATIONS

- 3.2.1 Schedule phasing of alterations and demolition as indicated on Drawings.

3.3 DEMOLITION

- 3.3.1 Demolition of, or alteration to, any portion of the existing buildings shall proceed only after approval of the Owner, and after weather-tight and dustproof partitions have been erected to provide thorough protection to the adjoining areas and rooms.
- 3.3.2 When permission has been granted to proceed with alterations in the existing buildings, work shall be carried out expeditiously and continuously to completion.

- 3.3.3 If suspected hazardous or contaminated materials are encountered, advise Consultant and await instructions regarding removal and disposal of such contaminants which may be considered hazardous to health, prior to demolition.
- 3.4 RECONSTRUCTION, ALTERATIONS AND MAKING GOOD
- 3.4.1 The work shown on the Drawings, Schedules and Specifications may or may not be all the work required, do all demolition, make good all finishes and execute all necessary work including incidentals to make a complete job of the alterations.
- 3.4.2 Do not undermine, damage, or endanger existing pipe lines, electrical conduit and wiring by digging, cutting or any other operation in the performance of the Work of the Contract. Immediately repair and make good to any existing work so affected to the Consultant's satisfaction at the Contractor's expense.
- 3.4.3 Cut off, cap, divert, or remove existing water, gas, electric and other services in areas being altered which are affected by the changes as required or as directed by the municipal authorities and the utility company concerned, and the Consultant. Protect and maintain active services to the existing building.
- 3.4.4 Perform the Work in such a manner so as to cause a minimum of noise or interference to the use of the existing building.
- 3.4.5 Whenever it becomes necessary to cut or interfere in any manner with existing apparatus for short periods of time, Do work at such times as agreed upon between the Owner, Consultant, and the Contractor.
- 3.4.6 Where new work connects with existing and where existing work is altered, all necessary cutting and fitting required making satisfactory connections with the existing work shall be performed under this Contract, so as to leave the entire work in a finished and workmanlike condition.
- 3.4.7 Make good materials and finishes which are damaged or disturbed during the process of additions and reconstruction under the Contract.
- 3.4.8 Where existing work is to be made good, the new work shall match exactly the old work in material, form, construction and finish unless otherwise noted or specified.
- 3.4.9 Perform drilling of existing work carefully, leaving a clean hole no larger than required.
- 3.4.10 Provide, throughout the entire construction period, proper and safe means of fire exit from all zones of the existing building at all times to the approval of the authorities having jurisdiction.
- 3.4.11 Protect work in the existing buildings, such as floors, finishes, trim, etc., as completely as possible to hold the replacing of damaged work by each Section to a minimum.
- 3.4.12 Provide openings through existing roof as required by new mechanical equipment. Maintain watertight at all times. Provide new blocking, curbs and cants and make good roof and provide flashing as may be required.

- 3.4.13 Protect existing roofs, roof flashings, parapets and all items on roofs from damages of any cause, and make good damages at no cost to the Owner.
- 3.4.14 Ensure the public is protected against falling debris, chemicals and water.
- 3.4.15 Properly co-ordinate the various Sections taking into account also the existing installations to assure the best arrangement of pipes, conduits, ducts and mechanical, electrical and other equipment, in the available space. Under no circumstances will any extra cost be allowed due to the failure by the Contractor to co-ordinate the work. If required, in critical locations, interference and/or installation drawings shall be prepared showing the work of the various Sections as well as the existing installation, and these drawings shall be submitted to the Consultant for review before the commencement of work.
- 3.4.16 Removal and relocation of mechanical and electrical items indicated as relocated and reused are specified under respective Mechanical and Electrical Drawings. Co-ordinate the removal and relocation of these items.
- 3.4.17 Remove existing finishes as indicated on the Drawings to neat, straight lines and leave substrate clean and even, suitable for new finishes indicated.
- 3.4.18 Without limiting the generality of the foregoing, do the following repairs:
1. Replace existing windows as located on the Drawings. Solidly anchor and make weather-tight.
- 3.4.19 Remove temporary partitions and screens when no longer required, and make good damaged or blemished adjoining work as directed by Consultant.

END OF SECTION

1 GENERAL

1.1 General Instructions

1.1.1 The Contractor shall retain and the Owner shall pay independent inspection companies who shall inspect and test site conditions, procedures and materials.

1.2 Duties and Authorities of Testing Agency

1.2.1 The Consultant shall prepare terms of reference for each testing agency. These terms of reference shall be submitted to the Contractor for review.

1.2.2 Testing agency is expected to do the following:

.1 Act on a professional and unprejudiced basis and carry out inspection and testing functions to establish compliance with requirements of Contract Documents, Working Drawings and Detailed Specifications.

.2 Check work as it progresses and prepare reports stating results of tests and conditions of work and state in each report whether specimens tested conform to requirements of Contract Documents, Working Drawings and Detailed Specifications, specifically noting deviations.

.3 Distribute reports as follows:

.1 Owner - 1 copy

.2 Consultant - 2 copies

.3 Building Department - 1 copy

.4 Contractor - 1 copy

.5 Sub-consultants (where applicable) - 1 copy

1.2.3 Testing agency is not authorized to amend or release any requirements of Contract Documents, Working Drawings nor Detailed Specifications, nor to approve or accept any portion of work.

1.3 Contractor's Responsibilities

1.3.1 The Contractor shall do the following:

.1 Notify testing agency minimum 48 hours in advance of operations to allow for assignment of personnel and scheduling of tests without causing delay in work.

.2 Provide testing agency with access to work at all times.

.3 Supply material samples for testing.

.4 Supply casual labor and other incidental services required by testing agency.

.5 Provide facilities for site storage of samples.

1.3.2 When initial inspection and testing indicates non-compliance with Contract Documents, Working Drawings or Detailed Specifications any subsequent re-inspection and re-testing occasioned by non-compliance shall be performed by same testing agency and cost thereof borne by the subcontractor.

END OF SECTION

1 GENERAL

1.1 Product Quality

1.1.1 Products supplied for work shall be new and as far as possible and unless otherwise specified, of Canadian manufacture.

1.2 Standards

1.2.1 The work of each trade shall be carried out by skilled, experienced personnel who have been certified to carry out the work by various trade associations and in accordance with the Apprenticeship and Trades Qualifications Act and applicable regulations.

1.2.2 Where reference is made to specification standards produced by various organisations, conform to the latest edition of the standards specified as amended and revised to the date of the Contract.

1.2.3 Each subcontractor must possess and be familiar with the specified standards which affect their work.

1.2.4 Generally, materials and workmanship shall meet or exceed the requirements of CAN/CSA, ASTM, CGSB, CAN/UL and manufacturer's printed instructions.

1.2.5 Where required, conform to the requirements of LEED® Certification.

1.3 Substitutions

1.3.1 The Contractor shall base his Tender Price upon the Tender Documents.

1.3.2 Prior to the Close of Tenders, the Owner and the Consultant may consider requests for substitutions from that specified in the Tender Documents, providing the requests are submitted in writing describing such substitutions in full detail, the type of material, equipment or method and reasons for deviating from the Tender Documents. In addition, submit any increase or decrease in price of any substitution.

1.3.3 In making a request for a substitution, confirm in writing that:

- .1 The Contractor has investigated the proposed product and method and determined it to be equal or superior in all respects to that specified.
- .2 The same guarantee is given for the proposed substitution as for the product and method originally specified.
- .3 The installation of the proposed substitution will be coordinated into the Work, and such changes in the Work will be made as required to accept the substitution and to ensure the Work is complete in all respects. The cost of changes in the Work necessary to incorporate a proposed substitution is to be included in any proposed increase or decrease to the Contract Price associated with the proposed substitution.

- .4 Do not substitute materials, equipment or methods unless such substitutions have been specifically approved in writing prior to the close of tenders by the Consultant.
- .5 The Owner reserves the right to accept or reject, at its sole discretion, any proposed substitution.

1.4 Workmanship

- 1.4.1 All work shall be carried out in accordance with the best trade practice, by mechanics skilled in the type of work concerned.
- 1.4.2 Products, materials, systems and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the applicable manufacturer's printed directions.
- 1.4.3 Where specified requirements are in conflict with manufacturer's written directions, follow manufacturer's directions, but inform the Consultant in writing prior to proceeding with affected work. Where specified requirements are more stringent than manufacturer's directions, comply with specified requirements.

END OF SECTION

1 GENERAL

1.1 General Requirements

- 1.1.1 Be responsible for cleanliness of the project to satisfaction of the Consultant. Maintain work in neat and orderly condition and free of ice and snow at all times.
- 1.1.2 Remove from site and legally dispose of rubbish and waste materials.
- 1.1.3 Burning or burying of rubbish and waste materials on site is not permitted.
- 1.1.4 Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- 1.1.5 Use cleaning material only on surfaces recommended by cleaning material manufacturer.

1.2 Cleaning During Construction

- 1.2.1 Remove debris, packaging and waste materials on a daily basis.
- 1.2.2 Keep dust and dirt to an acceptable level.
- 1.2.3 Remove oily rags, waste and other hazardous substances from premises at close of each day, or more often if required.

1.3 Final Cleaning

- 1.3.1 Upon completion of the Work, clean all surfaces and components utilizing the services of a professional cleaning company. Provide professional cleaning of all areas and surfaces to allow Owner to occupy without further cleaning.
- 1.3.2 Remove stains, dirt and smudges from finished surfaces.
- 1.3.3 Clean wall, ceiling and floor surfaces in accord with respective material manufacturer's recommendations.
- 1.3.4 Clean glass, remove stickers and paint; leave glass in spotless, polished condition; use cleaning liquids only.
- 1.3.5 Clean and polish hardware.
- 1.3.6 Clean mechanical and electrical fixtures and other fittings of labels, wrappings, paper and other foreign material.
- 1.3.7 Replace heating, ventilation and air conditioning filters.
- 1.3.8 Clean ducts, blowers and coils.
- 1.3.9 Upon completion of project, prior to Total Performance. Remove from site all waste and surplus materials.

END OF SECTION

PART 1 - GENERAL

1.1 CONTRACT COMMISSIONING

- 1.1.1 Comply with provisions of OAA, OCGA Document No. 100, April 1997 "Take-Over Procedures" except as modified herein or elsewhere in the Contract Documents.
- 1.1.2 Expedite and complete deficiencies and defects identified by the Consultant.
- 1.1.3 Submit required administrative and technical documentation, such as Statutory Declarations, Worker's Compensation Certificate, warranties, certificates of approval or acceptance from regulating bodies.
- 1.1.4 Review inspection and testing reports to verify conformation to the intent of the HalDocuments and that changes, repairs or replacements have been completed.

1.2 AS BUILT-DRAWINGS

- 1.2.1 Working and Record Drawings for this project shall be prepared on a CAD system.
- 1.2.2 Prior to Substantial Performance, prepare a CAD file set of Record Drawings based on the As-built Drawings and the Contract Drawings including all revisions, changes, deletions and additions made during execution of the Work.
- 1.2.3 Submit to the Owner a digital copy on a USB Drive, prior to application for Final Payment:
 - 1 PDF copy of all drawings listed on the List of Drawings
 - 2 CAD files of all drawings listed on the List of Drawings broken down into separate folders by discipline (Architectural, Site, Structural, Mechanical, and Electrical)
 - 3 CAD files shall include:
 - All x-refs, objects, blocks and images bonded into the drawings
 - Plot style
 - Room Signage (PDSB room numbers)
 - 4 CAD files to be saved in 2014 CAD version or earlier

1.3 MAINTENANCE INSTRUCTIONS AND DATA BOOK

- 1.3.1 Provide one electronic copy of maintenance instructions and data books, together with the record drawings as specified in the preceding Article, to the Owner prior to the date of Substantial Performance.
- 1.3.2 Submit one copy of the book for the Consultant's review prior to submitting the books to the Owner.
- 1.3.3 The books shall contain the name of the Contractor and the date of Substantial Performance for the Project. Supply the following data:
 - 1. Title sheet labelled "Operating and Maintenance Data" and listing project name, date,

- volume number, if applicable and names and addresses of Design-Build Contractor, and consultants.
2. List of contents. If more than one volume is required, provide a cross-reference contents page at front of each volume.
 3. Complete list of subcontractors and suppliers.
 4. Copy of finish hardware list, complete with all amendments and revisions.
 5. Complete listing of materials, products, and equipment including serial numbers,
 - i. manufacturer's names, and sources of supply.
 6. Description of each system, with the description of each major component of the
 - i. systems.
 7. Schedule of paints and coatings. Include sufficient explanation to fully identify each surface with the applicable paint or coating used. Enclose copy of color schedule.
 8. Operation and installation instructions for each assembly, component and system.
 9. Complete maintenance instructions for each assembly, component and system. Include warnings of harmful practices.
 10. Lists of spare parts for each assembly, component and system complete with names and addresses of suppliers.
 11. Cleaning, maintaining and preserving instructions for all materials, products and surfaces.
 - i. Include warnings of harmful cleaning, maintaining and preserving practices.
 12. A lubrication schedule of all equipment.
 13. Final reviewed shop drawings.
 14. Control schematics
 15. Copies of all warranties and extended warranties.
 16. Maintenance contracts
 17. Operating curves of mechanical and electrical equipment.
 18. Page-size Valve Tag Schedule and Flow diagrams.
 19. Water treatment procedures and tests.
 20. Final balancing reports for the mechanical systems.
 21. "As-built" drawing white prints and "as-built" CADD diskette.

22. Other data required elsewhere in Contract or deemed necessary by Consultant.
- 1.3.4 Books shall be three-ring hard cover loose-leaf binders, indexed as to contents and identified on the binding edges as "Maintenance Instructions and Data Book", with name of project. The binders shall contain the name of the Contractor and the date of Substantial Performance for the Project.
- 1.3.5 Terminology used in the various indexed sections of the books shall be consistent.
- 1.4 MAINTENANCE MATERIALS
- 1.4.1 Deliver to the site, unload and store where directed, maintenance materials specified in the various Sections of the Specifications. Obtain receipt from the Owner for delivered materials.
- 1.4.2 Package materials so that they are protected from mechanical damage and loss of essential properties.
- 1.4.3 Label packaged materials for proper identification of contents. If applicable give colour and finish, room number or area where material is used.
- 1.5 DISTRIBUTION SYSTEM DIAGRAMS
- 1.5.1 Prior to application for Substantial Performance, submit framed single line diagrams of the electrical distribution systems.
- 1.6 TRIAL USAGE AND INSTRUCTIONS – MECHANICAL
- 1.6.1 Thoroughly instruct the Owner's authorized representative in the safe operation of the systems and equipment.
- 1.6.2 Arrange and pay for the services of qualified manufacturer's representatives to instruct Owner on specialized portions of the installation; such as, refrigeration machines, boilers, automatic controls, and water treatment.
- 1.6.3 Submit a complete record of instructions as part of the maintenance instructions and data book given to the Owner. For each instruction period, supply the following data:
- .1 Date.
 - .2 System or equipment involved.
 - .3 Names of persons giving instructions.
 - .4 Names of persons being instructed.
 - .5 Other persons present.
- 1.6.4 Instructional period shall be carried out during a continuous period of 30 days.
- 1.6.5 The Owner shall be permitted trial usage of systems or parts of system for the purpose of testing and learning operational procedures. Trial usage shall not affect the warranties, not be construed as acceptance thereof; and no claim for damage shall be

made against the Owner for any injury or breakage to any part or parts of such systems due to the aforementioned tests, where such injuries and/or breakage are caused, directly or indirectly, by a weakness or inadequacy of parts, or by defective materials or workmanship of any kind whatsoever.

1.7 TRIAL USAGE AND INSTRUCTIONS – ELECTRICAL

1.7.1 Provide services of manufacturer's specialized representatives to instruct Owner in operation of systems and equipment. Coordinate training sessions for each type of operating system and equipment with qualified instructors and attendance of relevant subcontractor.

1.7.2 Permit the Owner's representatives, in order to familiarize themselves with the equipment, to operate systems for a reasonable period of time, as may be arranged.

1.7.3 Trial usage of any equipment by the Owner shall not affect the warranties, nor be construed as acceptance of the equipment or system, and no claim for damage shall be made against the Owner for injury or breakage to any part or parts of the aforementioned system or systems due to any such test, where such injuries or breakage are caused, in whole or in part, directly or indirectly, by a weakness or inadequacy of parts, or by defective materials or workmanship of any kind whatsoever.

1.7.4 Review information provided in maintenance instructions and data book with the Owner's representatives to ensure the Owner has a complete understanding of the electrical equipment and systems and their operation.

1.8 WARRANTIES

1.8.1 Extended warranties (warranties of more than two years duration) where specified in the Contract Documents, shall be provided by the Contractor and shall be in a form acceptable to the Consultant.

1.8.2 Where manufacturers offer, as a general policy, extended warranties on their products or other greater benefits than those called for in the specifications, the Contractor shall obtain the benefit of such extended warranties for the Owner and shall certify that he has done so before making the final claim for payment.

1.8.3 Upon completion of the Contract by the Contractor, or upon other termination of this Contract, the Contractor hereby agrees and covenants to assign to the Owner all warranties and guarantees which the Contractor has received from the sub trades employed by him on the Project.

1.8.4 Specified warranty periods shall not be construed as limiting the provisions of the General Conditions.

1.8.5 The carrying out of replacement work and making good of defects shall be executed at times convenient to the Owner and this may require work outside of normal working hours at the Contractor's expense.

1.9 SUBSTANTIAL PERFORMANCE OF THE WORK

1.9.1 Advise the Consultant in writing when the work has been substantially completed.

1.9.2 Prior to requesting a Substantial Performance submit the following:

1. Two copies of operating and maintenance manuals.
2. Two copies of inspection and acceptance certificates required from regulatory agencies.

1.9.3 Deficiency review:

.1 Neither Owner nor Consultant will be responsible for preparation or issuance of extensive lists of deficiencies. Contractor assumes prime responsibility for ensuring that items shown and described in the Contract Documents are complete. Any reviews to approve the certificate of Substantial Performance of the Work will be immediately cancelled if it becomes obvious to the Consultant that extensive deficiencies are outstanding.

.2 The Contractor shall conduct an inspection of the Work to identify deficiencies and defects, which shall be repaired. When the Contractor considers that the Work is substantially performed, the Contractor shall prepare and submit to the Consultant a comprehensive list of items to be completed or corrected and apply for a review of the Work by the Consultant to determine if Substantial Performance of the Work has been achieved.

.3 The Contractor's request described above shall include a statement by Contractor that the Work to be reviewed by Consultant for deficiencies is, to the best of the Contractor's knowledge, in compliance with Contract Documents, reviewed shop drawings, and samples, and that deficiencies and defects previously noted by Consultant have been repaired.

.4 No later than fifteen (15) working days after the receipt of the Contractor's request described above, but contingent upon the prior receipt, by the Consultant, of the closeout submittals in the manner and form specified in this section, the Consultant and the Contractor will review the Work to identify any defects or deficiencies. If necessary, the Contractor shall tabulate a list of deficiencies to be corrected prior to Substantial Performance of the Work being certified by the Consultant.

.5 During review, the Consultant and the Contractor will decide which deficiencies or defects must be rectified before Substantial Performance of the Work can be certified, and which defects are to be treated as warranty items.

.6 Provide a list and schedule of planned deficiency review having regard to the foregoing.

1.9.4 Certification of Substantial Performance of the Work:

.1 When the Consultant considers that the deficiencies and defects have been completed and that it appears that the requirements of the Contract Documents have been substantially performed, the Consultant shall issue a certificate of Substantial Performance of the Work to the Contractor, stating the date of Substantial Performance of the Work.

.2 The certificate of Substantial Performance of the Work shall be prepared in form required by Construction Lien Act.

1.9.5 Final Inspection for completion of the Contract:

.1 Deficiencies and defects shall be made good before the Contractor submits a written request for final review of the Work and before the Contract is considered complete.

.2 When Contractor is satisfied that the Work is complete, and after the Contractor has reviewed the Work to verify its completion in accordance with the requirements of the Contract Documents, the Contractor shall submit a written request for a final review by the Consultant, who in turn will notify the Owner.

.3 If there are any deficiencies identified as a result of this review, they shall be listed by the Consultant and submitted to the Contractor. This list shall be recognized as the final deficiency list for purposes of acceptance of the Work under the Contract.

.4 Such deficiencies shall be corrected by a date mutually agreed upon between Consultant and the Contractor, unless a specific date is required by Contract, and a further review by the Consultant shall be called for by the Contractor following his own review to take place within seven (7) days from date of request.

.5 Contractor shall thereafter submit invoice for final payment.

.6 Money shall be withheld for deficiency work and will be released only when all deficiencies have been completed. No partial payment to be recognized until all work is completed.

1.9.6 If the Contractor needs to return to the Place of the Work to complete deficiencies after the Owner has taken possession, the Contractor shall provide the Owner with a minimum of one (1) week's prior notice of such requirement.

END OF SECTION

1 GENERAL

1.1 Definition

1.1.1 Warranty = guarantee dated from date of Substantial completion.

1.2 Submission Requirements

1.2.1 Submit warranties as part of "Operating and Maintenance Manuals" in accord with requirements of Section 01 78 00.

1.2.2 Arrange warranties in systematic order matching Specification format. Include a table of contents listing warranties in same order.

1.2.3 Each warranty must show:

- .1 Name and address of project.
- .2 Name of Owner
- .3 Section Number and Title

1.2.4 All warranties issued by the manufacturer must be presented under the Contractor's letterhead, seal and signature and must bear the wording specified in Contract Documents.

1.3 List of Warranties

1.3.1 The following list of extended warranties is shown here for convenience only.

Item	Period
Entire Building, General Contract	1 year
Sealant	5 years
Caulking	5 years
Finish Hardware	3 years
Acoustic Ceilings	2 years
Paint and Finishing	2 years
Toilet Partitions	25 years
Mechanical	As specified under respective section
Electrical	As specified under respective section

1.3.2 Refer to Divisions 21 and 26 for Mechanical and Electrical warranty requirements.

END OF SECTION

1 GENERAL

- 1.1 The Contractor shall organize a warranty inspection to take place two weeks prior to the expiration of the standard one-year warranty. The Consultant, sub-consultants and trade contractors, the Contractor, and the Owner's representatives shall attend.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- 1.1.1 Comply with Division 1, General Requirements and all documents referred to therein.
- 1.1.2 Provide labour, materials, products, equipment and services required to complete the selective demolition work required and/or indicated on the Drawings and specified herein.
- 1.1.3 Visit site to establish extent of demolition to be carried out.
- 1.1.4 If suspected hazardous or contaminated materials are encountered, advise Consultant and await instructions regarding removal and disposal of such contaminants which may be considered hazardous to health, prior to demolition.

1.2 RELATED WORK

- 1.2.1 Removal of contaminated materials, friable asbestos containing materials, and PCB's, shall be by others prior to commencement of this Contract.
- 1.2.2 Removal and relocation of mechanical and electrical items indicated as relocated and reused are specified under respective Mechanical and Electrical Drawings. Co-ordinate the removal and relocation of these items.

1.3 REFERENCE STANDARDS

1.3.1 American National Standards Institute (ANSI):

- .1 ANSI A10.8-2011, Scaffolding Safety Requirements

1.3.2 National Fire Protection Association (NFPA):

- .1 NFPA 241-09, Standard for Safeguarding Construction, Alteration, and Demolition Operations

1.3.3 Provincial Legislation:

- .1 Legislation specific to Authority Having Jurisdiction for work governed by this Section

1.4 DEFINITIONS

- 1.4.1 Demolish: Detach items from existing construction and legally dispose of them off site, unless indicated to be removed and salvaged or removed and reinstalled.
- 1.4.2 Remove and Salvage: Detach items from existing construction and deliver them to Owner ready for reuse.

- 1.4.3 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- 1.4.4 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed, removed and salvaged, or removed and reinstalled.
- 1.5 EXAMINATION
 - 1.5.1 Visit and examine the site and note all characteristics and irregularities affecting Work of this Section. Submit a pre-demolition inspection report. Ensure the Owner of premises being inspected is represented at inspection.
 - 1.5.2 Where appropriate prepare a photographic or video record of existing conditions, particularly of existing work scheduled to remain.
 - 1.5.3 Where applicable, examine adjacent tenancies not part of the scope of work. Determine extent of protection required to areas and related components not subject to demolition.
- 1.6 PROTECTION
 - 1.6.1 Do not commence demolition until all personnel and Owner's equipment are removed from the area being demolished.

PART 2 - PRODUCTS

- 2.1 SALVAGE MATERIALS
 - 2.1.1 Salvage materials, products, and equipment indicated. Carefully remove items to be salvaged, protect during alteration and reinstall in locations indicated.
 - 2.1.2 Refer to sprinkler, mechanical and electrical Drawings and specifications for sprinkler, mechanical and electrical work to be reused.
 - 2.1.3 Salvage the following items for reuse and return to the Owner in an adequately preserved and usable condition on date of Substantial Performance or other mutually agreed date:
 - .1 Millwork, fire extinguishers, lockers, lights, clocks, bells and plumbing fixtures.
 - .2 Remove existing ceiling and light fixtures, as indicated for reuse or return to the Board.
 - 2.1.4 All materials and products from the demolition except noted otherwise shall become the property of the Contractor. Remove all material and debris from the site as quickly as possible and dispose of legally. Burning of debris on the site will not be permitted.
 - 2.1.5 Salvage materials, products, and/or equipment as directed by the Consultant. Remove carefully items to be salvaged to the locations designated. Protect during demolition and store above items. Materials and/or equipment directed to be salvaged shall remain the property of the Owner.

2.2 REPAIR MATERIALS

2.2.1 Use repair materials identical to existing materials:

- .1 If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
- .2 Use a material whose installed performance equals or surpasses that of existing material.
- .3 Comply with material and installation requirements specified in individual Specification Sections.

2.2.2 Floor Patching and Levelling Compounds: Cement based, trowel-able, self-levelling compounds compatible with specified floor finishes; gypsum based products are not acceptable for work of this Section.

2.2.3 Concrete Unit Masonry: Lightweight concrete masonry units, and mortar, cut and trimmed to fit existing opening to be filled. Provide standard hollow core units, square end units and bond beam units as indicated on drawings.

2.2.4 Brick: Install brick and mortar, cut and trimmed to fit existing opening to be filled, once demolition of hollow metal door and frame is completed. Match brick and mortar to existing adjacent materials as approved by the Consultant. Provide ties and accessories as required to complete the installation.

2.2.5 Gypsum Board Patching Compounds: Joint compound to ASTM C475, bedding and finishing types thinned to provide skim coat consistency to patch and prepare existing gypsum board walls ready for new finishes in accordance with Section 09 21 16 – Gypsum Board Systems.

2.2.6 Fireproofing: Patch and repair all fireproofing damaged during demolition of adjacent surfaces with compatible fireproofing materials. Provide test reports from fireproofing manufacture warranting installation, adhesion and compatibility between existing and new fireproofing materials.

2.2.7 Roofing: Remove no more existing roofing than can be covered in one day by new roofing. Refer to Division 7 for new roofing requirements.

PART 3 - EXECUTION

3.1 SEQUENCE OF ALTERATIONS

3.1.1 Schedule sequence of alterations and demolition as indicated on Drawings.

3.2 SCREENS

3.2.1 Provide temporary barriers, guard rails, protective covers, screens, enclosures, tarpaulins etc., as may be required to enclose work areas from other areas of the building, to maintain security, to confine dust, noise and workmen to the work area, and to give full protection to the public, building occupants, workmen employed for demolition

and to adjoining property, in compliance with authorities having jurisdiction. Locate screens as directed by the Consultant.

- 3.2.2 It is essential that the existing building be maintained weathertight at all times. Provide temporary protection, enclosures, tarpaulins, etc., as may be required to weatherproof any openings made in the Work.
- 3.2.3 Construct dustproof and windproof screens as required to completely enclose the work areas and the access passages to the work areas from the other areas of the existing building. Locate partitions as directed by the Consultant.
- 3.2.4 Build screens of 90 mm (3-5/8") metal studs at 400 mm (16") centres sheathed with sheets of 16 mm (5/8") gypsum board on both sides with close joints. Where exposed to the weather, fully cover screens with a heavy waterproof and dustproof paper with lapped and sealed joints. Fill spaces between studs with 100 mm (4") fibrous glass or mineral wool insulation batts to deaden sound.
- 3.2.5 Thoroughly pack framing at junctions of screens with floors, walls and ceilings with batt insulation in a manner to prevent infiltration of dust, dirt, etc. Over all junctions of screens with floors, walls and ceilings, apply continuous 40 mm (1-1/2") wide strips of masking tape both sides of screen to ensure that rooms within closed off areas which are not being altered are kept dust free.
- 3.2.6 Remove screens and make good damaged or blemished adjoining work when directed.

3.3 EXISTING SERVICES

- 3.3.1 Arrange and pay for the disconnection, capping and for plugging of all gas, water, hydro, telephone and other services to the structures.
- 3.3.2 Notify in advance each utility company involved and obtain approvals before commencing work.

3.4 DEMOLITION WORK

- 3.4.1 Refer to Drawings for extent of selective demolition work. Do all demolition work not specified to be done under other Sections.
- 3.4.2 Carry out selective demolition in strict accordance with provincial and municipal authorities having jurisdiction.
- 3.4.3 Take precautions to guard against movement of existing building and structures and displacement of elements of the building to remain. If at any time the safety of such elements appear to be in danger, suspend operations and notify the Consultant promptly. Take measures to support such elements. Do not resume demolition until the Consultant issues instructions.
- 3.4.4 The work shown on the Drawings, Schedules and Specifications may or may not be all the work required, do all demolition, make good all finishes and execute all necessary work including incidentals to make a complete job of the alterations.

- 3.4.5 Cut off, cap, divert, or remove existing water, gas, electric and other services in areas being altered which are affected by the changes as required or as directed by the municipal authorities and the utility company concerned, and the Consultant. Protect and maintain active services to the existing building.
- 3.4.6 Perform the Work in such a manner so as to cause a minimum of noise or interference to the use of the existing building.
- 3.4.7 Whenever it becomes necessary to cut or interfere in any manner with existing apparatus for short periods of time, Do work at such times as agreed upon between the Owner, Consultant, and the Contractor.
- 3.4.8 Where new work connects with existing and where existing work is altered, all necessary cutting and fitting required to make satisfactory connections with the existing work shall be performed under this Contract, so as to leave the entire work in a finished and workmanlike condition.
- 3.4.9 Make good materials and finishes which are damaged or disturbed during the process of additions and reconstruction under the Contract.
- 3.4.10 Where existing work is to be made good, the new work shall match exactly the old work in material, form, construction and finish unless otherwise noted or specified.
- 3.4.11 Perform drilling of existing work carefully, leaving a clean hole no larger than required.
- 3.4.12 Provide, throughout the entire construction period, proper and safe means of fire exit from all zones of the existing building at all times to the approval of the authorities having jurisdiction.
- 3.4.13 Protect work in the existing buildings, such as floors, finishes, trim, etc., as completely as possible to hold the replacing of damaged work by each Section to a minimum.
- 3.4.14 Properly co-ordinate the various Sections taking into account also the existing installations to assure the best arrangement of pipes, conduits, ducts and mechanical, electrical and other equipment, in the available space. Under no circumstances will any extra cost be allowed due to the failure by the Contractor to co-ordinate the work. If required, in critical locations, interference and/or installation drawings shall be prepared showing the work of the various Sections as well as the existing installation, and these drawings shall be submitted to the Consultant for review before the commencement of work.
- 3.4.15 Remove existing finishes as indicated on the Drawings to neat, straight lines and leave substrate clean and even, suitable for new finishes indicated.
- 3.4.16 At the end of each work shift leave work in a safe condition so that no part of the building or its finishes are in danger of toppling, collapsing or falling.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

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

1.1.2 Provide all labour, materials, products, equipment and services to finish and cure concrete floors, concrete toppings, floating slabs and horizontal surfaces required and/or indicated on the Drawings and specified herein.

1.2 RELATED WORK UNDER OTHER SECTIONS

1.2.1 Cast-In-Place Concrete: Section 03 30 00.

1.3 REFERENCES

1.3.1 ACI 117-2010 Standard Tolerances for Concrete Construction and Materials.

1.3.2 ACI 308R-01 Guide to Curing Concrete.

1.3.3 ASTM C309-11 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

1.3.4 ASTM C494/C494M-15 Standard Specification for Chemical Admixtures for Concrete

1.3.5 ASTM C1315-11 Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete

1.3.6 CSA A23.1-14/A23.2-14 Concrete materials and methods of concrete construction/Test methods and standard practices for concrete

1.4 ADMINISTRATION REQUIREMENTS

1.4.1 Coordination: Coordinate a meeting between the Contractor, Subcontractor responsible for concrete placement, and the Consultant to determine Site Quality Control testing section borders and sample measurement line locations, method of measurement, and accuracy requirements of the measuring devices.

1.4.2 Pre-Construction Meetings: Arrange meeting with Contractor, Subcontractor for work of this Section and other Subcontractors affected by work of this Section to discuss effects and issues governing installation of concrete finishing materials; prepare an outline agenda for meeting in accordance with Division 1.

1.5 QUALIFICATION

1.5.1 Work of this Section shall be performed by an approved, established floor finishing company having a proven record of satisfactory workmanship for a period of at least 5 years. Submit proof of this requirement to the Consultant well in advance of concrete finishing operations.

1.6 SUBMITTALS

1.6.1 Submit maintenance instructions for finishes supplied under this Section.

- 1.6.2 Product Data: Submit manufacturers product data for each materials specified including recommended application rates and methods of installation.
- 1.6.3 Minimum four weeks prior to placing of any cover slabs over waterproofing membranes, submit drawings showing proposed locations of control joints in cover slab.
- 1.6.4 Minimum two weeks prior to starting concrete work, submit proposed quality control procedures for Consultant's review for finishing, curing and protection.
- 1.6.5 LEED Projects: Submit product data for sealers and coatings, including printed statement of VOC content and chemical composition showing compliance with SCAQMD rule #1168. Include statement indicating the amount of materials used on the Project. Contractor and/or Subcontractor shall provide completed forms in accordance with Section 01 35 00.
- 1.7 JOB MOCK UP
 - 1.7.1 At location on site as directed by the Consultant, provide a completely finished sample area, 1.2 m x 1.2 m (4' x 4,) of integrally coloured and sealed, steel trowelled concrete floor for his approval.
 - 1.7.2 For accurate colour, the quantity of concrete mix to produce the sample shall not be less than 3 cu yds. Excess material shall be discarded according to local regulations.
 - 1.7.3 Remove mock-ups that are designated by the Consultant as unsuitable for incorporation in the Work.
 - 1.7.4 If finishing is unacceptable, provide additional mock-ups until workmanship is approved.
 - 1.7.5 Approved mock-up will serve as a standard by which subsequent Work will be judged acceptable.
- 1.8 JOB CONDITIONS
 - 1.8.1 Environmental Requirements:
 - .1 Perform Work only when environmental conditions are as specified in Section 03300.
 - .2 Ensure that adequate temporary heating is provided as required for cold weather work.
 - .3 Provide adequate moisture, sun shades and wind barriers to prevent too rapid drying of concrete during hot weather.
- 1.9 PROTECTION
 - 1.9.1 Keep traffic which would affect or disturb the curing procedures off the finished surfaces for a period of 7 days minimum.
 - 1.9.2 Protect exposed concrete finishes against damage until the building is accepted by the Owner.
 - 1.9.3 Protect floors which are to receive an architectural finish or traffic membrane system against contamination by oil, paint or other deleterious materials.
 - 1.9.4 Protect items set into floors from damage; ensure that alignment is not disturbed.

PART 2 - PRODUCTS

2.1 MATERIALS

- 2.1.1 Unless specified otherwise, materials shall meet requirements of Section 03300.
- 2.1.2 Ensure that concrete supplied for slabs contain no admixtures which would be incompatible with floor hardener materials or other applied finishes.
- 2.1.3 Curing materials shall be compatible with finish to be applied to concrete, and comply with ASTM C308.
- 2.1.4 Curing compound: Dissipating, liquid membrane forming curing compound.
 - .1 Basis of Design Materials:
 - .1 Kurez DR Vox by The Euclid Chemical Company, or other approved manufacture.
- 2.1.5 Combination curing and sealing compound shall meet requirements of ASTM C1315 and EPA regulation for maximum allowable VOC content.
- 2.1.6 Curing compound shall meet requirements of ASTM C309, and ASTM C1315 and EPA regulation for maximum allowable VOC content.
- 2.1.7 Combination Curing and Sealing Compound:
 - .1 Chlorinated rubber based compound, conforming to ASTM C309, Type 1; Class B, water based acrylic curing and sealing compound, compatible with surface hardener where hardener is used, when temperature permits:
 - .1 Florseal WB 25 by Sika Canada Inc.
 - .2 Aqua-Cure VOX by Euclid Chemical Company.
 - .3 VOCOMP-20 by W.R. Meadows of Canada Ltd., or other approved manufacture.
 - .2 Solvent based when required due to application temperature:
 - .1 Super Floor Coat by Euclid Chemical Canada Inc., or other approved manufacture.
 - .3 If product listed exceeds VOC limits replace with product that meets VOC limits and is acceptable to the Consultant.
- 2.1.8 Laminated waterproof paper consisting of laminations of kraft paper and water resistant materials capable of retaining the moisture in the concrete and tough enough to remain intact for the specified curing time.
- 2.1.9 Curing blanket for moist curing: Burlap sheet, or proprietary blanket fabricated for moist curing..
- 2.1.10 Plastic sheet for moist curing: Polyethylene sheet not less than [0.102 mm|4 mils] thick, clear for interior, white for exterior applications.
- 2.1.11 Non-metallic hardener: Premixed, selected natural grades of mineral aggregates including emery particles, having a Mohs Hardness 8 or better, pre-blended wetting and densifying agents and Portland cement.
 - .1 Diamag 7 by Sika Canada Inc.
 - .2 MasterTop 100 by BASF,
 - .3 Floor Hardener Pre-Mix by CPD Construction Products, or other approved manufacture.

- 2.1.12 Coloured admix for coloured concrete floor slabs: Colour as selected by Consultant. Admixture shall be a coloured, water-reducing, admixture containing no calcium chloride with colouring agents that are limeproof and ultra-violet resistant.
- .1 Chromix P Admixture and Chromix L by L.M. Scofield Company or other approved manufacture.
- 2.1.13 Curing and sealer for use with coloured concrete finish: Complying with ASTM C309 and be of the same manufacture as coloured admixture. Sealing and curing compound:
- .1 Cureseal-S Matte by L.M. Scofield Company or other approved manufacturer.
- 2.1.14 Integral colour mix:
- .1 Interstar Liquid Color by Interstar Materials Inc., or other approved manufacture.
- 2.1.15 Liquid chemical hardener:
- .1 Surfhard by Euclid Admixtures Canada Inc., or other approved manufacture.
- 2.1.16 Premixed, coloured, non-metallic hardener:
- .1 Colorplete by Sika Canada Inc., or other approved manufacture.
- 2.1.17 Stain for concrete floor slabs: Chemically reactive chemical stain:
- .1 Lithochrome Chemical Stain by L.M. Scofield Company or other approved manufacture. Colour as selected by Consultant.
- 2.1.18 Sealer for use with stained concrete finish:
- .1 Cementone Clear Sealer by L.M. Scofield Company, or other approved manufacture.
- 2.1.19 Admix for colour-conditioned concrete floor slabs: Single component, coloured, water-reducing, set-controlling admixture, complying with ASTM C494:
- .1 Chromix Admixture by L.M. Scofield Company, or other approved manufacture. Colour as selected by Consultant.
- 2.1.20 Joint filler: Self-levelling, 2-component, solvent free, moisture insensitive epoxy resin:
- .1 Sikadur 51/SL by Sika Canada Inc., or other approved manufacture.
- 2.1.21 Joint filler for control joints in floors which will be covered by an architectural finish: same as specified for exposed control joints, or use sand, cement, and additive grout mixture, mixed 2 parts sand, 1 part cement, 1 part additive.
- 2.1.22 Joint filler for control joints: Load bearing, epoxy-urethane filler:
- .1 Loadflex by Sika Canada Inc.
 - .2 Eco 700 by Euclid Admixture Canada Inc., or other approved manufacture.

- 2.1.23 Grout: For filling cracks and control joints: 1 part cement to 2 parts fine concrete sand wetted with additive/water solution to manufacturer's directions to provide suitable mix. Colour, texture and strength to match adjacent surfaces.
- 2.1.24 Non-slip inserts: Contractor's choice of either slot blocked-out during forming and pouring procedures or rout-out after concrete has cured and filled with aluminum-oxide and epoxy abrasive fill.
- 2.1.25 Non-slip aggregate: Aluminum oxide aggregate:
- .1 A-H Emerundum, by Anti-Hydro Canada Inc., or other approved manufacture.
- 2.1.26 Non-slip aggregate: Alumdum aggregate. No. 00 [0.4 mm to 2.4 mm|1/64" to 3/32"], grey, by the Norton Co. Ltd., or other approved manufacture.
- 2.1.27 Non-slip inserts:
- .1 Type 610 aluminum Super Grit by Wooster Products Inc.
 - .2 CT-22/138A by K.N. Crowder Mfg. Ltd., or other approved manufacture.
- 2.1.28 Non-slip stair nosings:
- .1 Type WP-3C (WP-3-SP with lip) Sure-Hold by Wooster Products Inc.,
 - .2 CT-20/3A (CT-21/3A with lip) by K.N. Crowder Mfg. Ltd., or other approved manufacture.
- 2.1.29 Sealer for exterior Concrete: 50:50 mixture of boiled linseed oil conforming to CAN/CGSB 1.2 cut back with kerosene.
- 2.1.30 Sealer:
- .1 Prothane urethane sealer by Proseal Concrete Floor Care Systems Inc.
- 2.1.31 LEED PROJECTS: Provide sealers and coatings with VOC content limits less than stated for the State of California's South Coast Air Quality Management District (SCAQMD) Rule #1106, current edition.

PART 3 - EXECUTION

- 3.1 LEVELLING AND FLOATING
- 3.1.1 Strike off concrete after it is placed, level and flush and then level and consolidate with a wooden darby or bullfloat. Complete levelling and consolidation before free moisture (bleeding) rises to surface.
- 3.1.2 When concrete has stiffened sufficiently to sustain foot pressure and after removing free bleed water, float concrete with hand or power float.
- 3.1.3 Co-ordinate work of this Section with work of Section 07145, Capillary Concrete Waterproofing for areas where capillary waterproofing is required to be floated into slabs.
- 3.1.4 Depress slabs where required to receive finishes.
- 3.1.5 Slope floors uniformly to floor drains where indicated. At isolated floor drains, depress level floor 6 mm locally, slope uniformly to drain.

3.2 CONTROL JOINTS

- 3.2.1 Provide sawcut control joints in concrete slabs and toppings, located on column centre lines, unless closer spacing is indicated. Saw-cut as soon as it is practicable to work the slab without tearing out course aggregate.
- 3.2.2 Cut joints in slabs on grade 5 mm (3/16") wide x 1/4 the depth of the slab.
- 3.2.3 Within four weeks, grout control joints.
- 3.2.4 Fill control joints with epoxy type filler where exposed; fill control joints to be covered with architectural finish using either epoxy joint filler as for exposed locations, or the sand/cement/grout mixture specified under Materials.
- 3.2.5 Rake out dirt in joints with an appropriate tool. Blow dirt out of joints with compressed air. Clean the floor surface by vacuuming with industrial type vacuum cleaner.
- 3.2.6 Apply filler in accordance with manufacturer's instructions, using the recommended application method.
- 3.2.7 Provide expansion joints in concrete walks, sidewalks and curbs spaced [4600mm | 15'-0"] o.c., and provide v-groove control joints in walks and sidewalks spaced [1500mm | 5'-0"] o.c.

3.3 CONTROL JOINTS IN SLABS ON GRADE

- 3.3.1 Refer to Section 03 30 00 - Cast-In-Place Concrete.
- 3.3.2 Use [3 mm|1/8"] "Soff-Cut" saw. Commence saw cutting within 2 hours of final surface finishing or when slab surface can support weight of saw and operator without disturbing the final finish.
- 3.3.3 Saw cut unreinforced slabs to a depth of [40 mm|1-1/2"].
- 3.3.4 For slabs that will be covered with architectural finish which will conceal joint, prepare the joints as follows:
 - .1 Clean residue from the joint.
 - .2 Fill joint with latex/sand/cement grout mixture and work into joint, or place fine silica sand in bottom of joint and fill top [25 mm|1"] of joint with epoxy joint filler to flush with top surface, do not overfill.
- 3.3.5 For slabs that will remain as exposed concrete, prepare and fill joints as follows:
 - .1 Clean saw cut residue from floor.
 - .2 Clean residue from joint by power washing with an [8 Mpa\1200 psi] water jet and allow to dry.
 - .3 Install polyethylene sealant backer rod of diameter sized 25% greater than joint width, flush with top of floor, to exclude dirt. Leave to receive final preparation and joint sealant under Section 07 90 00.

3.4 NON-SLIP INSERTS AND AGGREGATE

- 3.4.1 Install non-slip inserts in concrete and concrete-filled steel stairs, at nosings of landings and treads unless they are shown to have architectural applied finish.

- 3.4.2 Install non-slip inserts in concrete pedestrian ramp, at [300 mm|12"] o.c. Finish inserts slightly above adjacent surfaces.
- 3.4.3 Stop inserts [75 mm|3"] short of each side.
- 3.4.4 Install non-slip aggregate to concrete-filled steel stair treads and landings where no architectural applied finish will be applied. Apply aggregate in accordance with manufacturer's instructions.
- 3.5 STEEL TROWEL FINISH
 - 3.5.1 After floating, trowel surface with steel hand or float trowel keeping blade flat at first and raising blade angle little more on subsequent passes. Leave surface smooth, dense, of fine uniform texture without a swirl.
- 3.6 SWIRL FINISH
 - 3.6.1 In the final trowelling of Steel Trowel Finish, where swirled finish is scheduled, impart a slightly textured surface to the concrete by spin trowelling, moving the trowel in a "swirling" or circular motion, in such a way as to produce a spin trowelled (swirled) texture or pattern on the surface.
- 3.7 BROOM FINISH FOR BOND
 - 3.7.1 After floating, broom the substrate with a stiff bristle broom in one direction.
- 3.8 BROOM FINISH FOR NON-SLIP
 - 3.8.1 After steel trowelling, lightly broom the surface with a bristle push broom to obtain a fine even texture finish.
- 3.9 MOIST CURING
 - 3.9.1 Cover the concrete with non-staining burlap or canvas coverings. Keep surface continuously wet. When concrete has hardened sufficiently, it may be covered with sand which shall be kept moist. Keep concrete moist for a minimum period of seven consecutive days.
- 3.10 PLASTIC FILM CURING
 - 3.10.1 Cover concrete with polyethylene sheets.
 - 3.10.2 Lap all edges [100 mm|4"] minimum and seal all laps.
 - 3.10.3 Leave in place for a minimum of seven consecutive days.
- 3.11 COMBINATION CURING AND SEALING COMPOUND
 - 3.11.1 Apply combination curing and sealing compounds in strict accordance with manufacturers' specifications and as required to properly cure and seal the surfaces.
 - 3.11.2 After application of combination curing and sealing compound, protect surface with laminated waterproof paper or plywood or other approved protection.
 - 3.11.3 Apply one coat at completion of floor finishing. Apply second coat immediately prior to take-over, after proper cleaning of concrete floor.

3.12 INTEGRAL COLOUR MIX

- 3.12.1 Apply integral colour mix into plastic concrete in accordance with manufacturer's written instructions.
- 3.12.2 After levelling and floating, shake apply 1/2 of the colour mix as soon as concrete is firm enough to support weight and equipment and no standing water is present on the surface. Apply mix evenly over the floor surface in one direction commencing along walls, forms, doorways, columns and the like.
- 3.12.3 Machine float just enough to bring moisture completely through the mix and embed and compact the mix into the base concrete.
- 3.12.4 Immediately following the floating of the first mix apply the balance of the mix. Spread evenly and in a direction perpendicular to the first mix. Float as specified for the first mix.
- 3.12.5 Additional floating to further compact the surface may be done depending on time and setting characteristics of the concrete.

3.13 STAINED CONCRETE

- 3.13.1 Apply chemically reactive concrete stain to concrete slabs, where shown on Drawings, in accordance with manufacturer's instructions.
- 3.13.2 Apply sealer in matching colour to stained concrete.
- 3.13.3 Provide colours and saw-cut patterns in stained concrete as shown.

3.14 SHAKE HARDENED CONCRETE FINISH/INTEGRAL COLOUR MIX

- 3.14.1 After levelling and floating, shake apply 1/2 of the hardener as soon as concrete is firm enough to support weight and equipment and no standing water is present on the surface. Apply hardener evenly over the floor surface in one direction commencing along walls, forms, doorways, columns and the like.
- 3.14.2 Machine float just enough to bring moisture completely through the shake and to embed and compact the shake into the base concrete.
- 3.14.3 Immediately following the floating of the first shake apply the balance of the hardener. Spread evenly and in a direction perpendicular to the first shake. Float as specified for the first shake.
- 3.14.4 Additional floating to further compact the surface may be done depending on time and setting characteristics of the concrete.
- 3.14.5 After floating, steel trowel floor to non-slip swirl finish.
- 3.14.6 Apply premixed coloured, non-metallic hardener at the rate of:
 - .1 [5 kg/m²|1 lb/ft²] in change rooms
 - .2 [7 kg/m²|1.4 lb/ft²] in garage and service bays
 - .3 [9 kg/m²|1.8 lb/ft²] in roller rinks
- 3.14.7 Apply natural mineral, non-metallic hardener at the rate of:

- .1 [2.5 kg/m²|0.5 lb/sq.ft.] in stair treads, pedestrian ramps
- .2 [3.6 kg/m²|0.74 lb/ft²] in warehouse floors

3.14.8 Apply non-metallic hardener at the rate of:

- .1 [3 kg/m²|0.6 lb/ft²] in change rooms, store rooms
- .2 [5 kg/m²|1 lb/ft²] in manufacturing areas
- .3 [8 kg/m²|1.64 lb/ft²] in roller rinks

3.14.9 Moist cure apply curing compound as soon after trowelling and the surface will not be damaged by applicator and equipment.

3.15 NON-METALLIC HARDENED CONCRETE FINISH

3.15.1 After levelling and floating apply hardener as soon as concrete is firm enough to support weight and equipment and no standing water is present on the surface.

3.15.2 Spread material evenly by sprinkling at right angles in two passes close to floor level.

3.15.3 Float shake application promptly. Work wall, column and door areas first. Avoid excessive floating, but ensure that the shake application is completely wetted and incorporated into the base slab.

3.15.4 Immediately following the floating of the first shake apply the balance of the hardener. Spread evenly and in a direction perpendicular to the first shake. Float as specified for the first shake.

3.15.5 Additional floating to further compact the surface may be done depending on time and setting characteristics of the concrete.

3.15.6 After floating, steel trowel floor to non-slip swirl finish.

3.15.7 Apply premixed, non-metallic hardener at the rate of [3.6 kg/m²|75 lb/100 ft²].

3.15.8 Apply curing compound, complying with ASTM C309, as soon after trowelling and the surface will not be damaged by applicator and equipment.

3.16 CHEMICALLY HARDENED CONCRETE FINISH

3.16.1 Apply 2 coats of chemical hardener, not sooner than 28 days after concrete has been allowed to cure, unless otherwise recommended by manufacturer of chemical hardener. Application may be delayed provided sufficient time is allowed for hardener to dry before application of subsequent finish.

3.16.2 Ensure that surfaces are thoroughly cured, dry, and free from dust, and other foreign substances which would inhibit proper application of liquid compound, and have been moist cured.

3.16.3 Remove oil, grease, dirt and other foreign substances on surfaces. Apply chemical hardener as directed by manufacturer, spread evenly, avoiding puddles, allow to dry.

3.16.4 Check application of first coat for accumulation of surplus hardener in low spots.dry.

3.16.5 Apply second coat.

3.17 CHEMICAL HARDENER

- 3.17.1 Apply chemical hardener, not sooner than 28 days after concrete has cured, unless otherwise recommended by manufacturer of chemical hardener. Allow sufficient time per manufacturer's directions, for hardener to dry before application of subsequent finish.
- 3.17.2 Ensure that surfaces are thoroughly cured, dry, and free from dust, and has been moist cured.
- 3.17.3 Remove oil, grease, dirt and other foreign substances on surfaces. Apply chemical hardener as directed by manufacturer.
- 3.18 REMEDIAL WORK
- 3.18.1 Grind floor levels which do not comply with specified tolerances to the tolerances required, or level with epoxy or latex compound.
- 3.18.2 Obtain approval of method for correcting tolerances before proceeding.
- 3.18.3 Immediately prior to installation of applied floor finishes but not sooner than 28 days after concrete has been placed, examine concrete floor surfaces and repair cracks. Rout cracks which exceed [0.8 mm|1/32"] in width with mechanical router to [13 mm|1/2"] square cross section. Clean and fill cracks as specified for control joints.
- 3.18.4 Grinding of hardened concrete surfaces is to be avoided.
- 3.19 TOLERANCES
- 3.19.1 Levels of finished concrete floors and floors under finished flooring applications shall be to CAN/CSA A23.1 standards. Under waterproofing, traffic topping resilient and seamless flooring, finish levels shall not vary more than [1.6 mm|1/16"] in any running [300 mm|1'-0"].
- 3.19.2 Levels of finished concrete floors and floors under finishing applications shall be to ACI 117 standards. Under waterproofing, resilient and seamless flooring, finish levels shall not vary more than [1.6 mm|1/16"] in any running [300 mm|1'-0"]
- 3.19.3 Finish slab for specialized operations (i.e. narrow aisle warehouses, television studios, and air-pallet systems) 'super flat', with flatness number F_f exceeding 100 and levelness F_l number exceeding 50, when tested in accordance with ASTM E1155.
- 3.19.4 Levels of finished concrete floors and floors under finished flooring applications shall be finished to surface tolerances as listed in Table 16 of CAN/CSA A23.1, Class A, and Appendix D and E, when tested in accordance with CAN/CSA A23.2-10B.
- 3.19.5 Completed surfaces shall not vary more than [6 mm in 3 m|1/4" in 10'-0"] from dead level, F_f 25, F_l 20. Except where slopes and slopes to drains are required.
- 3.20 URETHANE SEALER
- 3.20.1 Allow concrete floors to receive urethane sealer to cure 2 to 3 weeks.
- 3.20.2 Acid etch, rinse and allow to dry.
- 3.20.3 Prime with water borne epoxy and apply 2 coats of Prothane at the site of [6.2 sq.m/1|300 sq.ft./gal] per application, giving a [1.5 mm|6 mil] thickness.

3.21 SLIP RESISTANT FILL

3.21.1 Form or rout cast-in-place concrete to provide two rows of grooves at stair treads and landings of cast-in-place and concrete filled stairs, unless they are shown to have architectural applied finish, other than paint or similar thin coating.

3.21.2 Terminate grooves [75 mm|3"] short of each side.

3.21.3 Fill with non-slip abrasive aggregate mix, finish slightly above adjacent surface in neat, straight line.

3.22 SCHEDULE

3.16.2 The following curing methods and finishes shall be applied to the corresponding surfaces:

SURFACE	CURING METHODS	FINISH
Exposed concrete floors and toppings	Combination curing and sealing	Steel trowel
Polished concrete floors	Combination curing and chemical hardener	Steel trowel, phenolic diamond grinding
Concrete to accept resilient flooring	Combination curing and sealing	Steel trowel
Concrete to accept stone / brick paving and ceramic tile applied using thin bed or adhesive method	Moist cure	Steel trowel
Concrete to accept marble tile and brick paving applied using mortar bed system	Moist cure	Wire broomed for bond after floating
Concrete to accept special flooring, seamless flooring, or similar thin, fluid applied finishes	Moist cure	Steel trowel
Carpet, including areas scheduled to receive carpet by tenants.	Moist cure or cure and seal	Steel trowel
Concrete to accept wood flooring	Combination curing and sealing	Steel trowel
Waterproofing and roofing membranes	Moist cure	Steel trowel
Parking garage floors and ramps	Moist cure	Steel trowel
Exposed concrete stair treads and landings	Combination curing and sealing compound	Swirl or coarse non-bristle slipbrush broomed
Concrete stairs and landings		Add silica sand to final coat
Concrete to receive traffic topping	Moist cure	Steel trowel
Concrete to receive urethane sealer	Moist cure	Steel trowel
Loading dock and other areas	Moist cure	Hardened with non-metallic

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scheduled to receive shake hardened concrete finish		shake during float finish followed by swirl steel trowel
Concrete to receive capillary waterproofing	Moist cure	Wood float
Concrete sidewalks and curbs	Combination curing and sealing compound	Finish to City of Toronto standards
Concrete sidewalks and curbs	Exterior sealer	Wood float and broomed
Concourse area	Moist cure primer epoxy sealer	Steel trowel

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

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

1.1.2 This Section includes supply and installation of unit masonry assemblies consisting of the following:

- .1 Veneer Brick
- .2 Architectural Concrete Masonry Units (CMUs)
- .3 Mortar, and Grout
- .4 Reinforcing steel
- .5 Masonry joint reinforcement
- .6 Ties and anchors
- .7 Miscellaneous masonry accessories

1.2 REFERENCES

- 1.2.1 ASTM C216 Standard SW Severe Weather (Cold Climate)
- 1.2.2 ASTM A82-02 Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
- 1.2.3 ASTM A116-11 Standard Specification for Metallic-Coated, Steel Woven Wire Fence Fabric.
- 1.2.4 ASTM A123/A123M-13 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- 1.2.5 ASTM A153/A153M-09 and Standard Specification for Zinc Coated (Hot-Dip) on Iron Steel Hardware.
- 1.2.6 ASTM A167-99 (2009) Standard Specification for Stainless and Heat-Resistant Chromium-Nickel Steel Plate, Sheet and Strip.
- 1.2.7 ASTM A580/A580M-15 Standard Specification for Stainless Steel Wire.
- 1.2.8 ASTM C207-06(2011) Standard Specification for Hydrated Lime for Masonry Purposes.
- 1.2.9 ASTM C331/C331M-14 Standard Specification for Lightweight Aggregates for Concrete Masonry Units.
- 1.2.10 CSA A23.1-09/A23.2-09 Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

- 1.2.11 CAN/CSA G164-M92 (R2003) Hot Dip Galvanizing of Irregularly Shaped Articles.
- 1.2.12 CSA A-82 EG Exterior Grade Masonry Unit
- 1.2.13 CSA S304-14 Design of Masonry Structures.
- 1.2.14 CSA A82.56-M1976 Aggregate for Masonry Mortar.
- 1.2.15 CSA A165 Series-14 CSA Standards on Concrete Masonry Units.
- 1.2.16 1 CSA A179-14 Mortar and Grout for Unit Masonry.
- 1.2.17 CSA A370-14 Connectors for Masonry.
- 1.2.18 CSA A371-14 Masonry Construction for Buildings.
- 1.2.19 CSA G30.3-M1983(R1998) Cold Drawn Steel Wire for Concrete Reinforcement.
- 1.3 DEFINITIONS
 - 1.3.1 Solid block: A masonry unit with a net cross sectional area of at least 75% of its gross sectional area in any plane parallel to its bearing surface.
 - 1.3.2 One hundred percent (100%) solid block: A masonry unit with plain flat ends and without cores.
 - 1.3.3 Administrative Requirements - Pre-Construction Conference: Arrange a site meeting attended by the contractor's superintendent, the Subcontractor's representative and foreman for this project, the Consultant, materials supplier(s), and other relevant personal before commencement of work for this Section; agenda for meeting will include; but not be limited to, the following:
 - .1 Confirmation of specifications and details for the project
 - .2 Required mortar, grout and concrete testing, batch control and grouting procedures
 - .3 Installation requirements of air/vapour membranes and insulation and coordination with other components of the Work
 - .4 Confirmation of cavity compartmentalization and drainage requirements
 - .5 Confirmation of appearance of exposed block lintels
 - .6 Confirmation of reinforcement at corners and wall intersections
 - .7 Coordination of interior and exterior crack control measures
 - .8 Confirmation of trowelled or tooled joints to concealed and exposed masonry faces
 - .9 Confirmation of methods for keeping mortar out of cavity space
 - .10 Confirmation of methods for controlling efflorescence during construction
 - .11 Confirmation of membranes and membrane flashing materials and details used for construction
 - .12 Review of submitted masonry unit samples
 - .13 Review of hot and cold weather requirements

1.3.4 Coordination: Coordinate components of the work of this Section with work performed by other Sections including; but not limited to, the following:

.1 Rain Screen Wall Construction: Masonry veneer forms a part of the exterior rain screen and protective facing. Construct assembly to allow for ventilation, drainage and pressure equalization of the voids between the veneer and the insulation with the outside pressures. Construct cavity space divided into separate compartments as a means of controlling these pressure differences within the building envelope.

.2 Steel Support Angles and Brackets: Coordinate requirements for structural steel support angles and brackets supplied and installed onto the building structure by Section 05 50 00.

1.4 DESIGN REQUIREMENTS

1.4.1 Fire and smoke separations: Where masonry walls, partitions and furring are required to act as fire and smoke separations or barriers or as fire protection for structural steel, they shall conform to Supplementary Guidelines to the latest OBC, with respect to equivalent thickness and type of concrete and to requirements of authorities having jurisdiction.

1.4.2 Comply with CSA A370, CSA A371, CSA S304, local building codes, authorities having jurisdiction and these Specifications. Should conflict occur, the more strict shall govern.

1.4.3 Comply with CAN3-A371 for construction tolerances. Tolerances shall not accumulate.

1.4.4 Irregularity in mortar joints of wall faces exposed or painted in the completed work shall not be noticeable when viewed from a distance of 15'.

1.5 SOURCE QUALITY CONTROL

1.5.1 The Consultant may appoint an independent testing company to test each type of masonry unit and mortar. Tests for masonry units shall be in accordance with CSA S304, and CSA A165 as appropriate. Submit products selected at random in presence of Consultant to the testing company for testing when directed.

1.5.2 Submit unit compression test and net area and absorption tests to Consultant prior to delivery of materials to the site.

1.5.3 Include testing cost as part of this Section.

1.6 FIELD QUALITY CONTROL

1.6.1 Perform field quality control tests as part of work of this Section.

1.6.2 Perform site tests to determine moisture content of unit at time of delivery to site.

1.6.3 Submit three test reports for each type of mortar and grout in accordance with CSA A179 .

- 1.6.4 Site test clay masonry units to determine initial rate of absorption in accordance with CSA A179.
- 1.7 SUBMITTALS
- 1.7.1 Submit two samples of each type of masonry unit, reinforcing, ties, anchors, accessories and cured coloured mortar for approval before delivery of materials to the site.
- 1.7.2 Submit two brick samples, each consisting of 6 bricks, showing range of colours and texture, stacked with simulated joints.
- 1.7.3 Products on site shall match approved samples.
- 1.7.4 Shop Drawings: Submit shop drawings indicating the following:
- .1 Indicate sizes, profiles, coursing, and locations of special shapes for concrete masonry units.
 - .2 Indicate sizes, profiles, and locations of each stone trim unit required.
 - .3 Detail corner units, end dam units, and other special applications for fabricated flashings.
- 1.7.5 Informational Submittals: Provide the following submittals when requested by the Consultant: Submit ULC Assembly Listings and Materials cut sheets for fire rated assemblies as follows:
- .1 Not later than 30 working days following Award of Contract, submit copies of ULC Assembly and Materials Listing for indicating ULC Number and how assembly meets the rating criteria for assemblies listed on drawings or meets requirements of Supplementary Standard SB-3 of Ontario Building Code
 - .2 Use the same system and material as would be required for a tested assembly for the project; ULC Listings are tested with the specific materials indicated; substitutions will not be permitted unless evidence of equivalency is confirmed.
 - .3 Submit manufacturer's product data for materials and prefabricated devices, providing descriptions are sufficient for identification at job site; include manufacturer's printed instructions for installation.
- 1.8 MOCK-UP
- 1.8.1 Prior to commencement of work, construct a 1000 mm (40") high and 1500 mm (60") long sample wall for each type of masonry wall on site at locations on the building approved by the Consultant.
- 1.8.2 Allow Consultant to inspect sample wall during the various stages of its construction.
- 1.8.3 Sample wall shall show the specified mortar, bond, joint treatment, back-up masonry, cast-in-place concrete and metal stud, reinforcement, insulation, vapour barrier, and flashing where applicable. Remove rejected sample walls from site. Approved sample wall may form part of the completed work. All work shall match approved sample wall.

1.8.4 Co-ordinate erection of sample wall with Sections providing back up construction.

1.9 PRODUCT DELIVERY, STORAGE AND HANDLING

1.9.1 Deliver and store masonry units, palletized, level and under protective covering. Do not overload structure.

1.9.2 Protect materials and products from deterioration by weather, mechanical damage and other causes, and from soiling.

1.9.3 Keep masonry materials and products completely free from frost, snow and ice.

1.10 COLD WEATHER WORK

1.10.1 Comply with CSA A371 and the following:

- .1 Where possible, deliver materials required to the site in advance of freezing temperatures.
- .2 Use dry, unfrozen masonry units.
- .3 Building on frozen work is prohibited. Remove sections of masonry deemed frozen and damaged before continuing construction of that section.
- .4 Do not use scorched sand, salts, or anti-freeze admixtures.

1.10.2 Cold Weather Construction Requirements

.1 Provisions for work in progress:

Condition	Requirement
Ambient temperature above 40°F (4.5°C)	Normal construction practice. Cover stored materials.
Ambient temperature below 40°F (4.5°C) or temperature of units below 40°F (4.5°C)	Heat mortar materials to produce mortar temperatures between 40°F (4.5°C) and 120°F (49°C) at time of mixing. Maintain mortar above freezing until used in masonry. If units have a temperature below 20°F (-7°C), heat to above 20°F (-7°C). Remove visible ice from units.

Condition	Requirement

Ambient temperature is between 25°F (-4°C) and 20°F (-7°C)	Heat masonry under construction from both sides. Install wind breaks when wind velocities reach 15 mph (24 km/h).
Ambient temperature is below 20°F (-7°C)	Provide heat enclosure for masonry under construction and maintain temperature above 32°F (0°C) within that enclosure.

2. Protection of newly completed work:

Condition	Requirement
Mean daily temperature above 40°F (4.5°C)	Normal construction practice. Cover top of unfinished masonry work to protect it from weather.
Mean daily temperature between 40°F (4.5°C) and 25°F (-4°C)	Cover completed masonry with weather resistive membrane to protect from rain or snow for 24 hours after construction.
Mean daily temperature between 25°F (-4°C) and 20°F (-7°C)	Cover masonry with insulating blankets or equivalent protection for 24 hours after construction.
Mean daily temperature below 20°F (-7°C)	Maintain temperature of masonry above 32°F (0°C) for 24 hours after construction.

1.11 HOT WEATHER PROTECTION

1.11.1 Protect freshly laid masonry from drying too rapidly, by means of waterproof, non-staining coverings.

PART 2 - PRODUCTS

2.1 MATERIAL

2.1.1 Concrete block: CSA A165.1, autoclaved, low pressure steam or bubble cured. All interior walls and partitions corners to be bullnose unit.

.1 Classification: S/15/A/M, 75% solid for all locations where structural members bear on concrete block.

- .2 H/15/A/M, for all other block work.
 - .3 Fire Resistant Concrete Masonry Units: Manufactured in accordance with CSA A165:
 - .1 2 Hour Fire Rating: H/15/C/O
 - .2 1 Hour Fire Rating: H/15/A/O
 - .4 Size: Modular imperial to sizes indicated on Drawings.
 - .5 Special shapes:
 - .1 Provide square units for exposed corners.
 - .2 Provide purpose made shapes for lintels and bond beams.
 - .3 Provide additional special shapes required for project.
 - .4 Manufacture special shapes at same time and with the same batch as standard concrete block to be used.
- 2.1.2 Architectural Block: Architectural Block series by Brampton Brick or equivalent texture and colour to be confirmed by Architect.
- 2.1.3 Portland cement: Type 10.
- 2.1.4 Masonry cement: Type H or Type L.
- 2.1.5 Sand: CSA A82.56M, as amended by CSA A179.
- 2.1.6 Lime: ASTM C207, hydrated lime.
- 2.1.7 Water: Clear and free from injurious amounts of deleterious substances.
- 2.1.8 Colour pigments: Pure mineral pigment, mineral oxide content minimum 70%. Fillers; inert. Maximum carbon black content; 1% water soluble matter. Colours to be selected by Consultant to match existing mortar at exterior brick.
- .1 Extra Strong Colour by Elementis Pigments Inc.,
 - .2 Staybrite by Sternson Limited, or other approved manufacture.
- 2.1.9 Non-shrink grout: Minimum compressive strength of 35 Mpa (5000 psi) at 28 days. Include non-ferrous expansion agents where exposed to view or weather.
- .1 Sika Grout 212 By Sika,
 - .2 Sealtight CG-86 by W.R. Meadows of Canada Ltd.,
 - .3 Thoro Multigrout by Harris Specialty Chemicals, or other approved manufacture
- 2.1.10 Parging mortar: Type N, having a compressive strength of 5.0 Mpa (759 psi) minimum, 1 part Portland cement to not less than 2 1/2 nor more than 3 1/2 parts sand by volume.
- 2.1.11 Control joint material:
- .1 Rapid Control Joint by Dur O Wal Limited,
 - .2 Titewall BL-A by Blok lok Ltd., or other approved manufacture.

2.1.12 Premoulded filler: 100% over sized:

- .1 Rodofam PR grade by Sternson Limited,
- .2 Sealtight Rescor by W.R. Meadows of Canada Ltd., or other approved manufacture.

2.1.13 Mineral wool filler: Mineral fibre batt insulation by Roxul Company, or other acceptable equivalents.

2.1.14 Through-wall flashing material: Modified bitumen, glass scrim reinforced elastomeric, 0.9 mm (35 mils) thick, Blueskin TWF by Henry Company, or other approved manufacture.

2.1.15 Flexible anchors and adjustable ties: 9 gauge galvanized rods.

2.1.16 Horizontal reinforcing:

- .1 Reinforcing: Truss type, consisting of 9 ga. wire complying with CSA G30.3, two side rods welded to a continuous diagonal formed cross rod forming a truss design with alternating welds not exceeding 8". Width of reinforcing unit shall be 1 1/2" less than nominal thickness of wall, BL 30 Blok Truss by Blok Lok or other approved manufacture.
- .2 Galvanizing: ASTM A116 Class 3 mill galvanized for interior walls and ASTM A153 Class B2 hot dipped galvanized after fabrication for exterior walls.

2.1.17 Masonry Unit Veneer/Concrete or Concrete Masonry Unit Substrate Tie Systems:

- .1 Backer Plate: Fabricated from stainless steel meeting requirements of CSA A370-04(R2009) and ASTM A1011/A1011M-12; designed to transfer wind loads to steel stud framing; length to suit total cavity, insulation and sheathing thickness, as detailed on Drawings.
- .2 Ties: Wire ties fabricated from stainless steel wire in accordance with CSA G30.18-09; length to allow for cavity width and to extend minimum 2" into masonry unit joint.
- .3 Fasteners: Self tapping metal screws to metal stud backup as recommended by tie manufacturer consisting of close tolerance bits for use in percussion drills, and hammer driven anchors with pull-out strengths of 5.4 kN for 20 MPa concrete and 3.75 kN for hollow concrete masonry unit with a 1" embedment:
 - .1 Fero Holdings Ltd., Rap-Tie System
 - .2 Blok-Lok, BL-407

2.1.18 Insulation fasteners: Wedge Lok by Block Lok Limited.

2.1.19 Interior and Exterior Single Wythe Concrete Block Walls:

- .1 Single wythe interior and exterior concrete block walls: Horizontal reinforcement shall be ladder type or truss type having two parallel side rods 3/16" diam. welded to 3/16" cross rods forming a ladder or truss design. Side rods shall be notched or

knurled. Design ladder or truss reinforcement to allow placement of side rods at center-line of both face shells of concrete block.

2.1.20 Minimum corrosion protection for masonry connectors and horizontal reinforcing, as outlined in CSA A370:

- .1 Interior masonry not subjected to moisture; Mill galvanized carbon steel.
- .2 Interior masonry subject to moisture, below grade masonry in contact with ground, and above grade exterior masonry in buildings less than 32'-0" in height (measured from the floor level of the first storey); Hot-dipped galvanized after fabrication with minimum zinc coating in accordance with ASTM A153, Class B wire ties/reinforcing 1.5 oz/ft² and ASTM A123 plates/strips/sheets 2 oz/ft², on each face.

2.1.21 Masonry connectors shall meet the following performance tolerance requirements as outlined in CSA A370:

- .1 Deflection; Maximum 3/32" including free play when acted upon by a lateral load of 0.05 ton force in all possible positions.
- .2 Linkage preventing separation of components i.e. brick tie/connector reinforcing, etc.
- .3 Free play of multi-part connectors; not more than 0.048" when assembled in all possible configurations and not subject to a load.

2.1.22 All steel anchors, reinforcement and other accessories: Stainless steel conforming to ASTM A167 or hot dip galvanized, complying with CSA G164, as herein specified.

2.1.23 Trim Units: Manufactured in accordance with CSA A165, and as follows:

- .1 Architectural Sill Profile:
 - .1 Size: 5-1/2" deep, complete with drip edge, 3-1/2" high, and angled to 3-1/4" high, with beveled edges.
 - .2 At locations requiring sills to wrap a corner, provide corner sill unit as a one (1) piece unit completed with beveled profile to match adjacent sill units. Miter joints are not permitted, unless prior written approved by the Consultant is obtained.
 - .3 Colour: As indicated on the Drawings.
 - .4 Basis of Cambridge Series, Architectural Sills Model R24/3.5 Angled, by Richvale York Block Inc.

2.2 MORTAR TYPES

2.2.1 Mortar types in parts by volume, complying with CSA A179-M shall be as follows:

TYPE	PORTLAND CEMENT	HYDRATED LIME OR LIME PUTTY	MASONRY CEMENT TYPE H	AGGREGATE LOOSE DAMP CONDITION	28 DAY COMPRESSIVE STRENGTH
S	1	1/2	0	4-1/2	12.5 MPa (1800 psi)
	1/2	0	1	4-1/2	
N	1	1	0	6	5 MPa (750 psi)
	0	0	1	3	

2.2.2 Use premixed masonry mortars prepared with Betomix 1.1.6 and Betomix Plus, by Daubois Inc., or other approved manufacture, for exterior face work.

2.2.3 Other masonry cement may be used only on interior masonry.

2.2.4 Add colouring pigment to mortar for face work if required. Colours shall be as later directed to match existing mortar at exterior brickwork. Under no circumstances shall colour pigment loading exceed 6% per 55 lb. of dry mixed mortar. Mix colouring pigment into mortar in accordance with manufacturer's written instructions and as required to ensure colour uniformity and consistency.

2.3 MORTAR LOCATIONS

2.3.1 Type SW hard burned clay face brick with initial rate of absorption range of 10 to 20 grams: Type N.

2.3.2 Back up masonry to exterior walls: Type S.

2.3.3 Bearing courses: Type S. Rake joints back 1/2" if such courses are to be exposed and point to match remainder of wall.

2.3.4 Non load bearing partitions: Type N.

2.3.5 Grout in around all beams, joists, truss bearing plates bearing on masonry work: Type S.

2.4 MORTAR PREPARATION

2.4.1 Measure and mix mortar products accurately according to CSA A179. Proportion products by either the property specifications or the proportion specifications of CSA A179.

2.4.2 Mortar of the products and proportions used shall be mixed to an initial flow of 100% to 115% and shall have a flow after suction of not less than 70% of original flow.

- 2.4.3 Do not mix different types of mortar in the same mixer unless the mixer is thoroughly cleaned first.
- 2.4.4 When air temperature is 27°C or higher, use and place mortar in its final position within two hours of mixing it. When air temperature is less than 27°C use and place mortar in its final position within 2 1/2 hours of mixing it. Discard mortar not used within above times.
- 2.4.5 Mortars which have stiffened within mix/use time limits due to moisture evaporation may be re tempered by adding enough water as is necessary to produce proper workability consistent with the initial rate of absorption of the masonry units.

2.5 GROUTS

- 2.5.1 Measure and mix grout products accurately according to CSA A179M.
- 2.5.2 Do not mix different types of grout in same mixer or mixer used for mixing of mortar unless mixer is thoroughly cleaned.
- 2.5.3 Use and place grout in its final position within 2 1/2 hours of mixing it. Discard grout not used within 2 1/2 hours.
- 2.5.4 Grout types by volume shall be as follows:

TYPE	PORTLAND CEMENT	HYDRATED LIME OR LIME PUTTY	AGGREGATE MEASURED IN LOOSE DAMP STATE
Fine			2-1/4 to 3 times the sum of the cementitious materials
Grout	1	0 to 1/10	
Coarse			1 to 2 times the sum of the cementitious materials
Grout	1	0 to 1/10	

- 2.5.5 Use coarse grout where required, in spaces 2" or more in least horizontal dimension. Use fine grout in spaces less than 2" in horizontal dimension.

2.6 ACCESSORIES

- 2.6.1 Weepholes: PVC 'T' shaped brick vents by Goodco Limited, or cadium plated airplane type 'Weep Holes-343' by Blok-Lok Limited, set 32" O.C. for architectural block in the following locations:

- .1 Bottom course of manufactured stone masonry units throughout;

.2 Top courses of manufactured stone masonry units throughout.

2.6.2 Mortar Dropping Control Devices:

.1 High density, polyethylene or nylon woven mesh type mortar dropping control devices with trapezoidal "zigzag" shaped top edge, designed to allow moisture/water to flow/drain downward in cavity/collar joints to the weepholes, thicknesses to suit cavities and collar joints, 'The Mortar Net' by Mortar Net USA Ltd., and distributed by JV Building Supply, division of Consolidated Materials Corporation, or approved equal.

PART 3 - EXECUTION

3.1 LINES AND LEVELS

3.1.1 Provide general lines and levels. Be responsible for accurate dimensions, lines and levels of work of this Section. Make work plumb and true.

3.2 CUTTING AND PATCHING

3.2.1 Do all cutting, fitting and patching of masonry to receive work of other trades, to make work properly come together and to make good to match adjacent masonry.

3.3 BUILT INS

3.3.1 Install items supplied by other trades to be built into masonry walls, plumb, level, properly aligned, rigid and secure. Build in miscellaneous metal work, loose lintels, bearing plates, sleeves, anchor bolts, anchors, wood nailers and all other items which required attachment or building into the masonry.

3.3.2 Set access doors and panels with front face flush with final wall finish. Such fittings shall be located precisely as directed.

3.3.3 Anchor steel door frames in place and build masonry around them. Do not attach door frames to walls by fastening to wood nailers. Use steel anchors. Solidly grout voids between masonry and steel frames for doors full with masonry mortar or fine grout. Keep exposed faces of frames free from mortar. Remove droppings promptly.

3.4 PROVISIONS FOR OTHER TRADES

3.4.1 Provide openings in masonry walls where required or indicated.

3.4.2 Accurately locate chases and opening and neatly finish to required sizes.

3.4.3 Where masonry encloses conduit or piping, bring to proper level indicated and as directed. Do not cover any pipe or conduit chases or enclosures until advised that work has been inspected and tested.

3.5 ERECTION – GENERAL

- 3.5.1 Erect masonry to correct dimensions, plumb, true and with level courses.
- 3.5.2 Maintain joints vertical in alternate courses or as broken by bond pattern in line, throughout the entire height.
- 3.5.3 Reinforce masonry as required, to support wall mounted equipment, building components and fixtures provided under other Sections.
- 3.5.4 Verify the loads to be supported and the arrangement and type of fastenings with the appropriate Section.
- 3.5.5 Lay masonry exposed to view or to receive a brushed or sprayed finish carefully with even joint widths, and with exposed faces flush and even throughout. Broken corners and spoiled units are not acceptable. Do not use units which are too contrasting in appearance. Provide satisfactory blending of tones and textures.
- 3.5.6 Where resilient base is indicated, tool joints to within 4" of the floor. Strike joints at base flush.
- 3.5.7 Lay block to receive adhesive-applied gypsum board plumb, with joints finished flush.
- 3.5.8 Level, align and plumb masonry for application of thin set applied ceramic tile to requirements of 09 30 00 - Ceramic Tile, with joints struck flush.
- 3.5.9 The corners of concrete masonry units projecting into habitable areas and exposed or painted in the finished work shall be single or double bullnosed as required to suit the particular location. Lay specially shaped masonry units required or shown on Drawings.
- 3.5.10 Completely fill and tool head and bed joints to provide support for vapour barrier adhesive.
- 3.5.11 Completely fill joints in solid block masonry with mortar. Fully cover the end areas and bearing areas of the face shells of hollow units with mortar.
- 3.5.12 Provide anchors, ties, crimps, and other mason's iron work required for the construction of the work.
- 3.5.13 Build in anchors, nailers, accessories, flashings and other items required as the masonry work progresses. Solidly fill with non-shrink grout all voids in masonry into which anchor bolts or other connection materials are built.
- 3.5.14 Fill hollow metal door and borrowed light frames occurring in masonry with grout.
- 3.5.15 Provide grout setting bed for flashing under window sills.
- 3.5.16 Determine the location and size of openings to be left in masonry walls for heating, ventilating, plumbing, electrical fixtures, ducts, boxes and other items. Pass conduits and piping through hollow cells of blocks or build around them and split blocks. Build

chases and openings as required accurately located and neatly finished, as the work progresses. Cut block for electrical boxes and recessed equipment accurately using a carborundum saw. Provide square clean edges.

- 3.5.17 Tooth new masonry into existing, where existing openings are to be filled in. necessary for construction purposes to "stop-off" a horizontal run of masonry, rake back 1/2-block length in each course. Tooothing is not permitted, except with the written approval of the Consultant.
- 3.5.18 Tool joints in exposed masonry to a neat concave finish using 5/8" diameter non staining tool. Before tooling, ensure that surface of mortar is thumb print hard and has lost water sheen. Strike joints flush in concealed locations. Rake alternate joints back 1/2" where masonry is to receive plaster directly. Do not rake back joints containing reinforcing.
- 3.5.19 Where fresh masonry joins masonry that is partially or totally set, clean and lightly wet the exposed surface of the set masonry so as to obtain the best possible bond with the new work.
- 3.5.20 Where the joints in interior masonry will be apparent in the completed building, start interior walls and the back-up masonry for exterior walls with a 4" starter course, or as necessary to achieve a neat appearance at the door head/lintel condition.
- 3.5.21 Where insulation and vapour barrier are to be built into masonry walls. Co-ordinate the erection of the masonry with the installation of insulation under Section 07 21 00, Building Insulation. Strike joints flush on exterior face of interior wythes and parge this surface with a 1/4" thick coating of cement mortar. Trowel surface smooth to receive vapour barrier adhesive. Build exterior wythe tight to completed insulation.
- 3.5.22 Provide light weight aggregate as required for fire rated partitions.
- 3.5.23 Lay all joint 3/8" thick unless otherwise specified or indicated on Drawings.
- 3.5.24 Use lightweight aggregate units for concrete masonry visible or painted in the finished work.
- 3.5.25 Other masonry units shall be of lightweight aggregate or of regular sand and gravel aggregates.
- 3.6 COMPOSITE EXTERIOR WALLS
- 3.6.1 Construct exterior brick masonry using brick to match existing brick. Use only clean, sound brick. Brickwork shall match adjacent existing brickwork in coursing, bonding, colouring of brick and mortar and shall blend into existing, to approval of Consultant.
- 3.6.2 Tooth new brickwork into existing.
- 3.6.3 Supply insulation fasteners to Section 07 21 00 for installation.
- 3.7 PARTITIONS

- 3.7.1 Unless otherwise shown or specified, lay concrete block masonry in running bond.
- 3.7.2 Build up non load bearing walls to within 1" of underside of structure unless shown otherwise. Obtain lateral support anchors from Section 05 10 00. Secure lateral support anchors to structure along wall. Perform necessary drilling of concrete. Where junction of wall and structure will be visible in the completed building, lay sash block so that grooves engage in legs of metal anchors such that anchorage is concealed. Where junction of wall and structure will be concealed, lay top course to engage lateral support angles. Install mineral wool filler in void between top of wall and underside of structure. Cut filler around legs of concealed anchors. Leave ready for caulking.
- 3.7.3 Use concrete aggregate block for walls and partitions on slabs on grade. At all other locations use light weight block.
- 3.7.4 Carry partitions up through ceiling to slab or metal deck above.
- 3.7.5 Where walls and partitions are pierced by structural members, ducts, pipes, fill voids with mortar to within 1" of such members flush with wall face. Fill spaces between partition and structural members, ducts and pipes with glass fibre or mineral wool insulation compressed 50% completely from one side of wall to other.
- 3.8 REINFORCING AND ANCHORING
 - 3.8.1 Reinforce and anchor masonry as required by local by laws when greater requirements are not specified or shown.
 - 3.8.2 Unless otherwise shown, tie walls at corners in masonry bond, alternate courses.
 - 3.8.3 At wall intersections, terminate one wall at the face of the other and build in prefabricated sections of truss type connectors at 16" o.c. vertically.
 - 3.8.4 Provide horizontal reinforcing above first block course above floors slab and in first block course below floor slab, with box ties to anchor face masonry to back up.
 - 3.8.5 Reinforce hollow concrete masonry walls with truss reinforcing every 16" o.c. to suit wall thickness.
 - 3.8.6 Cut alternate continuous reinforcing at control joints in straight walls. Lap splices in continuous length reinforcing 6".
 - 3.8.7 Install masonry reinforcing in two consecutive courses above and below openings in walls, extending not less than 3' 0" on both sides of opening.
 - 3.8.8 Use adjustable wall ties where the horizontal joints in adjacent wythes of masonry walls requiring reinforcing are not in vertical alignment. Install ties 12" o.c. horizontally and 16" vertically.

- 3.8.9 Solidly fill with mortar all voids in masonry into which anchor bolts, reinforcing steel or other connection materials are built.
- 3.9 LİNTELS
- 3.9.1 Lintels over openings in masonry shall have a minimum bearing of 8" on each side of opening. Provide building paper bond barrier at ends and under bearing parts of lintels.
- 3.9.2 Install loose steel lintels and bearing plates. Grout under lintels and/or bearing plates at each jamb with full bed of mortar.
- 3.9.3 Provide reinforced concrete block lintels of same thickness as wall for block walls of less than 8" thickness and for other block walls where units are to be painted or visible in the completed work. Construct lintels with special concrete lintel units. Supervise the filling of voids of units with concrete and their reinforcing with deformed steel bars. Cure before applying loads. Provide temporary support for lintels consisting of a level platform, true to the proper elevation and of sufficient strength to support the load without visible deflection. Maintain supports in place for a minimum of 7 days and for a period sufficient to permit the concrete to cure and gain sufficient strength to safely support all loads. Lay masonry units with full mortar coverage on all abutting edges with joints shoved tight. Where masonry construction is continued above the lintel, place the first course of masonry units on the lintel in a full mortar bed.
- 3.10 BEARING AND ANCHORAGE
- 3.10.1 Provide at least 16" of 100% solid masonry under bearing of beams, girders, trusses and lintels extending 8" beyond each side of bearing, at least 8" of 100% solid masonry under joists and under slabs. Hollow units filled with concrete are not acceptable. Provide a concrete distribution pad in lieu of solid masonry specified above for bearing plates anchored with bolts. Solid masonry in locations visible in the completed work shall be of same material and appearance as adjacent wall surface.
- 3.11 INSTALLATION DAMPPROOF COURSES
- 3.11.1 At walls having grout fill, turn damp-proof course material up at least 8" on the face of the back-up masonry and terminate in a reglet.
- 3.11.2 In all cases extend damp-proof course material through full thickness of face masonry.
- 3.11.3 Make 100% watertight seal between damp-proof course material strips with waterproof adhesive. Make 100% watertight seal between damp-proof course material and items passing through it.
- 3.12 REPOINTING
- 3.12.1 Cut back defective joints 1/2" taking care not to damage units. Remove dust and loose materials by brushing or by water jet. If water jet is used, allow excess water to drain before repointing.

3.12.2 Repoint with mortar similar to original mortar mix. Pre hydrate mortar by mixing with only a portion of required water, two hours before use. At end of curing period, rework mortar, adding remaining water.

3.12.3 Pack mortar tightly in thin layers and tool to required joint finish.

3.13 CLEANING

3.13.1 Clean masonry according to masonry unit manufacturer's written instructions.

3.13.2 Where mortar or stains cannot be removed as specified above, propose other methods to the Consultant for approval. Employ methods approved by the Consultant and remove mortar and stains.

3.14 PROTECTION

3.14.1 Provide and maintain protection against entry of moisture into masonry whenever work is interrupted. Use non staining water repellent paper, polyethylene sheet or tarpaulins overhanging walls 2' 0" minimum and secured in place to prevent wind uplift. Similarly protect exposed ledges to be covered by flashing or other material until such materials are installed.

3.14.2 Provide and maintain protective non staining boards to external corners which may be damaged by construction activities. Secure protection without damaging the work.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

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

1.1.2 Provide all labour, materials, products, equipment and services required to complete the metal fabrications work necessary and/or indicated on the Drawings and specified herein including all metal work which is not specified elsewhere.

1.2 REFERENCES

1.2.1 ASTM A53/A53M-12: Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

1.2.2 ASTM A123/A123M-13 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

1.2.3 ASTM A143/A143M-07(2014) Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedures for Detecting Embrittlement.

1.2.4 ASTM A153 / A53M-09 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

1.2.5 ASTM A167-99(2009) Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate.

1.2.6 ASTM A307-14 Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.

1.2.7 ASTM A325-14 Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

1.2.8 ASTM A394-08(2015) Standard Specification for Steel Transmission Tower Bolts, Zinc-Coated and Bare.

1.2.9 ASTM A563-15 Standard Specification for Carbon and Alloy Steel Nuts.

1.2.10 ASTM A653/A653M-15 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

1.2.11 ASTM A780/A780M-09(2015) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

1.2.12 ASTM 1011/A1011M-14 Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength, Low-Alloy, High-

- Strength Low-Alloy with Improved Formability, and Ultra High-Strength.
- 1.2.13 ASTM C939-10 Standard Test Method for Flow of Grout for preplaced-aggregate Concrete (Flow Cone Method)
- 1.2.14 ASTM C1107/1107M-14a Standard Specification for Packaged Dry Hydraulic-Cement Grout (Nonshrink)
- 1.2.15 CAN/CGSB 1.108-M89 Bituminous Solvent Type Paint.
- 1.2.16 CAN/CGSB 1.171-98 Inorganic Zinc Coating.
- 1.2.17 CAN/CGSB 1.181-99 Organic, Ready Mixed, Zinc Rich Coating.
- 1.2.18 CAN/CSA-G40.20-04(R2009) General Requirements for Rolled or Welded Structural Quality Steel.
- 1.2.19 CAN/CSA-G40.21-04(R2009) Structural Quality Steel.
- 1.2.20 CAN/CSA G164-M92 (R2003) Hot Dip Galvanizing of Irregularly Shaped Articles.
- 1.2.21 CISC/CPMA 2-75 Quick-Drying Primer For Use on Structural Steel.
- 1.2.22 CSA W47.1-09(R2014) Certification of Companies for Fusion Welding of Steel Structures.
- 1.2.23 CSA W47.2-11 Certification of Companies for Fusion Welding of Aluminum.
- 1.2.24 CSA W59-13 Welded Steel Construction (Metal Arc Welding).
- 1.2.25 CAN/CSA W117.2-12 Safety in Welding, Cutting and Allied Processes.
- 1.3 QUALIFICATIONS OF WELDING
- 1.3.1 Welding of steel and aluminum shall be undertaken only by a fabricator fully approved by the Canadian Welding Bureau and CSA W47.1 and CSA W47.2, as may be applicable.
- 1.3.2 Conform to safety requirements of CAN/CSA W117.2 for welding operations.
- 1.4 DESIGN
- 1.4.1 Design the work of this Section in accordance with the Ontario Building Code and the by-laws of the local municipality.
- 1.4.2 Maximum deflection for individual members shall not exceed 1/360th, of the span.
- 1.4.3 Work of this Section which will support other items or will be required to support structural loads of any nature shall be designed by a Professional Structural Engineer

registered in Ontario and who shall affix his/her professional seal and signature to the shop drawings for such items.

1.4.4 Work of this Section to be executed by firm thoroughly conversant with laws, by-laws and regulations which govern, and capable of workmanship of best grade of modern shop and field practice known to recognized manufacturer's specializing in this work.

1.5 SUBMITTALS

1.5.1 Shop drawings:

- .1 Make thorough examination of drawings and details, determine the intent, extent, and materials, and be fully cognizant of requirements when preparing shop drawings.
- .2 Submit shop drawings showing and describing in detail all work of this Section including large scale detail of members and materials, of connection and interfacing with work of other Sections, jointing details, and of anchorage devices, dimension, gauges, thicknesses, description of materials, metal finishing, as well as other pertinent data and information.
- .3 Digital files of design drawings shall not be used in the preparation of shop drawings.

1.5.2 Submit necessary templates and instructions where fastenings or anchors have to be built in by other trades.

1.5.3 Work designed by a Professional Engineer shall bear signature and stamp of the engineer.

1.5.4 Submit adequate written instructions for protection of completed work, and proper methods and materials to be used in cleaning.

1.6 STORAGE, DELIVERY, HANDLING AND PROTECTION

1.6.1 Coordinate deliveries to comply with construction schedule and arrange ahead for strategic off the ground, under cover storage locations. Do not load any area beyond the design limits.

1.6.2 Adequately protect and crate all components against damage, dirt, disfigurement and weather during delivery and storage. Damaged materials shall not be used and shall be replaced by approved material.

1.6.3 Cover and protect the work of other Sections in the area of work from damage. Make good all damage to the satisfaction of the Consultant.

1.6.4 Protect the installed work of this Section and on completion the work shall be examined and damage shall be remedied to the complete satisfaction of the Consultant.

PART 2 - PRODUCTS

2.1 MATERIALS

- 2.1.1 Structural Steel Sections and Steel Plate: New stock (not weathered or rusted); to conform to CAN/CSA-G40.21, Grade 300W (44W) and Grade 350W (50W) for wide flange shapes.
- 2.1.2 Hollow Structural Sections (HSS): New stock; to conform to CAN/CSA-G40.21, Grade 350W (50W), Class C, stress relieved.
- 2.1.3 Sheet Steel (Structural Quality): Conforms to ASTM A1011/A1011M.
- 2.1.4 Sheet Steel (Commercial Quality): Conforms to ASTM A653/A653M, stretcher levelled or temper rolled.
- 2.1.5 Tube: Conforms to ASTM A53.
- 2.1.6 Welding materials: Complying with CSA W59.
- 2.1.7 Interior primer: Complying with CISC/CPMA 2-75, oil alkyd type.
- 2.1.8 Stainless steel: Type 302 or 304 alloy, complying with ASTM A167.
- 2.1.9 Aluminum sheet: 1100 alloy, H14 temper, anodizing quality.
- 2.1.10 Aluminum extrusions: Alcan 6063 alloy, T5 temper.
- 2.1.11 Steel members, fabrications and assemblies shall be galvanized after fabrication by the hot dip process in accordance with CAN/CSA G-164 or ASTM A123.
- 2.1.12 Bolts, nuts and washers and iron and steel hardware components shall be galvanized in accordance with CAN/CSA G-164 or ASTM A153. Nuts and bolts shall be supplied in accordance with ASTM A307, A325, A394 and A563 as applicable.
- 2.1.13 Products shall be safeguarded against embrittlement in conformance with ASTM A143.
- 2.1.14 Organic zinc rich primer: Complying with CAN/CGSB 1.181 "Galvafruid SB Grade" by W.R. Meadows of Canada Ltd., "Kem Organic Zinc Rich Primer No. 6430" by Sherwin-Williams Company of Canada Ltd., "Glid-Guard Glid-Zinc Organic Line 5526 Line" by the Glidden Company Limited, or other approved manufacture.
- 2.1.15 Inorganic zinc coating: Complying with CAN/CGSB 1.171, "Glid-Guard Glid-Zinc No. 5535 Line" by Glidden Company Limited, or other approved manufacture.
- 2.1.16 Interior primer for steel: Complying with CISC/CPMA 2-75a.
- 2.1.17 Bituminous paint: Complying with CAN/CGSB 1.108.
- 2.1.18 Non-Shrink Grout: Premixed, high strength, maximum bearing, impact resistant, non-shrink non-metallic aggregate grout having minimum 76 Mpa 28 day compressive strength and conforms to ASTM C939 and ASTM C1107/C1107M, 'Embeco Premixed Grout' by Master Builders Technologies Ltd., or 'Tartan Grout Iron' by Webster & Sons Ltd., or 'Sika Grout 212 HP' by Sika Canada Inc.

2.2 FABRICATION

- 2.2.1 Verify all dimensions on the site before preparing Drawings or proceeding with shop work.
- 2.2.2 Insofar as practical, execute fitting and assembly in the shop with various parts of assemblies ready for erection at the building site.
- 2.2.3 Fabricate the work true to dimensions and square. Accurately fit members with hairline joints, and join using adequate fastening.
- 2.2.4 Construct finished work free from distortion and defects detrimental to appearance and performance.
- 2.2.5 File or grind exposed welds smooth and flush. Do not leave grinding marks. Construct internal and external corners with sharp lines. Provide continuous welds unless otherwise approved by the Consultant in writing.
- 2.2.6 Fabricate metal work complete with all components required for anchoring to concrete; bolting or welding to structural frames; standing free; or resting in frames or sockets in a safe and secure manner.
- 2.2.7 Weld all connections unless approved otherwise in writing by the Consultant.
- 2.2.8 Execute exposed fastenings neatly where approved and of the same material, colour and finish as the base metal, on which they occur.
- 2.2.9 Counter sink exposed fastenings, where such are approved in writing, and make as inconspicuous as possible with bolts cut off flush with nuts. Construct fastenings of the same material and finish as the base material on which they occur.
- 2.2.10 Insulate contact surfaces to prevent electrolysis due to metal to metal contact or between metal and masonry or concrete. Use bituminous paint, butyl tape, building paper or other approved means.
- 2.2.11 Thoroughly de-scale steel work before delivery to project site. Remove roughness and irregularities, clean with a wire brush, remove oil and grease and prime with one shop coat of paint to a 2 mil thickness.
- 2.2.12 Primer interior steel work supplied under this Section with one shop coat of interior primer.
- 2.2.13 Do not prime the following surfaces:
 - .1 steel to be encased in concrete;
 - .2 non-ferrous metals;
 - .3 surfaces and edges to be field welded. If painted, remove paint for field welding for a distance of at least 2" in all sides of the paint.

- 2.2.14 Hot-dip galvanize steel, where specified, in accordance with CAN/CSA G164 (coating weight as prescribed for type of article), or ASTM A653/G90 (coating weight; 1.25 oz./sq.ft.) as applicable. Galvanize after fabrication where possible. Follow recommended precautions to avoid embrittlement of the base metal by over pickling, overheating or during galvanizing.
- 2.2.15 Touch-up galvanized steel where galvanizing is damaged during installation with zinc rich primer, in accordance with ASTM A780.

2.2.16 Stainless steel shall be finished in No. 4 bright, brush finish, unless otherwise noted.

2.3 ANCHOR BOLTS AND OTHER MEANS OF ANCHORAGE

2.3.1 Provide all anchor bolts and expansion bolts or other means of anchorage required for building into floors, walls and ceilings, where it is necessary to secure metal and wood to concrete, masonry or steel work. Supply anchor bolts, nuts and similar hardware to the respective Sections for fastening.

2.4 MISCELLANEOUS STEEL SECTIONS

2.4.1 Supply and install all steel items not indicated to be supplied under other Sections.

2.4.2 Where sections are required to be built into masonry or concrete supply such members to the respective Sections.

2.5 CONCEALED SUPPORT ELEMENTS AND FRAMING

2.5.1 Supply and install all support elements and framing as shown on the Drawings for the items listed herein. Construct supports from rolled steel sections assembled by welding.

2.5.2 Design supports to withstand, within acceptable deflection limitations, their own weight, the weight of the items to be supported, loads imposed by the motion of supported items, where applicable, and all live loads, static and dynamic which might be applied to the supported items in the course of their normal function. Design supports with a safety factor of 3. Design supports further as required to accommodate structural deflection.

2.5.3 Provide all accessories, inserts and fixings necessary for attachment of supports to building structure. Drill supports as required to receive attachment of supported items. Arrange supports to avoid conflicts with pipes, ducts, precast concrete connections, thermal and vapour barrier construction, framing provided under other sections, and such that supports and their fixings are fully concealed from view within the finished work.

2.5.4 Paint all supports unless galvanizing is specified.

2.5.5 Provide concealed support elements or framing as required for the following items:

- .1 Vanities.
- .2 Grab bars occurring on gypsum board partitions.

2.6 LINTELS

- 2.6.1 Supply loose steel lintels to other Sections where required for building into the work. Fabricate lintels as shown on the Drawings. Galvanize lintels which will be exposed to the exterior.
- 2.6.2 Lintels for wall of less than 200mm nominal thickness shall be masonry lintels supplied and installed under Section 04200.

PART 3 - EXECUTION

3.1 INSTALLATION

- 3.1.1 Install miscellaneous metals work in the correct locations and positions, plumb, level, structurally sound, securely fastened, free from defects detrimental to finished appearance and to the approval of the Consultant.
- 3.1.2 Install the work of this Section using skilled craftsmen and in accordance with manufacturer's recommendations where applicable.
- 3.1.3 After installation, spot prime field bolt heads and nuts, field rivets, welds and any abrasions or damage to the shop coat of the primer.
- 3.1.4 Perform drilling of steel and/or concrete masonry to fasten the work of this Section.
- 3.1.5 All surfaces prime painted under the Section shall be free from runs, sags, crawls and other defects. This Section shall repair any such defects to the satisfaction of the Consultant.

END OF SECTION

- 2.1.2 Lumber grade and moisture content: Comply with official grading rules of NLGA for the particular lumber and grade, and structurally complying with the latest requirements of the NBC. Use only grade marked lumber.
- 2.1.3 Maximum moisture content of lumber: 7% for interior work, 19% for exterior work.
- 2.1.4 Softwood lumber: Comply with CSA O141.
- 2.1.5 Douglas Fir Plywood: Complying with CSA O121, COFI Exterior.
- 2.1.6 Framing lumber: Lumber for structural components shall be of species and grade specified, well seasoned, processed and stamped at same mill with appropriate grade markings. Conform to requirements of Standard Grading Rules for Canadian Lumber of National Lumber Grades Authority the (NLGA) with latest supplements, approved by the Canadian Lumber Standards Administrative Board.
 - .1 No. 1 Construction grade, Spruce, Balsam Fir, Lodgepole Pine or Ponderosa Pine.
- 2.1.7 All wood materials: Well seasoned, free from defects that would impair strength or durability.
- 2.1.8 Wood curbs: Vacuum/pressure impregnated in accordance with CAN/CSA O80.1 to an average net retention of [6.0 kg/m³][0.40 lb./ft³]. Wolman CCA preservative or other approved manufacture. Species shall be southern pine, ponderosa pine, fir, western hemlock or jack pine.
- 2.1.9 Blocking, concealed framing, cant strips, grounds, nailing strips: No. 2 Ontario White Pine, No. 2 Red Pine, or Construction No. 1 Jack Pine, all complying with the grading rules of NLGA, or Construction Douglas Fir complying with COFI standard grading and dressing rules.
- 2.2 PRESSURE PRESERVATIVE TREATED MATERIALS FOR ALL EXTERIOR APPLICATIONS / FRAMING
 - 2.2.1 Pressure Preservative Treated Lumber: Lumber graded and stamped in accordance with applicable grading rules and standards of associations or agencies approved to grade lumber by Canadian Lumber Standards Accreditation Board in accordance with CAN/CSA O80 Series.
 - .1 Species: Pine or Spruce-Pine
 - .2 Grade: No.2 or better structural posts and lumber, pieces may be grade stamped or shipment certified by letter of compliance.
 - .3 Grading authority: NLGA, paragraph 131CC
 - .4 Material having twisted grain or structural defects affecting integrity of lumber will not be acceptable for this project.
 - .5 Use only material with radius edges, minimum 6 mm.
 - .6 Kiln dry lumber materials to 8% moisture content or less.

- 2.2.2 Pressure Preservative Treated Plywood: Treated in accordance with CAN/CSA O80 Series, using water-borne preservative to obtain minimum net retention of 4 kg/m³ of wood. Plywood or laminated materials shall be manufactured with exterior grade adhesives. After treatment, plywood shall be kiln dried to moisture content of 8% or less.
- 2.3 PRESSURE FIRE RETARDANT TREATED MATERIALS
- 2.3.1 Treat by pressure impregnation with fire-retardant chemicals in accordance with CAN/CSA O80 Series to provide classification for flame spread of not more than 25, smoke developed of not more than 75 in accordance with CAN/ULC S102.
- 2.3.2 All fire retardant wood must comply with the requirements in AWPA Standard C20 for lumber and C27 for plywood.
- .1 AWPA C20: Structural Lumber, Fire-Retardant Pressure Treatment, lumber materials shall only be of species listed. After treatment, lumber 50 mm or less in thickness shall be kiln dried to moisture content of 8% or less.
- .2 AWPA C27: Plywood, Fire-Retardant Pressure Treatment, plywood or laminated materials shall be manufactured with exterior grade adhesives. After treatment, plywood shall be kiln dried to moisture content of 8% or less.
- .3 All species to comply with CAN/ULC S102 for surface-burning characteristics and shall bear identification showing classification and type of fire retardant.
- 2.3.3 Each piece or bundle of fire-retardant treated material or panel to bear ULC inspection label or stamp attesting to FRS rating indicating flame spread, smoke developed, and fuel contributed classification meeting AWPA standard C20 and C27 for Type A Use.
- 2.3.4 Fire retardant chemicals used to treat lumber must comply with FR-1 of AWPA Standard P17 and shall be free of halogens, sulphates and ammonium phosphate.
- 2.3.5 Acceptable materials: Plywood and lumber materials treated by licensed applicators with fire retardant materials from the following:
- .1 Hickson Corporation – Dricon FRTW
- .2 Hoover Treated Wood Products Inc. – Pyro-Guard
- .3 Chemical Specialties Inc. – D-Blaze
- 2.3.6 Rough hardware: Nails, screws, bolts, lag screws, anchors, special fastening devices and supports as required for the erection of all rough carpentry items.
- 2.3.7 Fastenings, nails, bolts, screws, lag screws, anchors, special fastening devices and supports as required for the erection of all rough carpentry items: Complying with CSA B111.
- 2.4 FABRICATION
- 2.4.1 Comply with CAN/CSA-O86 for all fabrication and assembly of structural components off site, or on site.

- 2.4.2 Treat wood in contact with masonry, or concrete, with wood preservative before setting in place. Apply preservatives in accordance with the manufacturer's written instructions.
- 2.4.3 Design construction details for expansion and contraction of materials.
- 2.4.4 Machine sand surfaces exposed in the finished work. Hand sand to an even smooth surface free from scratches.
- 2.4.5 Refer to structural drawings for sizes and structural requirements.
- 2.5 FABRICATION - FIRE RETARDANT TREATMENT
- 2.5.1 Pressure fire retardant treat lumber prior to final milling. Each piece shall bear the mark of Underwriters' Laboratories of Canada indicating conformance to Standard CAN/ULC-S102.

PART 3 - EXECUTION

- 3.1 INSTALLATION - GENERAL
- 3.1.1 Supply all labour, materials, equipment, services and perform all operations required to complete all rough carpentry work to the full intent of the drawings and as herein specified.
- 3.1.2 Consult with and co-operate with other Sections in advance and build-in or make provisions for installation of other work.
- 3.1.3 Provide running members of the longest lengths obtainable.
- 3.1.4 Slowly feed machine-dressed members using sharp cutters. Provide finished members free from drag, feathers, slivers or roughness of any kind. Remove machine marks by sanding.
- 3.1.5 Properly frame material with tight joints and rigidly secure in place. Use glue-blocks where necessary.
- 3.1.6 Design construction methods for expansion and contraction of the materials.
- 3.1.7 Conceal joints and connections wherever possible. Locate prominent joints only where directed.
- 3.1.8 Erect work plumb, level, square and to the required lines.
- 3.1.9 Do not regard blocking, strapping and other rough carpentry indicated as complete or exact. Provide rough carpentry items required for the installation of the work of other Sections. Blocking shall be through-bolted to structure.
- 3.1.10 Set and secure wood level, plumb and to correct locations indicated on Drawings. Ensure horizontal bowing is kept to a minimum.

- 3.1.11 Provide temporary bracing and anchorage required to hold members in place until permanently secured. Ensure member ends have sufficient bearing area.
- 3.2 INSTALLATION - GROUNDS, STRAPPING AND FURRING
- 3.2.1 Install grounds of a thickness required for the application of finishes. Install room side surfaces of grounds plumb and in true plane throughout. Secure grounds to metal furring with 16 ga. galvanized soft annealed tie wire.
- 3.2.2 Provide wood furring and strapping for applied facings, cupboards, caseworks, lockers, cubicles etc.
- 3.2.3 Provide 25mm x 50mm strapping at 400mm o.c. to suit details. Secure to nailing strips.
- 3.2.4 Furring generally shall be 50mm x 50mm at 400mm o.c. erected to suit job conditions, where indicated.
- 3.2.5 Shim members as required to provide a true and plumb surface.
- 3.3 INSTALLATION - CANT STRIPS, BLOCKING AND CURBS
- 3.3.1 Apply wood preservative to all surfaces of wood cant strips and blocking to be covered with flashing.
- 3.3.2 Provide wood blocking as indicated. Provide curbs around roof openings wider than 250mm in any direction. Build up curbs of 50mm x 150mm members to 300mm minimum above finished roof level. Bolt or anchor curbs securely in place at 600mm o.c. Provide blocking under cants equal to insulation thickness.
- 3.3.3 Provide 19mm thick, fire retardant treated, plywood mounting boards as required for mechanical and electrical equipment. Securely fasten to concrete, masonry or gypsum wallboard framing.
- 3.3.4 Immediately apply, in instance where primed work is cut, a coat of wood preservative to the resulting raw surfaces.
- 3.3.5 Provide wood blocking for anchoring of window frames.
- 3.3.6 Provide double studs or wood blocking and bolts in stud partitions for fastening of handrails, grab bars, to be capable of supporting 230 kg (500 lb) downward pull. Provide double studs and blocking for anchoring of door frames, and other items anchored to stud partitions.
- 3.3.7 Provide 16mm thick fire retardant treated plywood fastened to metal stud framing, at washroom mirrors. Provide 16mm thick plywood backing for mirrors fastened to block.
- 3.3.8 Co-ordinate with Section 09 29 00 - Gypsum Board, the installation of wood blocking for fastening of wall mounted accessories and casework
- 3.4 INSTALLATION - ROUGH HARDWARE
- 3.4.1 Supply and install rough hardware, including hardware for temporary enclosures.

3.4.2 Provide fasteners long enough so that at least half their length penetrates into the second member and as recommended by COFI. Minimize splitting of wood members by staggering the fasteners in the direction of the grain and by keeping fasteners well in from edges. Use spiral, annular or resin coated nails for plywood.

3.4.3 Fasten to hollow masonry units with toggle bolt, to solid masonry or concrete with lead expansion shields and lag screws. Do not use organic fibre or wood plugs.

3.5 INSTALLATION - PRESSED STEEL FRAMES

3.5.1 Set frames plumb and square in their exact location. Firmly block and brace to prevent shifting. Shim up where required to ensure proper alignment dimensions from finished floor to head of frame. Install temporary wood spreaders at mid-height.

3.5.2 Where pressed steel frames are installed in concrete walls, secure frames to concrete using lead expansion shields and anchor bolts. Perform drilling of concrete as required. Fill recessed bolt heads flush to frame face with approved metal filler and sand smooth.

3.5.3 Install fire rated door frames in accordance with requirements of authorities having jurisdiction to provide the required rating.

3.5.4 Install fire rated door frames in accordance with requirements of National Fire Protection Association and authorities having jurisdiction to provide the required rating.

3.6 PRESSURE PRESERVATIVE TREADED WOOD INSTALLATION

3.6.1 Comply with AWPA M4.

3.6.2 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation. Allow first coating to fully soak into grain before applying second coating in accordance with manufacturer's instructions.

3.6.3 Remove with fine sandpaper, chemical deposits on treated wood to receive applied finish.

3.6.4 Use only hot-dipped galvanized, corrosion resistant nail or screw fasteners. Staples are not acceptable for installation of preservative treated materials.

3.6.5 Use water-borne preservative treated wood for:

- .1 Wood in contact with masonry or concrete,
- .2 Wood within 450 mm of grade,
- .3 Wood decking and fence boards,
- .4 Wood in contact with flashings,
- .5 Wood in contact with waterproofing membranes, confirm compatibility with membrane manufacturer prior to application.

3.6.6 Use oil-borne preservative treated wood for:

- .1 Wood in contact with the ground,
- .2 Wood in contact with freshwater,
- .3 Landscaping timbers,
- .4 Retaining walls,
- .5 Piers or docks,
- .6 Pilings,
- .7 Bases of utility poles,
- .8 Bases of fence posts.

3.7 PRESSURE FIRE RETARDANT TREATED WOOD INSTALLATION

3.7.1 Field Cuts:

- .1 Do not rip, mill or conduct extensive surfacing of fire retardant treated lumber, label will be voided.
- .2 Only end cuts, drilling holes and joining cuts are permitted.
- .3 All cuts on plywood will be considered end cuts.
- .4 Fire-retardant lumber and plywood can be given a light sanding for cosmetic cleaning after treatment.
- .5 Pre-cut to the greatest extent possible before treating.

3.7.2 Fire retardant treated plywood used in structural applications shall be graded or span-rated material.

3.7.3 Use only hot-dipped galvanized, corrosion resistant nail or screw fasteners. Staples are not acceptable for installation of fire resistant treated materials.

3.7.4 Where humidity conditions are such that moisture may condense between hardware and treated wood, hardware shall be back-primed with a corrosive-inhibitive paint.

3.7.5 Back-prime at contact points and fasteners to prevent electrolysis when fire retardant framing members are used in metal buildings.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- 1.1.1 Comply with Division 1, General Requirements and all documents referred to therein.
- 1.1.2 Provide all labour, materials, products, equipment and services to complete the finish carpentry and millwork necessary and/or indicated on the Drawings and specified herein.

1.2 RELATED WORK UNDER OTHER SECTIONS

- 1.2.1 Supply and installation of rough carpentry: Section 06 10 00.
- 1.2.2 Supply of finish hardware: Section 08 70 00.

1.3 REFERENCES

- 1.3.1 ANSI/NPA A208 2009 Medium Density Fiberboard for Interior Use.
- 1.3.2 ASTM D1037-12 Standard Test Method of Evaluating the Properties of Wood-Based Fiber and Particle Panel Materials.
- 1.3.3 NEMA LD3-2005 High Pressure Paper Base, Decorative Laminates.
- 1.3.4 CAN3-O188.0-M78 Standard Test Methods for Mat Formed Wood Particleboard and Waferboard.
- 1.3.5 CAN3 O188.1-M78 Interior Mat Formed Wood Particleboard.
- 1.3.6 CSA O112 Series-(R2014) Evaluation of Adhesives for Structural Wood Products
- 1.3.7 CSA O121-08(R2013) Douglas Fir Plywood.
- 1.3.8 CAN/CSA O141-05(R2014) Softwood Lumber.
- 1.3.9 CSA 0151-09(R2014) Canadian Softwood Plywood.
- 1.3.10 NFPA 80-2013 Fire Doors and Other Opening Protectives.

1.4 QUALITY ASSURANCE

- 1.4.1 The work of this Section shall be executed by fully equipped, expert craftsmen, highly skilled in millwork fabrication, having a minimum of five (5) years continuous Canadian experience in successful manufacture/fabrication and installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.
- 1.4.2 Unless otherwise specified herein comply with the requirements for Custom grade work as set out in the Quality Standards for Architectural Millwork published by the

AWI/AWMAC.

1.4.3 Supplements and modifications to the above standards as indicated on the drawings or as specified herein shall govern work of this section.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

1.5.1 Accept delivery of cabinet work and doors.

1.5.2 Inspect millwork, cabinet work and doors for damage, upon delivery to the site. Items which cannot be readily corrected by sanding, or do not have primer or sealer applied shall be promptly returned to the manufacturer.

1.5.3 Store millwork, casework, and doors in a dry and clean location. If required, store in a temperature and humidity controlled area.

1.5.4 Arrange for proper sequence and scheduling of millwork delivery so as not to delay the progress of the work. Prevent materials not reasonably required from accumulating.

1.5.5 Be responsible for any damage to doors from time of delivery until accepted by Owner after installation.

1.5.6 Provide dry storage areas. Stack materials with 150 mm (6") clearance off the floor.

1.5.7 Accept delivery of finishing hardware. Store hardware in a dry, locked and supervised area.

1.5.8 Protect installed hardware from damage and blemishes.

1.5.9 Protect fire-retardant materials against humidity and moisture.

1.5.10 Protect counter tops with 6 mm (1/4") plywood or other suitable sheet material.

1.6 SUBMITTALS

1.6.1 Submit shop Drawings for all items showing large scale details of construction. Indicate profiles of members, jointing, fastenings, strapping, cut-outs for mechanical and electrical services and related items.

1.6.2 Submit three 300 mm x 300 mm (12" x 12") samples of wood and plastic laminate veneers, and three 300 mm (12") long samples of wood trim, to be supplied to the project, before proceeding. Samples shall show colours, profiles, edging and construction.

1.7 ADMINISTRATIVE REQUIREMENTS

1.7.1 Coordination: Coordinate sizes and locations of framing, blocking, furring, and reinforcements provided by work that is specified in other Sections is complete before starting work of this Section.

1.7.2 Pre-Construction Meeting: Arrange a preconstruction meeting attended by Contractors personnel, Consultant, finish carpentry Subcontractor to discuss:

- .1 Installation requirements
- .2 Special surface effects and finishing
- .3 Coordination of work with adjacent finishes
- .4 Protection of finishes
- .5 Acceptability of substrates and quality of materials being used for the project

1.8 SITE CONDITIONS

1.8.1 Site Measurements: Verify dimensions by site measurements before fabrication and indicate measurements on Shop Drawings where casework is indicated to fit walls and other construction; coordinate fabrication schedule with construction progress to avoid delaying the Work; locate concealed framing, blocking, and reinforcements that support woodwork by site measurements before being enclosed and indicate measurements on Shop Drawings.

1.8.2 Established Dimensions: Establish dimensions and proceed with fabricating casework without confirmed site measurements where site measurements cannot be made without delaying the Work; coordinate with the construction to ensure that actual dimensions correspond to established dimensions; allow for trimming and fitting.

1.8.3 Ambient Conditions: Maintain area or room in which casework is being installed at a uniform temperature and humidity for 24 hours prior to, during and after installation in accordance with AWS for relative humidity and moisture content; provide additional lighting to maintain a minimum of 430 lx on surfaces and areas where casework is being installed.

1.9 WARRANTY

1.9.1 Warrant plastic laminate work of this Section against defects in materials and workmanship in accordance with General Conditions but for an extended period of two (2) years and agree to repair or replace faulty materials or work which appears during warranty period, without cost to the Owner/Tenant. Defects shall include but not be limited to, opening of joints, cracking, shrinkage, warpage, delamination of plastic laminate.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Wood members: Clean, seasoned, straight, square and true on all four sides. Comply with minimum size and tolerances of CSA O141. Grade-mark all wood materials. Kiln dry wood materials for interior use to a moisture content of 4% to 8%.

2.1.2 Douglas Fir plywood: Comply with CSA O121. Western Softwood Plywood: Comply with CSA O151. Exposed two sides shall be Grade G2S, and exposed one side shall be Grade G/Solid. Consider fitment doors exposed on both sides.

- 2.1.3 Lumber grading - Complying with official grading rules of NLGA.
- 2.1.4 Lumber species, Group D Balsam Fir or Spruce, complying with CAN/CSA 3-086, unless noted otherwise.
- 2.1.5 Hardwood for paint finish: Paint grade Birch.
- 2.1.6 Hardwood Plywood: Comply with CSA O115 Type II, Exposed faces shall be Architectural Grade, selected veneers and unexposed faces shall be sound grade. Exposed faces and edges shall be belt sanded other faces regular sanded.
- 2.1.7 Wood veneer: Of species specified to match approved sample, minimum 0.8 mm (1/32") thick, architectural quality selected for uniformity of colour, figure and grain. Piece veneers shall be parallel clipped, jointed by tapeless splicer and edge glued. Face veneers shall not contain open joints, face depressions, glue stain, patches, plastic repair or any other manufacturing irregularities or defects.
- 2.1.8 Particle Board: Complying with CAN3-O188 or CAN3-O188.1 Grade R, density of 656 kg/cu m (41 lbs./cu.ft.) minimum. Where hardware or fasteners are to be secured, provide solid wood for the thickness of the board.
- 2.1.9 Medium Density Fibreboard (MDF): Premium grade, 770 kg m³ (48 lbs/ft³), complying with ANSI A208.2, as tested in accordance with ASTM D1037 methods.
- 2.1.10 High Density Fibreboard (HDF): Premium grade, 882 kg/m³ (55 lbs/ft³), complying with ANSI A208.2, as tested in accordance with ASTM D1037 methods.
- 2.1.11 Exposed framing solid members and trim: quarter sawn, architectural grade, matched for compatibility of grain and colour.
- 2.1.12 Concealed framing: Comply with NLGA, S-Dry No. 1 grade Ontario White Pine or Douglas Fir; comply with BCLMA construction grade.
- 2.1.13 Sealer: Water-repellent penetrating wood preservative, LePage's Wood Preservative, distributed by LePage's Ltd., Solignum distributed by Sturgeons Ltd., or other approved manufacture.
- 2.1.14 Fire retardant treatment of plywood and particle board: Conforming to CAN/CSA O80.27-M to provide a flame spread rating of 25 or less, in accordance with test method CAN/ULC-S102 of Underwriter's Laboratories of Canada.
- 2.1.15 Glue for wood assemblies: Comply with CSA O112.4, polyvinyl adhesive.
- 2.1.16 Adhesive for decorative laminate fabrication: Formulated for decorative laminate and to suit application without failure.
- 2.1.17 Plastic laminate facing sheet: High pressure decorative laminated plastic sheet complying with NEMA Publication LD3-2000, Class 1:
 - .1 Grade:
 - .1 Laboratory Grade 840/LGP

- .2 General Purpose (HGL and VGL)
- .3 Post Forming (PF)
- .4 Backing Grade (BK)
- .2 Type:
 - .1 Heavy Duty (HD) 2.0 mm (0.08") thick.
 - .2 Standard Duty (S) 1.2 mm (0.048") thick.
 - .3 Light Duty (LD) 0.75 mm (.03" thick).

2.1.18 Melamine: Melamine resin impregnated paper, thermally fused to particle board, Formica MCP by Cyanamide Canada Limited, Arborite Cladboard by Domtar Construction Materials, or other approved manufacture. Furniture finish in colour to be selected by Consultant.

2.1.19 Closet doors: Melamine faced hollow core wood doors complying with CAN/CSA O132.2, provided with lock blocks and intermediate stiles and rails to provide adequate support for fastening and hardware.

2.1.20 Plastic laminate for General Counter to be GP HGL, Pattern Series by Formica or approved equal.

2.1.21 Magnetic hooks: N40 Grade Neodymium-Iron-Boron magnets with 3 layer coating of Nickel-Copper-Nickel coating, minimum 0.0015" thick, with stainless steel dowel, mounted with three #6 stainless steel screws, Henkelhook as manufactured by Henkel Diversified Inc. or approved equal.

2.2 CABINET HARDWARE

2.2.1 Hafele and Accuride products and other product names and numbers listed in this article are a representative quality standard for hinges, handles, shelving pilasters and clips, drawer slides, elbow catches, locks, deadbolts, furniture glides, cupboard locks, door pulls, etc. Products of other manufacturers meeting or exceeding the quality herein specified shall be subject to approval by the Consultant.

2.2.2 For 19 mm (3/4") thick cabinet doors, drawers and shelving;

Hinge 165D 3903 FULL SC DOW MOD14
 Hinge 165D 3904 HALF SC DOW MOD6
 MPL F.W. SCREW MOD 1 3000/4000
 MPL PRE/11MM MOD 1 3000/4000
 Handle BR Satin CHR 8/32 CTC 96MM
 Shelf Support Strip ST.NIP 16X6X3500
 Shelf Support ST. ZIP. 16X28MM
 ACCURIDE C3832-C10 ST. ZIP. 100LB
 ACCURIDE C3832-C12 ST. ZIP. 100LB
 ACCURIDE C3832-C14 ST. ZIP. 100LB
 ACCURIDE C3832-C16 ST. ZIP. 100LB
 ACCURIDE C3832-C18 ST. ZIP. 100LB
 ACCURIDE C3832-C20 ST. ZIP. 100LB
 Elbow Catch Solid Brass CHR.PL
 Lock Core ZN.NI.MATT KEY DIFF TA

Deadbolt Lock Body RD.R.H./L.H.
 Deadbolt Lock Body RD.DR.
 Strike Plate ANGLED ST. BL.
 Cyl. ROSETTE BR.NI.MATT 17.4/24MM
 Furniture Glide PL. WH. DIA. 16MM

2.2.3 For 35 mm (1-3/8") thick cabinet doors:

Hinges	F179 76 x 76 Stanley C15
Roller Catches	504N Onward C26
Surface Bolt	043-4 X Angle Strike C15
Door Pulls	CBH245 - 4-1/2" C32D
Cabinet Locks	"Best" cylinder and core as supplied under Section 08 70 00 - Finishing Hardware.

2.2.4 Closet rods and flanges:

Rods: Chrome finish, 33 mm diam.
 Flanges: Chrome finish, Closed flanges at both ends of rod.

2.2.5 Shelf and rod: Steel, white enamel, Model No. 1797 by Hager.

2.2.6 Cabinet keying: Key all cabinets and drawer locks alike for each room, except teachers' closets, which shall be keyed to match classroom door.

2.2.7 Provide accessories such as rubber door silencers (2 per drawer or door), and other items necessary for completion of the cabinet work.

2.3 FABRICATION - GENERAL

2.3.1 Check job dimensions and conditions and notify the Owner in writing of unacceptable conditions. Do not proceed until remedial instructions are received.

2.3.2 As far as practical, assemble work at the shop and deliver to the job ready for installation. Leave ample allowance for fitting and scribing on the job.

2.3.3 Fabricate work square and to the required lines. Recess and conceal fasteners and anchor heads. Fill with matching wood plugs.

2.3.4 Provide wood members free from bruises. Blemishes, mineral marks, knots, shake and other defects. Select for colour, grain and texture. Machine and hand sand surfaces exposed in finished work to even smooth surface free from defects detrimental to appearance.

2.3.5 Provide running members in the maximum lengths obtainable. Provide thickness of members in maximum dressed size of standard lumber. Where thickness or width indicated is not available in hardwoods, use glue laminations to obtain sizes required. Spline or key solid boards 6" and wider and glue under pressure. Provide unexposed backs of veneers having the same physical characteristics as the face veneer.

2.3.6 Design construction details for expansion and contraction of materials. Unless otherwise

specified work shall be glued, and blind nailed. Properly frame material with tight, hairline joints and hold rigidly in place. Use glue blocks where necessary. Conceal joints and connections wherever possible. Locate prominent joints where directed. Glue and pin mortise and tenon joints. Intermediate joints between supports will not be permitted. Set and fill surface nails. Prevent opening-up of glue lines in the finished work.

- 2.3.7 Comply with glue manufacturer's recommendations for lumber moisture content, glue shelf life, pot life, working life, mixing, spreading, assembly time, time under pressure and ambient temperature.
- 2.3.8 Provide exposed end grain of solid members and edges of exposed plywood with matching solid edging at least 6 mm (1/4") thick.
- 2.3.9 Seal finish carpentry items before they leave the fabricating shop. For surfaces to receive natural or stain finish ensure that sealer is compatible with the final finish. Co-operate with
- 2.3.10 Section 09 90 00 and obtain written approval of proposed sealer.

2.4 FABRICATION - TRIM

- 2.4.1 Trim members shall be of sizes and profiles indicated. Trim members shall be slow-fed work, free from chatter and other machine marks.
- 2.4.2 Provide trim over 63 mm (2 ½") wide with backs ploughed or kerfed. Mitre all joints. Carefully machine drum-sand exposed flat surface. Minimize sanding on the job.

2.5 FABRICATION - CABINET WORK

- 2.5.1 Check job dimensions and conditions and notify Consultant in writing of unacceptable conditions. Do not proceed until remedial instructions are received.
- 2.5.2 As far as practical, assemble work at the shop and deliver to the job site ready for installation. Leave ample allowance for fitting and scribing on the site.
- 2.5.3 Unit bodies shall be minimum 19 mm (3/4") thick wood particle board. All bodies shall have backs.
- 2.5.4 Use HGL, HD plastic laminate for horizontal working surfaces. Use VGL, S for exposed vertical surfaces.
- 2.5.5 Countertops for vanities shall be post formed plastic laminate faced wood particle board.
- 2.5.6 Provide melamine on interior exposed surfaces.
- 2.5.7 Vanities and counters containing sinks shall have waterproof plywood backing for plastic laminate.
- 2.5.8 Other surfaces shall be HGL and VGL, LD. Colour and sheen to approval of Consultant.

- 2.5.9 Install metal supports supplied under Section 05 99 90 - Miscellaneous Metals, for support of vanities.
- 2.5.10 Provide magnetic hooks at Kindergarten cubbies and elsewhere at a coat hook locations as shown.
- 2.6 FABRICATION - PLASTIC LAMINATE FACED WORK
- 2.6.1 Comply with NEMA , Publication LD3-2000, Class 1, High Pressure, Paper Base, Decorative Laminates.
- 2.6.2 Provide cores of not less than 19 mm (3/4") nominal thickness solid face Douglas Fir or Western Softwood Plywood, or particle board.
- 2.6.3 Apply backing sheet to laminated flatwork. Apply uniform coating of sealer on exposed edges. Provide backing sheet of sufficient thickness to compensate stresses caused by the facing sheet.
- 2.6.4 Self-edge straight-line-edging with 1.2 mm (0.048") standard material and radius corners with post-forming material; apply with same adhesive as facing sheet. Chamfer edges uniformly at approximately 20° using machine router.
- 2.6.5 Locate joints at 2400 mm to 3000 mm (8'-0" to 10'-0") o.c. At L-shaped corners mitre plastic laminate, to the outside corner. Accurately fit members together to provide tight and flush butt joints, in true planes. Provide 6 mm (1/4") blind spline and approved type draw bolts; one draw bolt at maximum 450 mm (18") centres. Colour-match adjoining units.
- 2.6.6 Provide cut-outs as required for inserts, fixtures and fittings. Use radiused corners and chamfer edges around cut-outs to avoid chipping laminate.
- 2.6.7 Post-form laminate work to details indicated. Provide same core and laminate profiles to provide continuous support and bond for the entire surface.
- 2.6.8 Assemble work, true and square. Arrange adjacent parts of continuous laminate work to match in colour and pattern.
- 2.7 FABRICATION - VENEERED PANELS
- 2.7.1 Fabricate wood veneered panels from fire retardant wood particle board cores, minimum 13 mm (1/2") thick with backing sheet, solid edge strips, and face veneer of species indicated.
- 2.7.2 Book matching panels.
- 2.7.3 Apply uniform coating of sealer on exposed edges. Provide backing sheet of sufficient thickness to compensate stresses caused by facing sheet.
- 2.7.4 Provide cut-outs as required for inserts, fixtures and fittings. Use radius corners and chamfer edges around cut-outs to avoid chipping laminate / veneer.

PART 3 - EXECUTION

3.1 INSTALLATION - MILLWORK

- 3.1.1 Deliver millwork to the site. Provide units of such size as will not present difficult of entry to the place of installation.
- 3.1.2 Provide cutting and fitting required to install millwork in place.
- 3.1.3 Install units plumb and level without distortion. Shim as necessary with concealed shims. Accurately scribe and closely fit face plates, filler strips and trim to irregularities of adjacent surfaces.
- 3.1.4 Secure trim members into proper position with blind nailing where possible or heads of exposed nailing neatly set.

3.2 INSTALLATION - CABINETWORK

- 3.2.1 Counters, vanities, kitchen counters and cupboards may be delivered in assembled or knock-down form. Provide cutting and fitting and assemble as required to install these units properly in place.
- 3.2.2 Where dimensions are incorrect and alterations are required to the main structure of unit, return unit to the manufacturer for corrections.
- 3.2.3 Prepare cut-outs for fittings as required. Co-operate with the trades concerned.
- 3.2.4 Install units plumb, square, true, rigid, and level without distortion. Shim as necessary with concealed shims. Accurately scribe and closely fit face plates, filler strips and trim to irregularities of adjacent surfaces.
- 3.2.5 Secure trim members into proper position with blind nailing where possible or heads of exposed nailing neatly set.

3.3 INSTALLATION - PANELLING

- 3.3.1 Install panelling with concealed fastening.
- 3.3.2 Install work, true and square. Arrange adjacent panels to match in colour and pattern.

3.4 INSTALLATION - DOORS

- 3.4.1 Install hollow metal doors supplied under Section 08 10 00.
- 3.4.2 Check doors for correct size. If improperly sized return to manufacturer for corrections.
- 3.4.3 Prepare doors to receive hardware. Check each hardware item before installation. Drill pilot holes of suitable diameter.

- 3.4.4 Install doors. Maintain an even clearance, not exceeding 1/8", between door and frame and 19 mm (3/4"), at floor to allow free action of door. Allow for proper clearance where carpet is scheduled.
- 3.4.5 Install doors with warp age not to exceed 2 mm (3/32") measured diagonally across door.
- 3.4.6 Install door grilles where required.
- 3.4.7 Install fire rated doors in accordance with requirements of authorities having jurisdiction to provide the required rating. Install fire rated doors and frames according to NFPA 80.

3.5 INSTALLATION - FINISHING HARDWARE

- 3.5.1 Install finish hardware in accordance with manufacturer's written instructions. Do not modify finish hardware without manufacturer's written approval.
- 3.5.2 Install finish hardware secure, plumb, level, and true to line.
- 3.5.3 Install finish hardware to template.
- 3.5.4 Cut and fit to substrate avoid damage and weakening. Reinforce attachment substrate as necessary for installation and operation.
- 3.5.5 Completely cover cut-outs with hardware item.
- 3.5.6 Mortise work to correct location and size without gouging, splintering, and causing irregularities in exposed finish work.
- 3.5.7 Surfaces for Paint or Other Finish:
 - .1 Where cutting and fitting is required on substrata to be painted or similarly finished, install, fit, and adjust hardware prior to finishing.
 - .2 Remove hardware and place in original packaging.
 - .3 Re-install hardware after finishing operation is complete.
- 3.5.8 Install hardware items affixed to concrete with machine screws and threaded metal expansion shields.
- 3.5.9 Set, fit, adjust and clean hardware according to manufacturer's written instructions.
- 3.5.10 Lubricate moving parts as recommended by hardware manufacturer. Use graphite type lubrication if no other is recommended.
- 3.5.11 After installation of hardware under this section, check opening units for correct fit and uniformity of space around perimeter of units, or between units. Provide smoothly operating opening units free from binding.

3.6 HARDWARE MOUNTING HEIGHTS

- 3.6.1 Mortise lock strike: 990 mm (39") from centre of knob to finished floor.

- 3.6.2 Deadlock strike: 1270 mm (50") from centre of cylinder to finished floor.
- 3.6.3 Mortised night latches: 1270 mm (50") from centre of cross bar to finished floor.
- 3.6.4 Panic sets: 1020 mm (40") from centre to finished floor.
- 3.6.5 Door pulls: 1020 mm (40") from centre to finished floor.
- 3.6.6 Push plates: 1120 mm (44") from centre to finished floor.
- 3.6.7 Blank strikes: 1270 mm (50") from centre to finished floor.
- 3.6.8 Blank fronts: 1270 mm (50") from centre to finished floor.
- 3.6.9 Door closer arms: To allow maximum degree of swing.
- 3.6.10 Floor stops: To allow maximum degree of swing.

3.7 ADJUSTING AND CLEANING - HARDWARE

- 3.7.1 Check and adjust each operating hardware item to ensure proper operation and function of unit.
- 3.7.2 Lubricate moving parts as recommended by hardware manufacturer. Use graphite type lubricant if no other is recommended.
- 3.7.3 Repair or replace defective materials and units which cannot be adjusted and lubricated to operate freely and smoothly. Re-install items found improperly installed.
- 3.7.4 Prior to date of Substantial Performance, re-adjust and re-lubricate as necessary.
- 3.7.5 Instruct Owner's designated personnel in the proper adjustment and maintenance of hardware and finishes at time of final hardware adjustment.

3.8 CLEANING

- 3.8.1 On completion, remove manufacturer's identification markings and clean plastic laminate surfaces.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

1.1.1 This section include a description of materials to be supplied and labour required for the installation of all sheet metal caps, counter flashings, metal siding and all other roof related metal flashings required to complete the installation.

1.2 DISPOSAL

1.2.1 Be responsible for the safe disposal of all debris from the job site.

1.3 SAMPLES

1.3.1 Submit samples of sheet metal flashing specified before proceeding with the work, showing proposed method of shaping, forming, jointing and fastening.

1.3.2 Submit samples if approval of substitutions is requested.

1.3.3 Sheet metal flashing shall match colour of existing metal flashing of Building, particularly when they adjoin one another.

1.3.4 Submit shop drawings indicating material, thickness and finish.

1.4 QUALITY ASSURANCE

1.4.1 Sheet metal flashing work shall be carried out in accordance with the best standards practices; with joints locked, cleaned, caulked, as required, and exposed edges hemmed. Ample allowance shall be made in all work for expansion and contraction. Finished work shall ensure a complete, watertight installation.

1.4.2 Fabricator and tradesmen executing the work of this Section shall have had a minimum five (5) years continuous Canadian experience in successful manufacture and installation of Work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

1.4.3 Form to profiles as detailed upon the drawings, or as required to suite site conditions.

1.4.4 Mitred corners shall be straight and true to profiles shown on drawings, with flat surfaces free of distortion and free of face nailing.

1.5 REFERENCES

1.5.1 ASTM A653/A653M-15 Standard Specification for Steel Sheet, Zinc-Coated
(Galvanized) or Zinc-Iron Alloy-Coated
(Galvannealed) by the Hot-Dip Process

1.5.2 CSA B111-74(2003) Wire Nails, Spikes and Staples.

- 1.5.3 CAN/CGSB-1.108-M89 Bituminous Solvent Type Paint.
- 1.5.4 Standard practices, unless otherwise noted herein, shall be deemed to constitute recommended procedures published in S.M.A.C.N.A. – Architectural Manual.
- 1.6 INSPECTION AND TESTING
 - 1.6.1 The Owner will appoint and pay an independent inspection and testing agency, to inspect and test roofing and sheet metal work.
- 1.7 WARRANTY
 - 1.7.1 Remedy all defects in the Sheet Metal Flashings installed hereunder, which appears within a period of two (2) years from the date of final completion.
 - 1.7.2 Pay for all damage resulting from aforementioned defects. Make all necessary repairs and replacement within 48 hours of receipt of written notification.
 - 1.7.3 Provide a written warranty confirming the above, issued on the corporate letterhead, and sealed by an authorized company official.
 - 1.7.4 Nothing contained in this Article shall be construed as in any way restricting or limiting the liability in Common Law and statutory liability of the Contractor.

PART 2 - MATERIALS

- 2.1 DESCRIPTION
 - 2.1.1 Metal flashing shall be 24 gauge pre-finished commercial galvanized to ASTM A653/A653M. Coating designation G90, PPD 8000 Paint Series from standard colour chart. Paint finished to match existing colour or as requested by Owner.
- 2.2 CAULKING
 - 2.2.1 Refer to Section 07 90 00 – Sealants
- 2.3 STARTER STRIP
 - 2.3.1 Starter strips to be manufactured from the same type of material used for cap and counter flashings, and shall be of 20 gauge galvanized steel.
- 2.4 FASTENING CLEATS
 - 2.4.1 Fastening cleats to be manufactured from the same type of material used for cap and counter flashings and shall be of 2 gauge pre-painted steel.
- 2.5 UNDERLAY / SEPARATION SHEET

2.5.1 No. 15 felt.

2.6 STEEL FASTENERS

2.6.1 Flat head nails, bolts, screw and rivets to be galvanized stainless steel or same metal as material to be fastened. CSA B111.

2.6.2 Cadmium plated screws, coloured head.

2.7 BITUMINOUS METAL BACK PAINT

2.7.1 Bituminous metal back paint to CAN/CGSB-1.108-M Type II – Ace of Spades or 410-02 as manufactured by Bakor.

2.8 Wedges

2.8.1 Rolled plumber sheet wedge.

2.9 FABRICATION

2.9.1 Metal flashing shall be as detailed supplemented by recommendations of S.M.A.C.N.A. Architectural Manual. Also fabricated metal flashings to applicable CRCA 'FL' Series Specifications.

2.9.2 All free edges of metal flashing shall be strengthened by a fold at least 13mm wide, set out slightly and presenting a straight line and neat finish. From flashings in 2.4 metre lengths, and make allowance for expansion at joints. When flashing exceeds 600mm in height from flashing in 1.2 metre length. (Counter flashing to incorporate a stiffener edge at the toe of the cant.)

2.9.3 Metal shall be formed on a bending brake, shaping trimmed and hard seaming shall be done on bench, as far as practicable, with proper sheet metal working tools. Sections shall be square, true, and accurate to size, free from distortion. Angles of bends and folds for interlocking metal shall be made with full regard to expansion and contraction to avoid bucking or fullness in service and to avoid damaging surfaces of metal.

2.9.4 Dry joints are to be tight but not dented so as to permit slight adjustments of sheets and yet remain watertight.

2.9.5 Lock seams at all corners.

2.9.6 Do not install fasteners through cant strips.

2.9.7 Supply and install dry separation sheeting under all metal flashings. Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

2.9.8 Proceed with the flashing of all penetrations and curbs within the field of the roof and at its perimeter. This includes but is not limited to:

- .1 vent and oil pipes projecting above the roof;

- .2 roof drains chimneys, electrical conduits, piping, etc. as they protrude through the roof;
- .3 curbs and flashings at ducts, roof top equipment bases, etc.

PART 3 - EXECUTION

3.1 ANCHORS AND FASTENERS

- 3.1.1 Space exposed fasteners evenly and in an organized pattern, keep number to a minimum. Where exposed to view, use metal fasteners of same material, colour, texture and finish as the metal on which they occur. Obtain approval before installing any exposed fasteners.

3.2 COUNTER FLASHINGS

- 3.2.1 Install metal counter flashings as soon as possible after membrane flashings are in place and accepted by Owner.
- 3.2.2 Counter flashing shall have crimped bottom edge, stiffening break and shall extend at least 450mm up verticals or as detailed and extend down over cant strips to roof surface.
- 3.2.3 Where detailed, turn top edge of flashing into walls secure with lead wedge or friction fit pins into reglet and caulk joint at wall.
- 3.2.4 Secure sections of metal S-lock joints and allow for sufficient expansion and contraction between each piece.
- 3.2.5 Secure metal counter flashing a minimum of 300mm above roof membrane. Use fasteners of sufficient length to penetrate at least 25mm into substrate.

3.3 CAP FLASHING

- 3.3.1 Supply and install continuous metal starter strip, secure at 600mm on centre, maximum of 50mm above the drip edge, with fastener of sufficient length to penetrate a minimum of 25mm into substrate.
- 3.3.2 Supply and install metal cleats at 600mm on centre and as detailed. Use fastener of sufficient length to penetrate a minimum of 25mm into substrate.
- 3.3.3 Use concealed fastener except where approved by Consultant.
- 3.3.4 Secure sections of metal in S-lock joints, and allow for sufficient expansion and contraction between each piece.
- 3.3.5 Supply and install separation sheeting (underlay) between cap flashings and the surface they are installed over.
- 3.3.6 Form cap flashings to profiles as shown on the details and/or drawings. Ensure positive drainage to the interior (roof surfaces) areas (i.e. slope cap flashing towards roof surface).

3.4 CAULKING

- 3.4.1 Install caulking in accordance with the manufacturer's latest recommendations. Refer to Section 07 90 00 – Sealants.

3.5 CLEANUP

- 3.5.1 Finished sheet metal flashing work shall be clean and left in neat, workmanlike condition. Adjoining materials shall be properly cleaned of soil caused by this trade; debris and soil shall be removed from site to satisfaction of Owner.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

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

1.1.2 Provide labour, materials, products, equipment and services required to complete the fire stopping and smoke seals work.

1.2 RELATED WORK SPECIFIED ELSEWHERE

1.2.1 Caulking and Sealants: Section 07 90 00.

1.2.2 Fire dampers in all locations where ductwork passes through wall, partition, roof or ceiling, required to be fire rated: Division 15.

1.3 REFERENCES

1.3.1 ASTM E814-13a Standard Test Method of Fire Tests of Penetration Firestop Systems.

1.3.2 CAN/ULC S115-11 Standard Method of Fire Tests of Firestop Systems.

1.4 SYSTEM DESCRIPTION

1.4.1 Work of this Section comprises fire stopping and smoke seal materials and/or systems to provide closures to fire and smoke at openings around penetrations, at unpenetrated openings, at projecting or recessed items, and at openings and joints within fire separations and assemblies having a fire-resistance rating, including openings and spaces at perimeter edge conditions.

1.4.2 Provide seals to form draft tight barriers to retard the passage of flame and smoke.

1.4.3 The installed seal shall provide and maintain a fire resistance rating equivalent to the rating of the adjacent floor, wall or other fire separation assembly to the requirements of and as acceptable to the authorities having jurisdiction and the Consultant.

1.4.4 Fire stopping and smoke seals within mechanical (i.e. inside ducts, dampers) shall be provided as part of the work of Division 15. Fire stopping and smoke seals around the outside of such mechanical assemblies where they penetrate rated fire separations shall be part of the work of this Section.

1.5 QUALITY ASSURANCE

1.5.1 Provide the work of this Section using experienced and competent installers, approved, trained and licensed by the material or system manufacturer.

1.5.2 Fire stopping and smoke seal materials shall conform to the temperature and flame rating, and fire hose rating of CAN/ULC S115 and ASTM E814, and other requirements

of authorities having jurisdiction.

1.6 SUBMITTALS

1.6.1 Submit shop drawings indicating the ULC assembly number, the required temperature and flame rating, thickness, installation methods and materials of fire stopping and smoke seals, damming materials, anchorages and fastenings.

1.6.2 Submit manufacturer's product data for materials and prefabricated devices, providing descriptions sufficient for identification at the Project site. Include manufacturer's printed instructions for installation.

1.6.3 Submit samples of each type of fire stopping and smoke seal material.

1.6.4 Submit manufacturer's certification that installed fire stopping and smoke seal materials comply with specified requirements.

1.7 MOCK-UP

1.7.1 Apply one sample installation on representative substrate of each type of installation and required fire rating.

1.7.2 Sample shall comply with requirements as to thickness and density of application to achieve fire rating required.

1.7.3 Acceptable mock-up may remain as part of completed work.

1.8 DELIVERY, STORAGE AND HANDLING

1.8.1 Deliver and store materials in original wrappings and containers with manufacturer's seals and labels intact. Protect from damage and environmental conditions in accordance with manufacturer's recommendations.

1.9 SITE CONDITIONS

1.9.1 Comply with manufacturer's recommended requirements for temperature, relative humidity, and substrate moisture content during application and curing of materials.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

2.1.1 Fire stopping and smoke seal materials of the following manufacturers complying with these specifications are acceptable:

- .1 Canadian General Electric Company Limited.
- .2 Electrovert Ltd.
- .3 Firestop Systems Inc.
- .4 M.W. McGill and Associates.

- .5 Tremco Ltd.
- .6 Hilti (Canada) Corporation.
- .7 or other approved manufacture.

2.2 MATERIALS

- 2.2.1 Fire stopping and smoke seals: Asbestos free materials and systems complying with standards specified herein, by one or more of the specified acceptable manufacturers, installed in accordance with tested assemblies acceptable to authorities having jurisdiction to provide an effective barrier against the passage of fire, smoke and gases, and to provide a fire resistance rating not less than the fire resistance rating of the surrounding floor, wall or other assembly.
- 2.2.2 Products shall be manufactured under ULC Follow-up Program and each package/ container shall bear ULC label or listing mark.
- 2.2.3 Service penetration assemblies: Certified by ULC in accordance with CAN/ULC S115 and listed in ULC Guide No. 40 U19.
- 2.2.4 Service penetration firestop components: Certified by ULC in accordance with CAN/ULC S115 and listed in ULC Guide No. 40 U19.13 under the Label Service of ULC.
- 2.2.5 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: An elastomeric seal; do not use a cementitious or rigid seal at such locations.
- 2.2.6 Firestopping and smoke seals at openings around penetrations for pipes, duct work and other mechanical items requiring round and vibration control: Elastomeric, do not use cementitious or rigid seal at such locations.
- 2.2.7 Primers: To manufacturer's recommendation for specific material, substrate, and end use.
- 2.2.8 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
- 2.2.9 Damming and backup materials, supports and anchoring devices: To manufacturer's recommendations, and in accordance with the tested assembly being installed as acceptable to authorities having jurisdiction.
- 2.2.10 Sealants for vertical joints: Non-sagging.

PART 3 - FABRICATION

3.1 FIRESTOPS

- 3.1.1 Supply and install mineral wool firestop material at all suspended slabs, between edge of slabs and exterior cladding and in vertical positions at air shafts. Place firestop material under permanent 35% compression. Use impaling clips or metal trims to hold insulation in place.

- 3.1.2 Supply and install stick clips at maximum [300 mm|1'-0"] o.c. secured to concrete in an approved manner, to support firestop material in place.
- 3.1.3 Supply and install continuous steel angles, hot dipped, galvanized, minimum [10 mm|3/8"] thick for firestopping where shown and as required.

PART 4 – EXECUTION

4.1 PREPARATION

- 4.1.1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. Ensure that substrates and surfaces are dry and frost free.
- 4.1.2 Clean bonding surfaces to remove deleterious substances including dust, paint, rust, oil, grease and other foreign matter which may otherwise impair effective bonding.
- 4.1.3 Do not apply fire stopping and smoke seals to substrates and surfaces previously painted or treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.
- 4.1.4 Remove insulation from insulated pipe and duct where such pipes or ducts penetrate a fire separation unless ULC certified assembly permits such insulation to remain within the assembly.
- 4.1.5 Beginning of installation shall indicate acceptance of existing conditions.
- 4.1.6 Prepare surfaces and prime in accordance with manufacturer's directions.
- 4.1.7 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

4.2 MIXING

- 4.2.1 Mix components in a mixer clean and free of used and set materials and surface contaminants.
- 4.2.2 Thoroughly mix components in accurate proportions.
- 4.2.3 Apply mixed materials within time limit recommended by the manufacturer.

4.3 APPLICATIONS

- 4.3.1 Apply fire stopping and smoke seals in strict accordance with manufacturer's instructions and tested designs to provide the required temperature and flame rated seal, and to prevent the passage of smoke.
- 4.3.2 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.

- 4.3.3 Completely fill and seal voids with fire stopping and smoke seal materials.
- 4.3.4 Tool or trowel exposed surfaces.
- 4.3.5 Remove excess compound promptly as work progresses and upon completion.
- 4.3.6 Allow materials to cure. Do not cover up materials until full curing has taken place.
- 4.3.7 Notify Consultant when completed installations are ready for inspection and prior to concealing or enclosing fire stopping and smoke seals.

4.4 SCHEDULE OF LOCATIONS

- 4.4.1 Provide fire stopping and smoke seal materials at openings and penetrations in fire resistance rated assemblies, including but not limited to, the following locations:
 - .1 Penetrations through fire resistance rated masonry, concrete, and gypsum board partitions and walls.
 - .2 Top of fire resistance rated masonry and gypsum board partitions.
 - .3 Intersection of fire resistance rated masonry and gypsum board partitions.

4.5 CLEAN UP

- 4.5.1 Remove excess materials and debris and clean adjacent surfaces immediately after application.
- 4.5.2 Remove temporary dams after initial set of fire stopping and smoke seal materials.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

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

1.1.2 All labour, materials, products, equipment and services to complete the joint caulking and sealants work necessary and/or indicated on the Drawings and specified herein.

1.1.3 All caulking and sealing required to make the building sealed tightly from the exterior and caulked from the interior to withstand the action of the elements and to complete the building vapour barrier and not specified under other Sections, shall be the work of this Section.

1.2 WORK INCLUDED UNDER OTHER SECTIONS

1.2.1 Masonry Wall: Section 04 20 00.

1.2.2 Fire stopping and smoke seals: Section 07 84 00.

1.2.3 Gypsum Board: Section 09 29 00.

1.3 REFERENCES

1.3.1 CGSB 19-GP-5M Solvent Sealing Compound, One-Component, Acrylic Base, Curing (Incorporating Amendment No. 1)

1.3.2 CAN/CGSB 19.24-M90 Compound Multicomponent, Chemical-Curing Sealing

1.4 QUALITY ASSURANCE

1.4.1 Perform the work by a recognized established caulking and sealing contractor having at least five years experience and skilled mechanics thoroughly trained and competent in the use of caulking and sealing equipment and the specified materials.

1.4.2 Arrange with the caulking and sealant manufacturers for visit at the job site by one of their technical representatives before beginning the caulking and sealing installation to discuss with the Contractor and the Consultant the procedures to be adopted, to analyze site conditions and inspect the surfaces and joints to be sealed, in order that recommendations may be made.

1.4.3 Discuss the following items:

- .1 Weather condition under which work will be done;
- .2 Anticipated frequency and extent of joint movement;
- .3 Joint design;
- .4 Suitability of Durometer hardness and other properties of material to be used.

- 1.4.4 Technical representative shall randomly inspect preparation of substrate and perform random testing of installed work at at least ten(10) locations.
1. Cut tests locations to be 150mm long.
 2. Certify thickness, hardness and surface finish conforms to intended design.
 3. Report to consultant.
- 1.5 SUBMITTALS
- 1.5.1 Submit a signed letter from the sealant and caulking manufacturers prior to commencement of work of this Section which states:
- .1 Sealants and caulking materials selected for use from those specified;
 - .2 Surface preparation requirements;
 - .3 Priming and application procedures;
 - .4 Verification that sealant and caulking are suitable for purposes intended and joint design;
 - .5 Sealants and caulking are compatible with other materials and products with which they come in contact including but not limited to sealants provided under other Sections, insulation adhesives, bitumen, block, concrete, metals and metal finishes;
 - .6 Verification that sealants and caulking are suitable for temperature and humidity conditions at time of application.
- 1.6 ENVIRONMENTAL CONDITIONS
- 1.6.1 Ambient and substrate surface temperatures shall be above 5°C during application and during the work of this Section.
- 1.7 WARRANTY
- 1.7.1 Submit a five year warranty of the materials and workmanship for the sealing work. Under the warranty, the materials shall not breakdown, decompose, lose their resiliency, crack, or lose bond with sides of joints.

PART 2 - PRODUCTS

- 2.1 MATERIALS
- 2.1.1 All caulking and sealants: Non-bleeding and capable of supporting their own weight except for the self-levelling type sealant for horizontal surfaces.
- 2.1.2 Caulking: One component acrylic base (solvent release type) complying with CGSB 19-GP-5M.
- 2.1.3 Caulking for horizontal surfaces: Self-levelling pourable grade, Shore "A" hardness of 25-35, fully water resistant for continuous wet conditions, grey in colour, Duoflex SL by Sika, or other approved manufacture.
- 2.1.4 Sealant: Multi-component chemical curing, complying with CAN/CGSB 19.24-M Type 2,

- Dymeric 240FC by Tremco Manufacturing Company (Canada) Ltd., or other approved manufacture.
- 2.1.5 Sealant for saw-cut horizontal surfaces: Multi-component, self-levelling, conforming to ASTM D2240 Tremco Control Joint Sealant, BASF Masterfill 300, or Sika Loadflex.
- 2.1.6 Sealant for Joints around Interior Door Frames, Windows and Under Exterior Thresholds: One-part, low or medium modulus, neutral curing 100% silicone joint sealant, conforming to ASTM C920-11, Type S, Grade NS, Class 35.
- .1 DC CWS by Dow Corning.
 - .2 SWS by GE
 - .3 SikaSil WS-305CN by Sika
- 2.1.7 Sealant for Exterior Wall Joints: Air-seal sealant: One part, silicone, shore A hardness 15-25, conforming to CGSB 19-GP-13M, classification C-1-40-B-N and C-1-25-B-N and ASTM C920-11, Type S, Grade NS, Class 25. Use NT, M, G, A and O:
- .1 DC 791 by Dow Corning
 - .2 UltraPruf II SCS 2902 by GE
 - .3 Spectrum 3 by Tremco
 - .4 SikaSil N-Plus by Sika
- 2.1.8 Sealant for vanity and kitchen counter splash-backs and washroom fixtures: Mould and mildew resistant, Shore A Hardness 15-25, conforming to ASTM C920, Type S, Grade NS, Class25, use NT, G, and A:, colour white.
- .1 SCS1700 by GE
 - .2 DC 786 by Dow Corning
 - .3 Tremsil 200 by Tremco
 - .4 Omni Plus by Sonneborn
 - .5 SikaSil –GP by Sika
- 2.1.9 All caulking, sealants, cleaning solvents, fillers and primers: Compatible with each other.
- 2.1.10 Colours for caulking and sealants: As selected later by the Consultant and not necessarily standard colours.
- 2.1.11 Joint backing: White non-absorbent open cell foam polyethylene, Sof Rod, by Tremco, or other approved manufacture. Filler diameter shall be 50% greater than joint width before installation.
- 2.1.12 Bond breaker: Tape of type supplied or recommended by sealant or caulking manufacturer.
- 2.1.13 Primers: As recommended by the caulking and sealant manufacturer. Primers shall suit the various job conditions.
- 2.1.14 Cleaning material: Xylol, Methyl-ethyl-ketone, Toluol or as recommended by the

caulking and sealant manufacturer.

PART 3 - EXECUTION

3.1 INSPECTION

- 3.1.1 Ensure joints to receive sealant and caulking are suitable to accept the sealant and caulking.
- 3.1.2 Ensure that surfaces to be caulked or sealed are sound, dry, free from dirt, water, frost, loose scale, corrosion asphalt, paints or other contaminants which may adversely affect the performance of the caulking or sealing materials.
- 3.1.3 Before any caulking or sealing is commenced, test the materials for indications of staining or poor adhesion.
- 3.1.4 Do not apply caulking or sealing to masonry until mortar has cured.
- 3.1.5 Ensure joints and spaces which are to receive caulking or sealing compound are in no case less than [10 mm|3/8"] deep; nor less than [6 mm|1/4"] wide nor more than [20 mm|5/8"] wide.

3.2 PREPARATION

- 3.2.1 Perform cleaning to the extent required to achieve acceptable joint surfaces.
- 3.2.2 Ensure ambient and existing site conditions are suitable for installation of sealant work.
- 3.2.3 Protect adjacent finishes from damage, where heavy abrasive cleaning is required such as sandblasting, grinding or wire brushing.
- 3.2.4 Cleaning procedures:
 - .1 Metal:
 - .1 Blast cleaning: Sandblast or iron shot blast surfaces requiring heavy cleaning to bright metal. Remove loose matter by compressed air or commercial vacuum cleaner.
 - .1 Power tool cleaning: Clean surfaces by wire brush, impact tools, abrasive wheels or by buffing. Remove loose matter by compressed air or vacuum cleaner.
 - .3 Solvent cleaning: Clean with solvent applied by spray or brush. Wipe with clean wiping cloth. Remove paints with paint remover and wipe with solvent. Remove residue.
 - .2 Concrete and Masonry:
 - .1 Remove all friable material with wire brush or chipping, until surfaces are sound. Remove surface residue with a stiff brush, vacuum cleaner or compressed air.
 - .2 Concrete surfaces shall be cured for at least 28 days. Acid etch joint surfaces to remove alkaline salts and neutralize acid with a solution of trisodium phosphate, followed by rinsing with clean, cold water.

- .3 Allow joints to dry thoroughly.
- .4 Completely remove resinous products used as curing compounds and form release agents.
- .3 Glass, Ceramics and Porcelain:
 - .1 Brush with solvent and wipe with clean wiping cloths. Remove residue.
- .4 Wood:
 - .1 Remove foreign matter such as soil, paint, grease, asphalt, resin with solvents, abrasives and paint removers; make surfaces clean and dry.
- 3.2.5 Do not exceed shelf life, and pot life of the materials and installation times, as stated by the manufacturers.
- 3.2.6 Become familiar with the work life of the sealant to be used. Do not mix two part materials until required for use.
- 3.2.7 Mix sealants thoroughly with a mechanical mixer capable of mixing at 80-100 rpm without mixing air into the materials. Continue mixing until the material is a uniform colour and free from streaks of unmixed material.
- 3.2.8 Mask areas adjacent to the joints as required. Prevent contamination of adjacent surfaces. Remove masking promptly after the joint has been completed.
- 3.3 INSTALLATION
- 3.3.1 Install materials in compliance with the recommendations of their manufacturers.
- 3.3.2 Fill joints to within [10 mm|3/8"] of the surface with filler material.
- 3.3.3 If recommended by the manufacturer of the caulking or sealing materials, prime joints to prevent staining, or to assist the bond or to stabilize pouring surfaces. Apply primer with a brush which will permit all joint surfaces to be primed. Perform priming immediately before installation of caulking or sealant.
- 3.3.4 Caulking and sealants shall be of gun or knife grade consistency to suit the joint condition. Use gun nozzles of the proper sized to suit the joints and the caulking and sealing material.
- 3.3.5 Install caulking and sealant with manually operated or air pressure operated guns.
- 3.3.6 Use sufficient pressure to fill all voids and joints. Caulking compounds and sealants shall bond to both sides of joint but not backing material.
- 3.3.7 Ensure that the correct sealant depth is maintained. Superficial painting with a skin bead will not be accepted.
- 3.3.8 Caulking installations shall be a full bead free from air pockets and embedded impurities and having smooth surfaces, free from ridges, wrinkles, sags, air pockets and imbedded impurities.

- 3.3.9 After joints have been completely filled, tool them neatly to a slight concave surface.
- 3.4 CLEANING
- 3.4.1 Immediately clean adjacent surfaces which have been soiled and leave work in a neat clean condition. Remove excess materials and droppings using recommended cleaners and solvents.
- 3.5 REPAIR
- 3.5.1 Cut out damaged caulking and sealing, re-prepare and prime joints and install new material as specified to the Consultant's satisfaction.
- 3.6 PROTECTION OF COMPLETED WORK
- 3.6.1 Provide wood planks or other approved, non-staining means of protection for the completed caulking and sealants installations where required to protect the work from mechanical, thermal, chemical and other damage by other construction operations and traffic.
- 3.6.2 Maintain protection securely in place until project completion. Remove protection when so directed by the Consultant.
- 3.7 LOCATION SCHEDULE
- 3.7.1 Use sealing compounds for joints to be filled on the exterior or weather side of the construction.
- 3.7.2 Seal between vanity and kitchen counter splash-back and wall finish, and sinks and taps to counter.
- 3.7.3 Seal between washroom fixtures and wall and/or floor.
- 3.7.4 Seal inside corners of tiled walls in washrooms.
- 3.7.5 Use caulking compounds to fill all other joints.
- 3.7.6 In general, seal the following joints:
- .1 Exterior wood and metal frames - exterior side;
 - .2 Control and expansion joints in exterior walls, garage floors, and paving.
 - .3 Joints between walls and floating slabs.
 - .4 At shelf angle in exterior masonry walls.
 - .5 Provide sealant between curtain wall and air/vapour barrier and curtain wall and adjacent construction on the interior face of curtain wall.
- 3.7.7 In general, caulk the following joints:
- .1 Interior aluminum or pressed steel frames - both sides;

- .2 Exterior aluminum and pressed steel frames - interior side.
 - .3 Control joints in interior exposed masonry - both sides.
 - .4 Joint between full height masonry partitions and underside of structure - both sides.
 - .5 Drywall partitions extending to underside of structure - both sides.
- 3.7.8 Joint designations in previous paragraphs do not limit responsibility to caulk all locations required to create and secure a continuous enclosure.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

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

1.1.2 All labour, materials, equipment and services to supply the hollow metal door, and steel door and screen frame work necessary and/or indicated on the Drawings and specified herein.

1.2 RELATED WORK UNDER OTHER SECTION

1.2.1 Glass and glazing: Section 08 80 00.

1.3 REFERENCES

- | | | |
|--------|--------------------|---|
| 1.3.1 | ASTM A794/A794M-12 | Standard Specification for Commercial Steel (CS), Sheet, Carbon, (0.16% Maximum to 0.25% Maximum), Cold-Rolled. |
| 1.3.2 | ASTM A653/A653M-15 | Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process. |
| 1.3.3 | ASTM A924/M924-14 | Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process |
| 1.3.4 | CAN/CGSB 1.132-M90 | Zinc Chromate Primer, Low Moisture Sensitivity. |
| 1.3.5 | CGSB 31-GP-105M | Coating, Conversion, Zinc Phosphate, for Paint base. |
| 1.3.6 | CAN/ULC S702-14 | Standard for Thermal Insulation Mineral Fibre for Buildings. |
| 1.3.7 | CSA W47.1-09(2014) | Certification of Companies for Fusion Welding of Steel. |
| 1.3.8 | CSA W59-13 | Welded Steel Construction (Metal Arc Welding), Includes Update No. 1 (2014), Update No. 3 (2015), Update No. 4 (2015). |
| 1.3.9 | ANSI/DHI A115 | Installation Guide for Doors and Hardware. |
| 1.3.10 | CSDFMA | Canadian Steel Door and Frame Manufacturers Association |

1.4 SUBMITTALS

- 1.4.1 Shop drawings: Provide shop drawings in accordance with Section 01 33 00 - Submittals. Show, in as large a scale as practical, components, construction, methods of joining, welds, fastening and sleeving, type of metal, gauges and finishes, door swing, location of hardware and all other pertinent data. Clearly locate visible fixings on shop drawings.
- 1.4.2 Door and frame schedule: Identify each door and frame with a symbol listed in the schedule and place legibly on the unit at the time of manufacture. Co-ordinate symbol with architectural drawing symbols and indications.
- 1.4.3 Certificate: Substantiate design and construction of fire doors and frames, if required by the Consultant.
- 1.4.4 Submit full size hollow metal door and frame for approval, before production.
- 1.4.5 Upon Substantial Completion, provide Owner with a written Warranty, identifying both supplier and manufacturer, on materials and workmanship, for a period of one year following date of completion. Deficiency correction during the period of warranty is the mutual responsibility of the General Contractor and the supplier.
- 1.4.6 Informational Submittals: Provide the following submittals when requested by the Consultant: Source Quality Control Submittals: Submit information on zinc coating treatment and primer spot treatment, including instructions for surface treatment before site painting and any restrictions or special coating requirements.

1.5 QUALITY ASSURANCE

- 1.5.1 Manufacturer: Obtain hollow metal doors and frames from single source of supply and from a single manufacturer, and as follows:
 - .1 Fabricate work of this Section to meet the requirements of the Canadian Steel Door and Frame Manufacturer's Association, Manufacturing Specification for Doors and Frames as a minimum, and as further modified in this section.
 - .2 Fabricator shall be a member in good standing of the Canadian Steel Door and Frame Manufacturer's Association.
- 1.5.2 Supplier: Obtain hollow metal doors and frames from single source of supply and from a single manufacturer.
- 1.5.3 Installer: Use installers who are experienced with the installation of hollow metal doors and frames of similar complexity and extent to that required for the Project.
- 1.5.4 Testing Agencies: Provide doors produced under label service program of a testing agency acceptable to Authorities Having Jurisdiction, and as follows:
 - .1 Steel Fire Rated Doors and Frames: Labelled and listed by an organization accredited by Standards Council of Canada for ratings specified or indicated.
 - .2 Provide fire labelled frame products for those openings requiring fire protection ratings, as scheduled:

- .1 List by nationally recognized agency having factory inspection service and construct as detailed in Follow-up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.
- .2 Fabricate all rated doors, frames and screens to labelling authority standard.
- .3 Fire rated frame construction shall conform to can4 s105-m

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

- 1.6.1 Carefully wrap doors and frames ensuring complete protection during shipping and storage.
- 1.6.2 Deliver units to the site in undamaged condition and store in a suitable location. Store units vertically.
- 1.6.3 Stockpile doors and frames inside the building with the identification symbol readily visible, and in the general order in which they will be required for installation and in such a way that the floor structure is not loaded beyond the capacity for which it was designed.
- 1.6.4 Touch-up damaged galvanized units promptly with zinc-rich primer. Touch-up prime coated units with primer.
- 1.6.5 Remove damaged units, installed or not, and install new units. Replace or make good adjacent work damaged on account of such replacements at no extra cost to the Owner.

1.7 SITE CONDITIONS

- 1.7.1 Site Measurements: Verify actual dimensions of openings by site measurements before fabrication and indicate measurements on shop drawings; coordinate fabrication schedule with construction progress to avoid delaying the Work.
- 1.7.2 Established Measurements: Establish dimensions and proceed with fabricating doors and frames without site measurements where site measurements cannot be made without delaying the Work; coordinate construction to ensure that actual site dimensions correspond to established dimensions.

1.8 WARRANTIES

- 1.8.1 Submit a five (5) year warranty of the materials, products and labour of this Section and warranty that windows and panels are water and weather-tight, structurally sound and free from distortion; that aluminum finishes will not develop excessive fading or non-uniformity of colour, and will not crack, peel or otherwise corrode; that glazing splines and sealant will be free from deterioration from sunlight, weather and oxidation, and will be free from permanent deformation under load.
- 1.8.2 Submit a five (5) year warranty that aluminum finishes will not develop excessive fading, non-uniformity of colour, and will not crack, peel, delaminate, or otherwise corrode.
- 1.8.3 Submit a ten (10) year warranty of the insulating glass units and warranting that the insulating glass units shall be free from material obstruction of vision as a result of dust

or film formation on the internal glass surfaces by any cause, under normal conditions, other than extrinsic glass breakage.

- 1.8.4 Upon Final Completion, provide Owner with a written Warranty, identifying both supplier and manufacturer, on materials and workmanship, for a period as listed above following date of completion. Deficiency correction during the period of warranty is the mutual responsibility of the General Contractor and the supplier.
- 1.8.5 Warranties shall include the prompt remedy of defect upon written notification from the Owner that defects exist. Remedy shall include labour, materials, equipment, and services required to make good defective areas of the work, and in case of the factory fabricated components, to supply and install new components, all at no cost to the Owner. Warranties shall also include making good other adjoining parts and finishes or other Owner's property damaged or disturbed in the process or remedying defects. Warranty period shall recommence on remedied work.
- 1.8.6 In the case of work performed by subcontractors and where warranties are specifically required or requested by the Consultant, secure such additional written warranties and deliver same to the Owner.
- 1.8.7 Warranties shall be in be in a form approved by the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Sheet steel:

- .1 Exterior Doors and Frames: Galvanized, AS120, steel sheets in accordance with ASTM A924/M924; coated to meet requirements of ASTM A653/A653M, Commercial Steel (CS), Type B; stretcher levelled standard of flatness where used for face sheets.
- .2 Interior Doors and Frames (Normal Humidity): Electrolytic zinc coated steel sheets in accordance with ASTM A879/A879M, Commercial Steel (CS), Class B coating; mill phosphatized; suitable for unexposed applications; stretcher levelled standard of flatness.

2.1.2 Wipe coat galvanized with a minimum zinc coating of 107 g/sq m (0.35 oz/sq.ft.) to ASTM A653/A653M Coating Class A01.

2.1.3 Hot dip galvanized: Minimum 183 g/sq m (0.60 oz/sq.ft.) and having a Rockwell B maximum of 65 and suitable for forming and bending without metal or coating fracture.

2.1.4 Minimum thicknesses (Gauges), uncoated and zinc wipe coat steel:

- .1 Door frames 1.6 mm (16 ga.)
Frames for doors over 1068 mm (3'-6") wide 2.0 mm (14 ga.)
- .2 High Traffic Doors (hollow steel construction stiffened) Door faces 1.6 mm (16 ga.)

	Top and bottom end channels	1.6 mm (16 ga.)
	Vertical stiffeners	0.9 mm (20 ga.)
.3	Doors (honeycomb core construction)	
	Door faces	1.2 mm (18 ga.)
	Top and bottom end channels	1.2 mm (18 ga.)
.4	Reinforcements	
	Mortised template hinges	3.4 mm (10 ga.), with integral high-frequency angle, and integral field-conversion from standard-weight to heavy-weight hinges at all locations in both doors and frames.
.5	Continuous hinges	2.7 mm (12 ga.) continuous reinforcement in both doors and frames
	Lock and Strike reinforcement	1.6 mm (16 ga.)
	Flush bolt reinforcement and Jamb floor anchors	1.6 mm (16 ga.)
	Channel spreaders	1.6 mm (16 ga.)
	Guard boxes	0.8 mm (22 ga.)
	Hinge reinforcement	2.5 mm (12 ga.)
	Anchors	
	T anchors	1.6 mm (16 ga.)
	L anchors	1.2 mm (18 ga.)
	Closer	2.5 mm (12 ga.)
	Surface mounted hardware	2.5 mm (12 ga.)

2.1.5 Primer: CAN/CGSB 1.132-M, Zinc chromate rust inhibitive primer.

2.1.6 Zinc rich primer: Galvafruid SB grade by W.R. Meadows Ltd., Kem Organic Zinc Rich Primer No. 6430, by Sherwin Williams Co. of Canada Ltd., Glidden No. 16113 zinc rich primer by Glidden Co. Ltd., or other approved manufacture.

2.1.7 Phosphatizing: CGSB 31-GP-105M.

2.1.8 Double stud bumpers: Black #52, by Stanley Works of Canada Ltd., or other approved manufacture.

2.1.9 Glass stops: 0.037" C-shaped, 16 mm (5/8") high, flush screw applied.

2.1.10 Fasteners for stops: Cadmium plated, recessed, flat or oval head Phillips screws.

2.1.11 Honeycomb core: Resin impregnated kraft honeycomb, vermin and rot resistant.

2.1.12 Temperature Rise Rated (TRR): Solid slab core of non-combustible, inorganic composite to limit temperature rise on the unexposed side of door to [250 deg C for [30] [60] minutes] [no limit] rating, in accordance with CAN4 S104.

2.1.13 Anchors: As required to suit condition.

2.1.14 Rubber Bumpers: 3 per door.

- 2.1.15 Insulation: CAN/ULC S702, Type 1, minimum density 24 kg/cu m (1.5 lb/cu.ft.) consisting of durable fibrous material processed from rock, slag or glass, bound with deterioration resistant binders.
- 2.1.16 Materials for fire-rated doors and frames: Complying with ULC requirements.
- 2.1.17 Backpaint: Asphalt enamel, quick drying type. Ace of spades by Domtar Construction Materials Ltd., or other approved manufacture.
- 2.1.18 Sound and light seal: Drop seal mortise type 16 mm (5/8") neoprene insert by Pemko Mfg. Co., or mortise type drop seal #36H by Zero Weather-Stripping Co. Ltd., or other approved manufacture.
- 2.1.19 Gaskets: 16 mm (5/8") square neoprene rubber, closed cell extrusion.

2.2 FABRICATION – GENERAL

- 2.2.1 Assemble units by arc welding in accordance with CSA W59 to produce a finished unit square, true and free of distortion. Welding shall be continuous unless specified otherwise. Welding shall be undertaken only by a fabricator fully approved by the Canadian Welding Bureau to the requirements of CSA W47.1.
- 2.2.2 Permit access to an approved inspection and testing company for the purpose of inspecting at random, doors under construction for this project.
- 2.2.3 Make provisions in doors and frames to suit requirements of trade or Section providing security devices. Provide removable plates or knock-outs for electrical contacts. Provide conduit and fish wire to location of electric strike on concealed face of frames.
- 2.2.4 Provide all function holes for all latching and locking hardware, including those for through-bolted lever trim. (CSDFMA-08100, Article 2.3.5).
- 2.2.5 Factory mortise, reinforce, drill, and tap all preparations for mortise template hardware. Site-drill and tap for installation of surface-applied hardware, in accordance with hardware manufacturer=s installation templates. (CSDFMA-08100, Article 2.3.4).

2.3 FABRICATION - FRAMES AND SCREENS

- 2.3.1 Form frames accurately to profiles indicated. Construct frames straight and free from twist or warp.
- 2.3.2 Blank, drill, reinforce and tap frames to receive templated hardware. Reinforce frames for installation of closers. Install stiffener plates or two angle spreaders where required to prevent bending of frame and to maintain alignment when setting. Weld reinforcement in place.
- 2.3.3 Cut frame mitres accurately and weld on inside of frame profile. Fill frame corners, exposed surface depressions and butted joints with air-drying paste filler. Sand to a smooth uniform finish. Apply one coat of primer.

- 2.3.4 Supply jamb and mullion extensions and anchors required to secure screens to the structure. Fabricate anchorage to prevent transfer of load from support framing to the screens when deflection of structure occurs.
- 2.3.5 Where frames terminate at finished floor, supply floor plates for anchorage to slab. Check depth of extension of finished floor to structural slab and provide jamb extension anchorage as required. Provide 50 mm (2") minimum adjustment.
- 2.3.6 Provide three adjustable "T" anchors per jamb or six "L" anchors per jamb for frames up to 2300 mm (7'-6"). Add one "T" anchor or two "L" anchors per jamb for additional 600 mm (2'-0") or fraction thereof in frame height.
- 2.3.7 Supply removable stop and frame, where required for the overhead concealed door closers, properly connected to frame and prepared for attachment to closer, prior to shipment.
- 2.3.8 Provide three double stud bumpers per single door, four bumpers per double door, except for exterior doors. Lowest bumper shall be 230 mm (9") minimum above bottom of door.
- 2.3.9 Reinforce door frame head if opening is wider than 1500 mm (5'-0"). Reinforce jambs and mullions at junction of heads.
- 2.3.10 Fabricate metal screens to sizes shown.
- 2.3.11 Knock-down frames will not be permitted unless it can be shown that preassembled frames are impossible to install.
- 2.3.12 Back paint exterior frames where in contact with concrete or masonry or dissimilar metals.
- 2.3.13 Install gaskets into 6 mm x 6 mm (1/4" x 1/4") deep groove in jambs and head of door frames, as shown. Apply with approved adhesive.
- 2.3.14 Where openings to receive hollow metal frames have already been built, supply reverse channel bucks, one for each 600 mm (2'-0") or fraction thereof. Reinforce bucks where frame is to be fire rated.
- 2.3.15 Fire rated frames in fire separations: Constructed to ULC approval and bearing ULC, ULI or Warnock Hersey Professional Services label, as acceptable to authorities having jurisdiction and as specified for doors. Locate label on inside of hinge jamb, midway between top hinge and head of door frame, so that it is concealed when door is closed.
- .1 Frame System: Proprietary TRR framing system meeting the specified fire and resistive ratings and acceptable to fire rated glass systems installed under Section 08 80 00.

2.4 FABRICATION - HOLLOW METAL DOORS

- 2.4.1 Fabricate doors 45 mm (1-3/4") thick, flush face, seamless and to conform to details and schedules.
- 2.4.2 Provide honeycomb core construction for interior doors. except doors noted as high traffic doors are indicated. Laminate honeycomb core material to both inside faces of door, completely fill the inside hollow of the door with core material. Join door faces at vertical door edges by tack welding every 150mm (6"), filling, grinding and dressing smooth.
- 2.4.3 Provide insulated hollow steel construction for exterior doors and high traffic interior doors are required. Edge seams, continuously welded, filled and sanded flush. Weld recessed end channel closures to close top and bottom of door. Weld vertical stiffeners to face sheets at a maximum of 150 mm (6") o.c. Fill voids with insulation.
- 2.4.4 Equip fire labelled exterior doors with factory installed flush steel top caps.
- 2.4.5 Top and bottom of doors shall be provided with inverted, recessed, nominal 1.60 mm steel end channels [; nominal 2.74 mm steel end channels for acoustic doors], welded to each face sheet at 150mm on centre.
- 2.4.6 Mortise, reinforce, drill and tap doors to receive templated hardware and reinforce for surface mounted hardware. Check hardware list for details.
- 2.4.7 Provide both stiles of single doors bevelled 3 mm in 50 mm (1/8" in 2"). Fabricate doors with clearance of 3 mm (1/8") to the frame and 19 mm (3/4") to finished floor.
- 2.4.8 Provide flush top edge on exterior doors, with drip on exterior side.
- 2.4.9 Fill voids in stile and rail type doors, including stiles, transom head and bottom rail in glazed doors, with core material.
- 2.4.10 Where glass openings are indicated, provide integrally formed cutouts with steel framed glass mouldings. Aluminum mouldings will not be permitted.
- 2.4.11 Install sound and light gaskets using mortise type drop seal at bottom of door and gaskets at jamb and head of door. Set gaskets into a 6 mm x 6 mm (1/4" x 1/4") deep groove and fastened with approved adhesive.
- 2.4.12 Thermally broken doors shall be constructed in two sections, joined rigidly with thermal break material. Fabricate anchors for thermally broken frames to suit wall conditions; avoid cold transfer from exterior frame section to interior frame section.
- 2.4.13 Provide insulated sealed glazing kits to all exterior door with sidelight or glazed transom.
- 2.5 FABRICATION - FIRE RATED HOLLOW METAL DOORS
- 2.5.1 Construct fire rated doors to ULC requirements, bearing ULC, ULI, or Warnock-Hersey International Ltd., label, and acceptable to authorities having jurisdiction. Provide fire protection ratings indicated and time/ temperature rise label to requirements or authorities having jurisdiction.

- 2.5.2 Face sheets: Minimum nominal 1.60 mm base steel sheet thickness.
- 2.5.3 Stiffened and sound deadened with honeycomb core laminated under pressure to each face sheet.
- 2.5.4 Locate labels on the inside of door at hinge jamb midway between the top hinge and door head.
- 2.5.5 Construct and reinforce for hardware, fire-rated doors similar to standard units.
- 2.6 ACOUSTICAL DOORS AND FRAMES
 - 2.6.1 Acoustical doors: Sound reduction doors, Series S, 45 mm (1-3/4") thick, complete with door frames, acoustical seals, automatic mortised door bottom, and complete assembly to provide minimum 43 STC when installed, by Stanley-Bumeda Ltd., or other approved manufacture.
- 2.7 INSULATED EXTERIOR STEEL DOOR FRAMES
 - 2.7.1 Thermally broken frames shall be constructed in two sections, joined rigidly with thermal break material. Fabricate anchors for thermally broken frames to suit wall conditions; avoid cold transfer from exterior frame section to interior frame section.
 - 2.7.2 Fabricate jambs, heads, sills centre rails and mullions from 1.6 mm (16 gauge) wipe coated galvanized steel, "Therma-Frame" by S.W. Fleming & Co. Ltd., "Maco-therm" by Macotta Company of Canada Limited, or other approved manufacture.
 - 2.7.3 Separate interior and exterior frame sections by a polyvinyl chloride (PVC) thermal break. Do not connect sections to each other by screws welds, grommets or other fastening devices.
 - 2.7.4 Design wall and floor anchors to suit wall conditions and not to permit thermal transfer from exterior to interior surfaces of frame sections.
- 2.8 HARDWARE PREPARATION
 - 2.8.1 Prepare for template hardware in accordance with ANSI/DHI A115 Standards, unless noted otherwise herein. Locate hardware preparations vertically in accordance with CSDFMA Recommended Dimensional Standards, unless noted otherwise herein.
- 2.9 FINISHING
 - 2.9.1 Doors and frames manufactured from zinc wipe coated steel or hot dipped galvanized: Factory-applied touch-up primer to areas where coating has been removed or abraded due to grinding or handling.
 - 2.9.2 Doors and frames to exterior: Hot dipped galvanized.
 - 2.9.3 Doors and frames to all other areas: Wipe coat galvanized.

PART 3 - EXECUTION

3.1 EXAMINATION

3.1.1 Examine substrates, door swing arcs, areas of installation and conditions affecting installation for compliance with requirements for manufacturers installation tolerances and other conditions affecting performance of work of this Section.

3.1.2 Verify roughing-in for embedded and built-in anchor locations before installing frames.

3.1.3 Verify door and frame size, door swing and ratings with door opening number before installing frames.

3.1.4 Installation of hollow metal doors and frames will denote acceptance of site conditions.

3.2 INSTALLATION

3.2.1 Supply doors and frames to Sections responsible for installation.

3.2.2 Door Frames:

- .1 Remove temporary spreaders before installing door frames, leaving exposed surfaces smooth and undamaged.
- .2 Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set; limit of acceptable frame distortion 1/16" out of plumb measured on face of frame, maximum twist corner to corner of 1/8"; align horizontal lines in final assembly.
- .3 Brace frames rigidly in position until adjacent construction is complete; install wooden spreaders at third points of frame rebate to maintain frame width, install centre brace to support head of frames 4' and wider in accordance with ANSI A250.1; do not use temporary metal spreaders for bracing of frames.
- .4 For frames over 1220mm (4') in width, provide vertical support at the centre of head.

3.2.3 Frame Tolerances: Install frames to tolerances listed in ANSI A250.11, and as follows:

- .1 Squareness: Maximum 0.8mm (1/32") measured across opening between hinge jamb and strike jamb.
- .2 Plumbness: Maximum 0.8mm (1/32") measured from bottom of frame to head level.
- .3 Alignment: Maximum 0.8mm (1/32") measured offset between face of hinge jamb and strike jamb relative to wall construction.
- .4 Twist: Maximum 0.8mm (1/32") measured from leading edge of outside frame rabbet to leading edge of inside frame rabbet.

3.2.4 Doors:

- .1 Fit hollow metal doors accurately in frames within clearances required for proper operation; shim as necessary for proper operation.
- .2 Install hardware in accordance with manufacturers' templates and instructions.

- .3 Adjust operable parts for correct clearances and function.
- .4 Install glazing materials and door silencers where required.
- .5 Install fire rated doors within clearances specified in NFPA 80.
- .6 Install louvers and vents.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- 1.1.1 Comply with Division 1, General Requirements and all documents referred to therein.
- 1.1.2 All labour, materials, equipment and services required to supply and install the glass and glazing indicated on the Drawings, specified herein, and not specified in other Sections.

1.2 RELATED WORK SPECIFIED UNDER OTHER SECTIONS

- 1.2.1 Aluminium doors and screens: Section 08 11 16.
- 1.2.2 Hollow metal doors and frames: Section 08 11 00.
- 1.2.3 Wood doors: Section 08 14 00
- 1.2.4 Aluminium Curtain Wall: Section 08 44 00

1.3 REFERENCES

- 1.3.1 ASTM A167-99(2009) Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip (Withdrawn 2014).
- 1.3.2 ASTM B117-11 Standard Practice for Operating Salt Spray (Fog) Apparatus.
- 1.3.3 ASTM D395-14 Standard Test Methods for Rubber Property - Compression Set.
- 1.3.4 ASTM D412-06a(2013) Standard Test Methods for Vulcanized Rubber And Thermoplastic Rubbers and Thermoplastic Elastomers – Tension.
- 1.3.5 ASTM D1149-07(2012) Standard Test Method for Rubber Deterioration - Cracking in an Ozone Controlled Environment.
- 1.3.6 CAN/CGSB 12.1-M90 Tempered or Laminated Safety Glass.
- 1.3.7 CAN/CGSB 12.2-M91 Flat Clear Sheet Glass.
- 1.3.8 CAN/CGSB 12.3-M91 Flat, Clear Float Glass.
- 1.3.9 CAN/CGSB 12.5-M86 Mirrors, Silvered.
- 1.3.10 CAN/CGSB 12.20-M89 Structural Design of Glass for Buildings.
- 1.3.11 CAN/CGSB 19.24-M90 Multicomponent, Chemical-Curing Sealing Compound.

1.4 SUBMITTALS

- 1.4.1 Samples: Duplicate 12" x 12" samples of each type and thickness of glass and 12" long mirror frame.
- 1.4.2 Product Data: Submit manufacturer's product data for each type of product specified. Data shall indicate compliance with specification and installation recommendations of manufacturer of

products being used.

- 1.4.3 Maintenance data: Written instructions for protection of completed work, for re-glazing, and for proper methods and materials to be used in cleaning.

1.5 DELIVERY, STORAGE AND HANDLING

- 1.5.1 Delivery and Acceptance Requirements: Deliver packaged materials in their original containers with manufacturer's labels and seals intact.

- 1.5.2 Storage and Handling Requirements: Store vertically, blocked off the floor in a weatherproof enclosure in original containers with manufacturers labels and seals intact until read for installation, and as follows:

- .1 Install glass as soon as possible after delivery to site.
- .2 Handle glass carefully to its place of installation.
- .3 Prevent damage to glass, adjacent materials and surfaces.

1.6 SITE CONDITIONS

- 1.6.1 Ambient Conditions: Maintain temperature, humidity and solar exposure conditions of Glass Glazing materials during shipping, storage and site installation as required by manufacturer to maintain warranty and performance of installed products.

1.7 WARRANTIES

- 1.7.1 Submit a two (2) year warranty, commencing from date of Substantial Performance, against defects in the workmanship and materials, including and not necessarily limited to the following:

- .1 Cracked or scratched glass, shrinking, cracking, staining, hardening, sagging of glazing materials, loosening or rattling of glass.
- .2 Glazing work is water and weather tight and free from distortion, that glazing materials will not deteriorate due to exposure to atmosphere and weather, will not be displaced, and will be free from permanent deformation under load.
- .3 Glass breakage due to thermal shock or change occurring within weather extremes stated for the place of building under OBC, and an inside temperature range of 5°C and 42°C.
- .4 Loosening of mirror frame fastenings.

- 1.7.2 Submit a five warranty, commencing from date of Substantial Performance, against deterioration of mirror silver backing and cracking of mirrors.

1.8 LEED™ STRATEGIES

- 1.8.1 All trades must examine practices, as outlined in the related sections, to assist the team in achieving these results.

1.8.2 Related Sections:

- .1 01 35 20 General LEED® Requirements
- .2 01 35 50 Waste Management Disposal
- .3 01 35 90 Indoor Air Quality Management
- .4 01 61 10LEED® Product Requirements
- .5 31 25 00 Construction Pollution Prevention.

- 1.8.3 Materials used for Work in this section are to include, but are not limited to the following criteria:
- .1 Materials used in work of this Section are to contain high amounts of recycled content and are to be sourced regionally from within 800 km via truck or 2400 km via rail or ship from jobsite in accordance with Section 01 61 10.
 - .2 Glazing must comply with the following thermal performance criteria: Winter U-value: Argon 0.25 Solar Heat Gain Coefficient: 0.36
- 1.8.4 The following must be submitted as appropriate for Consultant's review and approval:
- .1 Submit Schedules A and D, as appropriate, of Section 01 61 10A LEED Product Requirements Schedules following the measures outlined in Section 01 61 10, for all applicable products.

PART 2 - PRODUCTS

2.1 MATERIALS

- 2.1.1 Except where more specifically specified herein, glass shall meet or exceed requirements of CAN/CGSB 12.20.
- 2.1.2 Glass: Each unit shall bear manufacturer's label indicating quality, and thickness.
- 2.1.3 Thickness of glass as shown on Drawings except as specified herein.
- 2.1.4 Sheet glass: CAN/CGSB 12.2, B quality or better.
- 2.1.5 Float glass: CAN/CGSB 12.3, glazing quality, annealed.
- 2.1.6 Safety glass: CAN/CGSB 12.1, Type 2, Class B, heat treated float glass, Category I Heat Strengthened, Category II Tempered. Tong and roller marks free.
- 2.1.7 Glass:
- .1 GL1 : 12 mm Clear vision with white ceramic frit pattern by AGC
 - .2 GL2 : Matelux 6 mm Acid-etched partition glass, clear colour by AGC
 - .3 GL3 : 6 mm Clear Temper glass, clear colour by AGC
 - .4 GL4 : 12 mm Laminate Glass by AGC
- 2.1.8 Glazing compound: CAN/CGSB 19.24, multi component, chemical curing.
- 2.1.9 Heel bead: Dymonic by Tremco, or other approved manufacture.
- 2.1.10 Glazing tape: Extruded, ribbon shaped, non-drying, non-skinning, non-oxidizing polyisobutylene tape with continuous synthetic rubber spacer rod, sufficiently wide and thick as to completely cover bite area of the glazing unit when the unit is pushed into place, Polyshim 2, by Tremco Ltd., or other approved manufacture.
- 2.1.11 Mirrors: CAN/CGSB 12.5, Type 1A, polished float glass 1/4" thick and withstanding a 72 hour exposure in accordance with ASTM B117, by PPG Industries Ltd., AFG Glass, Pilkington Glass Limited, or other approved manufacture. Mirror backing shall be resistant to sulphur and hydrogen sulphide fumes. Polish and round all corners of mirrors.
- 2.1.12 Adhesive for mirrors: Special mirror mastic, "Mirro-Mastic" by Palmer Products Corporation, or other approved manufacture.

- 2.1.13 Backpaint and sealer for mirrors to be adhesive applied: "Mirro-Bac" paint for back painting mirror and "Mirro-Mastic Bond" for sealing substrate surfaces by Palmer Products Corporation or other approved manufacture.
- 2.1.14 Shims (for wet glazing): Pressure sensitive resilient extruded synthetic rubber and as recommended by insulating glass unit manufacturer.
- 2.1.15 Spacers and setting blocks, 80 Durometer: Neoprene rubber or EPDM, A hardness ± 5 respectively, resistant to oxidation and permanent deformation under load.
- 2.1.16 One part glazing gaskets: Extruded neoprene or EPDM of approved profile. Gaskets properties - tensile strength, ASTM D412, 1500 psi; Durometer A hardness, 50 ± 5 ; resistance to permanent set, ASTM D395, Method D, 25 % maximum set; minimum elongation at break, ASTM D412, 300%; resistance to ozone, ASTM D1149, showing no cracks.
- 2.1.17 All glazing materials, products, primers and cleaning solvents: Mutually compatible.
- 2.1.18 Colours for glazing materials: As selected later from standard colours.
- 2.1.19 Glass for doors and interior screens: 1/4" thick, tempered glass.
- 2.1.20 Mirror trim: Formed to approved profile from 0.050" thick, ASTM A167, Type 302 stainless steel in No. 4 finish. Vandal-proof mounting fastenings to suit type of substrate and fully concealed in the finished work.

2.2 INSULATING GLASS

- 2.2.1 Insulating Glass Units: Provide sealed insulating glass units in accordance with CAN/CGSB-12.8 in configurations indicated, and as specified herein.
- 2.2.2 Manufacture sealed insulating glass units without edge channels or tape, that is, with bare glass edges.
- 2.2.3 Use two stage seal method of manufacture, as follows:
 - .1 Primary Seal: polyisobutylene sealing compound between glass and black stainless steel spacer/separator.
 - .2 Secondary Seal: silicone base sealant, filling gap between the two lites of glass at the edge up to the spacer/separator and primary seal.
- 2.2.4 Install stainless steel capillary breather tubes to equalize pressure differentials between insulating glass fabricating location and insulating glass installation location; crimp tube immediately prior to installation in accordance with glass fabricators written instructions.
- 2.2.5 Sealants for Insulating Glass Units:
 - .1 Primary Seal: Polyisobutylene; colour black.
 - .2 Secondary Seal: Structural silicone based; colour black.
- 2.2.6 Insulating Vision Glass Units:
 - .1 6mm clear tempered glass
 - .2 13mm argon filled space

- .3 6mm clear tempered glass with low-emissivity coating on surface facing cavity. Basis of Design Product: EnergySelect 36 by AGC Glass

2.2.7 Safety Laminated Insulating Vision Glass Units:

- .1 4mm clear tempered glass
- .2 1.5mm shatter-resistant PVB film
- .3 4mm clear tempered glass
- .4 13mm argon filled space
- .5 6mm clear tempered glass with low-emissivity coating on surface facing cavity. Basis of Design Product: EnergySelect 36 by AGC Glass

2.2.8 Insulating Glass Light Diffusing Units:

- .1 6mm clear tempered glass, acid etched on #2 surface. Basis of design product: Mattelux by AGC glass
- .2 13mm argon filled space
- .3 6mm clear tempered glass with low-emissivity coating on surface facing cavity. Basis of Design Product: EnergySelect 36 by AGC Glass

2.2.9 Safety Laminated Insulating Glass Light Diffusing Units:

- .1 4mm clear tempered glass, acid etched on #2 surface. Basis of design product: Mattelux by AGC glass
- .2 1.5mm shatter-resistant PVB film
- .3 4mm clear tempered glass
- .4 13mm argon filled space
- .5 6mm clear tempered glass with low-emissivity coating on surface facing cavity. Basis of Design Product: EnergySelect 36 by AGC Glass

2.2.10 Security Insulating Vision Glass Units:

- .1 32mm laminated glass / polycarbonate, refer to section 08 88 53 for composition
- .2 13mm argon filled space
- .3 6mm clear tempered glass with low-emissivity coating on surface facing cavity. Basis of Design Product: EnergySelect 36 by AGC Glass

2.3 FABRICATION

2.3.1 Minimum thicknesses of glass shall be in accordance with CAN/CGSB 12.20, except as specified herein.

2.3.2 Accurately size glass to fit openings allowing the clearance recommended by the glass manufacturer, and in accordance with the following tables:

- .1 Minimum Glass Clearances

Thickness	Edge Clearance	Face Clearance
18 oz. or 3/32"	1/8"	1/16"
24 oz. or 1/8"	1/8"	1/8"
32 oz.	1/8"	1/8"
3/16"	1/8"	1/8"
7/32"	3/16"	1/8"
1/4"	1/4"	1/8"

over 1/4" 1/4" or 3/4 times the glass thickness,
whichever is the greater.

* Where any dimension of glass exceeds 30" increase minimum edge clearances by 1/16".

- .2 Bite of glass edge on stop:
1. Up to 50" united size: 1/4" minimum.
 2. Over 50" united size: 1/2" minimum.

PART 3 - EXECUTION

3.1 INSPECTION

- 3.1.1 Verify drawing dimensions at the site before proceeding with fabrication of work.
- 3.1.2 Ensure that openings are free from distortion, and that surfaces are free from protrusions that will obstruct face and edge clearances.
- 3.1.3 Ensure that wood is sealed, ferrous metals are painted or zinc coated, and that surfaces are suitable for adhesion of glazing materials.
- 3.1.4 Ensure that ambient and surface temperatures are above 5°C before applying glazing materials.
- 3.1.5 Ensure that surfaces to receive mirrors are sealed.
- 3.1.6 Ensure that movable units to be glazed are adjusted for proper operation.

3.2 PREPARATION

- 3.2.1 Free rabbets, stops and glass edges of dust, dirt, moisture, oil and other foreign matter detrimental to or obstructing the glazing material.
- 3.2.2 Mask surfaces subject to staining, and wherever necessary to ensure neat appearance of the glazing materials. Remove masking as work progresses.

3.3 INSTALLATION – GENERAL

- 3.3.1 Install work in accordance with manufacturer's instructions. Handle and install glass in accordance with manufacturer's directions. Prevent nicks, abrasion and other damage likely to develop stress on edges.
- 3.3.2 Remove and replace glazing stops in original locations using original fasteners, securely set and undamaged.
- 3.3.3 Use setting blocks and spacers as required to properly support the glass, centred in place in glazing space independent of the materials and to uniformly distribute its load.
- 3.3.4 Use a minimum of 2 setting blocks, located at the quarter points. Locate spacers at jamb edges of glass, uniformly spaced at 2'-0" o.c. maximum, and 1'-0" maximum from top and bottom.
- 3.3.5 Set glass properly centred with uniform bite and face and edge clearance, free from twist, warp or other distortion likely to develop stress.

3.3.6 Leave labels on glass until it has been set and inspected and approved. Leave glass whole and without cracks, scratches or other defects and with settings in perfect condition at completion, to approval of Consultant.

3.3.7 Remove rejected, broken or damaged glass due to defective materials or improper setting and replace with perfect materials. Units producing distorted vision shall be rejected and replaced at the reasonable discretion of the Consultant.

3.4 INTERIOR GLAZING

3.4.1 Unless otherwise specified, all interior glazing shall be dry glazing.

3.4.2 Install extruded glazing gasket around entire perimeter of glass. Make tight butt joint at corners of lights. Place neoprene setting blocks at sill and spacers at both jambs as required to centre the unit in the frame. Place the unit into the frames and apply the stops against the gaskets. Tighten the screws or clips to obtain positive uniform pressure avoiding excessive pressure.

3.4.3 Ensure rattle-free cushioning.

3.5 INSTALLATION - EXTERIOR GLAZING

3.5.1 Install glass with labels facing the interior. Ensure that sufficient space is left within the glazing space to allow thermal movement of glass without imposing stress on the glass.

3.5.2 Install heat treated safety glass with convex side facing the exterior.

3.5.3 Install wet glazing materials to obtain complete contact and adhesion over the full bite area of the unit and to be free from gaps, air bubbles, and embedded foreign matter. Use primers when recommended by the glazing material manufacturer. Use sufficient bedding compound so that when glass is pushed into place, excess compound is forced out around the entire margin. Use shims to ensure maintenance of uniform face clearance. Where required on both sides of a unit, make shims coincident.

3.5.4 Install glazing tape to ensure complete contact and adhesion over the full bit area of the unit. Make joints only at corners of the unit. Where tape has no integral shim, cut it to fit close around applied shims. Fit tape accurately with tight joints, free from tension, gaps, and cracks. After installation of glass, the tape shall not extend more than 1/8" above the line of the fixed stop. Remove and re-glaze units where the tape exceeds this tolerance.

3.5.5 Where specified or shown on the Drawings, gun in a heel bead of glazing compound to ensure a continuous seal between glazed element and frame.

3.5.6 Where visible or exposed to weather, finish gunned bead surface to slope away from glass for shedding water. Ensure a weather tight seal.

3.6 INSTALLATION - MIRRORS

3.6.1 Thoroughly seal and prime substrate with sealer and primer as recommended by mirror manufacturer.

3.6.2 Adhesive apply mirror to plywood backing, and fasten plywood to structure with concealed fastenings.

3.6.3 Install mirrors using dollops of mirror mastic spaced as recommended by the manufacturer of the mirror mastic for 60% coverage. Brace mirrors in place until mastic has set. Butt-edged mirrors

shall give an un-warped image.

3.6.4 Provide mirror trim at mirrors, using concealed fastening.

3.7 CLEANING

3.7.1 Clean and make good to the approval of the Consultant, surfaces soiled or otherwise damaged in connection with the work of this Section. Pay the cost of replacing finishes or materials that cannot be satisfactorily cleaned.

3.7.2 Upon completion of the work, remove all debris, equipment and excess material resulting from the work of this Section from the site.

END OF SECTION

PART 1 – GENERAL

1.1 SUMMARY

1.1.1 Section Includes:

- .1 Fire-rated glazing materials installed as [transoms] [borrowed lites] [windows] in fire-rated frames.

1.1.2 Related Sections include the following:

- .1 Section 08 11 00 “Metal Doors and Frames” for vision panels in interior doors and interior vision panel (borrowed lites) frames.
- .2 Section 08 11 16 “Aluminum Doors and Screens” for vision panels in interior doors and interior vision panel (borrowed lites) frames.
- .3 Section 08 14 00 “Wood Doors” for vision panels in interior doors.
- .4 Section 08 51 13 “Aluminum Windows”.
- .5 Section 08 52 00 “Wood Windows”.
- .6 Section 08 53 13 “Vinyl Window”

1.2 REFERENCES

1.2.1 American Society for Testing and Materials (ASTM):

- .1 ASTM E2010-01: Standard Test Method for Positive Pressure Fire Tests of Window Assemblies.

1.2.2 Glass Association of North America (GANA):

- .1 GANA – Glazing Manual.
- .2 FGMA – Sealant Manual.

1.2.3 National Fire Protection Association (NFPA):

- .1 NFPA 80: Fire Doors and Windows.
- .2 NFPA 257 – Fire Tests of Window Assemblies.

1.2.4 Underwriters Laboratories, Inc. (UL):

- .1 UL 9 – Fire Tests of Window Assemblies.

1.2.5 Standard Council of Canada:

- .1 ULC Standard CAN4-S104: Fire Tests of Door Assemblies.
- .2 ULC Standard CAN4-S106: Fire Tests of Window Assemblies.

1.2.6 **<Insert building code name used by authority having jurisdiction>.**

1.3 DEFINITIONS

- 1.3.1 Manufacturer: A firm that produces primary glass, fabricated glass or framing as defined in referenced glazing publications.

1.4 SUBMITTALS

- 1.4.1 Comply with requirements of Section 01 33 00<Insert Section #>.

- 1.4.2 Product data: Submit manufacturer’s technical data for each glazing material required, including installation and maintenance instructions.

- 1.4.3 Certificates of compliance from glass and glazing materials manufacturers attesting that glass and glazing materials furnished for project comply with requirements. Separate certification will not be

required for glazing materials bearing manufacturer's permanent label designating type and thickness of glass, provided labels represent a quality control program involving a recognized certification agency or independent testing laboratory acceptable to authority having jurisdiction.

- 1.4.4 Product Test Listings: From UL indicating fire-rated glass complies with requirements, based on comprehensive testing of current product.
- 1.4.5 Samples: Submit, for verification purposes, approx. 8-inch by 10-inch sample for each type of glass indicated.
- 1.5 QUALITY ASSURANCE
 - 1.5.1 Glazing Standards: GAMA Glazing Manual and FGMA Sealant Manual.
 - 1.5.2 Fire Protective Rated Glass: Each lite shall bear permanent, nonremovable label of UL certifying it for use in tested and rated fire protective assemblies.
- 1.6 DELIVERY, STORAGE, AND HANDLING
 - 1.6.1 Deliver, store, and handle materials under provisions of Section 01 60 00<Insert Section #>.
 - 1.6.2 Deliver materials to specified destination in manufacturer or distributor's packaging, undamaged, complete with installation instructions.
 - 1.6.3 Store off ground, under cover, protected from weather and construction activities.
- 1.7 WARRANTY
 - 1.7.1 Provide manufacturer's limited warranty under provision of Section 01 78 00<Insert Section #>.

PART 2 – PRODUCTS

- 2.1 MANUFACTURERS
 - 2.1.1 Manufacturer: FireLite® as manufactured by Nippon Electric Glass Company, Ltd., and distributed by Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, WA 98065 phone (800.426.0279) fax (425.396.8300) e-mail sales@fireglass.com, web site <http://www.fireglass.com> or equivalent.
- 2.2 PERFORMANCE REQUIREMENTS
 - 2.2.1 Fire-rated glass ceramic clear and wireless glazing material listed for use in non-impact safety-rated locations such as transoms and borrowed lites with fire rating requirements ranging from 20 to 90 minutes with required hose stream test.
 - 2.2.2 Passes positive pressure test standards UL 10C.
- 2.3 MATERIALS-GLASS
 - 2.3.1 Properties:
 - .1 Thickness: 3/16 inch [5 mm].
 - .2 Weight: 2.56 lbs/ft² or 12.5 kg/m²
 - .3 Approximate Visible Transmission: 88 percent.
 - .4 Approximate Visible Reflection: 9 percent.
 - .5 Hardness (Vicker's Scale): 700.
 - .6 Fire-rating: 20 minutes to 90 minutes.

- .7 Impact Safety Resistance: None.
 - .8 Positive Pressure Test: UL 10C; passes.
 - .9 Surface Finish:
 - 1. Standard Grade is polished for a surface quality that is comparable to alternative fire-rated ceramics marketed as having a premium finish.
 - 2. Premium Grade is finish ground and polished on both surfaces to provide superior surface quality, improving overall clarity and providing a surface that is unmatched by alternative products.
 - 3. Obscure-Patterned surface for privacy
 - .10 Positive Pressure Test: UL 10C; passes.
- 2.3.2 Maximum sheet sizes based on surface finish:
- .1 Premium: 48 inches by 96 inches.
 - .2 Standard: 48 inches by 96 inches.
 - .3 Obscure: 36 inches by 96 inches.
- 2.3.3 Labeling: Permanently label each piece of FireLite® with the FireLite® logo, UL logo and fire rating in sizes up to 3,325 sq. in., and with the FireLite® label only for sizes that exceed the listing (as approved by the local authority having jurisdiction).
- 2.3.4 Fire Rating: Fire rating classified and labeled by UL for fire rating scheduled at opening locations on drawings, when tested in accordance with [ASTM E2010-01] [ULC Standards CAN4 S-104 and CAN4 S-106] [NFPA 257] [UL 9 and UL 10B].
- 2.3.5 Substitutions: No substitutions permitted.
- 2.4 GLAZING COMPOUND FOR FIRE-RATED GLAZING MATERIALS
- 2.4.1 Glazing Tape: Closed cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent. Glass panels that exceed 1,393 sq. inches for 90-minute ratings must be glazed with fire-rated glazing tape supplied by manufacturer.
- 2.4.2 Glazing Compound: DAP 33 putty.
- 2.4.3 Silicone Sealant: One-part neutral curing silicone, medium modulus sealant, Type S; Grade NS; Class 25 with additional movement capability of 50 percent in both extension and compression (total 100 percent); Use (Exposure) NT; Uses (Substrates) G, A, and O as applicable. Available Products:
- .1 Dow Corning 795 - Dow Corning Corp.
 - .2 Silglaze-II 2800 - General Electric Co.
 - .3 Spectrem 2 - Tremco Inc.
- 2.4.4 Setting Blocks: Neoprene, EPDM, or silicone; tested for compatibility with glazing compound; of 70 to 90 Shore A hardness.
- 2.4.5 Cleaners, Primers, and Sealers: Type recommended by manufacturer of glass and gaskets.
- 2.5 FABRICATION
- 2.5.1 Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standard as required to comply with system performance requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- 3.1.1 Examine glass framing, with glazier present, for compliance with the following:
- .1 Manufacturing and installation tolerances, including those for size, squareness, offsets at corners.
 - .2 Minimum required face or edge clearances.
 - .3 Observable edge damage or face imperfections.
- 3.1.2 Do not proceed with glazing until unsatisfactory conditions have been corrected.
- 3.1.3 Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings that are not firmly bonded to substrates.

3.2 INSTALLATION (GLAZING)

- 3.2.1 Comply with referenced FGMA standards and instructions of manufacturers of glass, glazing sealants, and glazing compounds.
- 3.2.2 Protect glass from edge damage during handling and installation. Inspect glass during installation and discard pieces with edge damage that could affect glass performance.
- 3.2.3 Set units of glass in each series with uniformity of pattern, draw, bow, and similar characteristics.
- 3.2.4 Cut glazing tape to length and set against permanent stops, flush with sight lines to fit openings exactly, with stretch allowance during installation.
- 3.2.5 Place setting blocks located at quarter points of glass with edge block no more than 6 inches from corners.
- 3.2.6 Glaze vertically into labeled fire-rated metal frames or partition walls with same fire rating as glass and push against tape for full contact at perimeter of pane or unit.
- 3.2.7 Place glazing tape on free perimeter of glazing in same manner described above.
- 3.2.8 Install removable stop and secure without displacement of tape.
- 3.2.9 [Use specified glazing compound, without adulteration; bed glazing material in glazing compound; entirely fill all recess and spaces. Provide visible glazing compound with smooth and straight edges.]
- 3.2.10 Install so that appropriate [UL] [FireLite®] markings remain permanently visible.

3.3 PROTECTION AND CLEANING

- 3.3.1 Protect glass from contact with contaminating substances resulting from construction operations. Remove any such substances by method approved by glass manufacturer.
- 3.3.2 Wash glass on both faces not more than four days prior to date scheduled for inspections intended to establish date of substantial completion. Wash glass by method recommended by glass manufacturer.

3.4 GLAZING SCHEDULE

Rating	Assembly	Max. Exposed Area (Sq. In.)	Max. Width Of Exposed Glazing (In.)	OR	Max. Height Of Exposed Glazing (In.)	Stop Height
20 to 60 min.	Other than doors					
	HMS or wood*	3,325	95		95	5/8"
	Fireframes® D.S.	3,325	95		95	3/4"
90 min.	Other than doors					
	HMS	2,627	56 1/2"		56 1/2"	5/8"
	Fireframes D.S.	2,627	56 1/2"		56 1/2"	3/4"

* HMS indicates hollow metal steel framing. Fireframes® D.S. indicates Designer Series narrow profile framing available from TGP. For wood frames, check with manufacturer for maximum tested glass sizes.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- 1.1.1 Comply with Division 1, General Requirements and all documents referred to therein.
- 1.1.2 Provide all labour, materials, products, equipment and services to supply and install gypsum board systems and light gauge metal framing required and/or indicated on the Drawings and specified herein.

1.2 REFERENCES

- 1.2.1 ASTM C475/C475M-15 Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
- 1.2.2 ASTM C1002-14 Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
- 1.2.3 ASTM C1047-14a Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
- 1.2.4 ASTM C1178/C1178M-13 Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel.
- 1.2.5 ASTM E90-09 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
- 1.2.6 CAN/CGSB 7.1-98 Lightweight Steel Wall Framing Components.
- 1.2.7 CAN/CGSB 19.21-M87 Sealing and Bedding Compound Acoustical.
- 1.2.8 CAN/CSA A82.27-M91 Gypsum Board
- 1.2.9 CAN/CSA A82.31-M91 Gypsum Board Application.
- 1.2.10 CAN/CSA A123.2-03(R2013) Asphalt-Coated Roofing Sheets.
- 1.2.11 CAN/ULC S702-14 Standard for Thermal Insulation Mineral Fibre for Buildings.

1.3 DESIGN

- 1.3.1 Fire Rated Construction: Construct to approved ULC design for fire resistance ratings indicated. Submit written proof of construction meeting ULC design.
- 1.3.2 Sound rated construction: STC tested in accordance with ASTM E90.

1.4 SUBMITTALS

- 1.4.1 Submit shop drawings showing pertinent construction details for fire and sound rated construction in large scale detail.
- 1.4.2 Product Data: Submit manufacturer's current technical literature for each component.
- 1.4.3 Samples: Supply for Consultant's review, if requested, samples of the following:
 - .1 Board: Submit sample of each panel product specified, 150mm (6") square.
 - .2 Trim: Submit sample of each type of trim specified, 305mm (12") long.
 - .3 Texture: Submit sample, 305mm (12") square, of textured coated gypsum board.
- 1.4.4 Quality Assurance Submittals:
 - .1 Design Data, Test Reports: Provide manufacturer's test reports indicating product compliance with indicated requirements.
 - .2 Manufacturer's Instructions: Provide manufacturer's written installation instructions.
- 1.5 QUALITY ASSURANCE
 - 1.5.1 Contractor executing work of this Section shall have a minimum of five (5) years continuous Canadian experience in successful installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.
- 1.6 PRODUCT DELIVERY, STORAGE AND HANDLING
 - 1.6.1 Deliver materials in original, unopened containers or bundles stored in a place providing protection from damage and exposure to elements.
 - 1.6.2 Store board on flat, smooth and dry base.
 - 1.6.3 Coordinate deliveries to comply with construction schedule and arrange ahead for off the ground, enclosed, under cover storage location. Do not load any area beyond the design limits.
 - 1.6.4 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.
 - 1.6.5 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact, in accordance with GA-238 and manufacturer's recommendations.
 - 1.6.6 Protect bagged products from excessive moisture or wetting. Store metal component sections in crates to prevent damage to material. Do not use bent or deformed material.
- 1.7 ENVIRONMENTAL REQUIREMENTS
 - 1.7.1 Temperature within the building shall be maintained uniformly within the range of 12°C to 21°C, 24 hours before installation and until joint cement has dried.
 - 1.7.2 Provide adequate ventilation to eliminate excessive moisture within the building before commencement of the work of this Section.

PART 2 - PRODUCTS

2.1 MATERIALS - GENERAL

2.1.1 Materials required for fire rated construction: Listed and labelled by ULC.

2.2 MATERIALS - GYPSUM BOARD

2.2.1 Tile Backer Board: Glass Mat Water Resistant Gypsum Backer Board: Manufactured in accordance with ASTM C1178 and C1658 to produce greater resistance to water penetration and to provide improved surface bonding characteristics for ceramic tile than standard gypsum board:

.1 Location: Substrate for ceramic tile.

.2 Acceptable Materials:

.1 Fiberock Aqua Tough Tile Backerboard by CGC Inc.

.2 Diamondback Tile Backer by CertainTeed.

.3 GlasRoc Tile Backer by Georgia-Pacific Canada.

2.2.2 Water (Moisture) and Mould Resistant Wallboard: Conforming to ASTM C1396 or ASTM C1278, 1220mm (48") wide panels of maximum practical lengths to minimize end joints, tapered edges, 13mm (1/2") thick, with water (moisture) and mould resistant core. Mould resistant panel score of 10 when tested in accordance with ASTM D3273 and evaluated to ASTM D3274. Less than 5% water absorption by weight after 2-hour immersion, as per ASTM C473.

.1 Acceptable Materials: Paperless, coated fibreglass mat on face, back and long edges, water-resistant treated core gypsum board. Conforming to ASTM C1658:

.1 DensArmour Plus High Performance Interior Panels by Georgia Pacific Canada.

.2 Fiberock Brand Aqua-Tough Interior Panels, by CGC Inc.

2.3 MATERIALS - FRAMING MEMBERS

2.3.1 Metal track: CAN/CGSB 7.1, 26 ga. galvanized steel, roll formed of width to suit metal studs.

2.3.2 Metal studs: CAN/CGSB 7.1, 26 ga. galvanized steel, cold-rolled formed face at least 1-5/8" wide, depth as indicated. Provide knock-outs in studs to facilitate pipe, and conduit installation.

2.3.3 Hangers: 9 lwg minimum soft annealed and galvanized wire for 1/2" thick gypsum board; 3/16" diameter galvanized mild steel pencil rods for thicker gypsum board.

2.3.4 Ceiling runner or carrying channels: Cold formed 18 ga. mild steel channels, weighing not less than 0.60 lbs/ft., coated with a rust inhibitive paint or galvanized.

2.3.5 Ceiling furring channels: 26 ga. cold formed galvanized steel hat-shaped section.

2.3.6 Metal furring clips: 10 IW ga. minimum.

- 2.3.7 Wall furring channel: 26 ga. cold rolled galvanized steel hat-shaped section, 1-3/8" wide at crown, 2-3/4" wide at brim, 7/8" deep.
- 2.3.8 Resilient channels: RC-1 by CGC, or other approved manufacture.
- 2.3.9 Tie wire: 16 ga. extra pliable, soft, annealed, galvanized wire of high strength.
- 2.3.10 Hanger wire anchors: "RedHead TW-1614" anchors, by Phillips Drill Company, Division of ITT Industries of Canada Ltd., or other approved manufacture.
- 2.4 MATERIALS - ACCESSORIES
 - 2.4.1 Accessories shall comply with ASTM C1047.
 - 2.4.2 Joint treatment: 2" wide perforated tape reinforcement, joint filler or compound, and topping compound. Joint compound and tape shall be of the same manufacturer as gypsum board and comply with ASTM C475/C475M.
 - .1 Joint Compound for Tile Backing Panels: Gypsum based tile backing board: Use setting type taping and setting type, sandable topping compounds.
 - .2 Joint Compound for Exterior Sheathing Boards [and Soffit Panels]: Fibreglass mesh tape.
 - .3 Joint Compound for Abuse-Resistant Panels:
 - .1 ToughRock™ Sandable Joint Compound, by Georgia-Pacific.
 - .2 Durabond/Sheetrock Setting-Type Joint Compound, by CGC Canada Inc.
 - 2.4.3 Laminating adhesive: Sheetrock brand laminating compound by Canadian Gypsum Co. Ltd., or other approved manufacture.
 - 2.4.4 Tape for use with water resistant gypsum board: 2" wide 10 x 10 glass mesh tape.
 - 2.4.5 Water: Clean, fresh, potable, free from deleterious materials.
 - 2.4.6 Fasteners: Galvanized or aluminum, #6 x 1", 1-1/4", 1-5/8" drywall screws, flat head Phillips or recessed square socket type. 3/8" pan head door frame screws, (Type S12), and complying with ASTM C1002.
 - 2.4.7 Fasteners for exterior soffit boards: 1-1/4", Type S-12, Wafer Head, Climaseal finished, screws.
 - 2.4.8 Casing bead: Galvanized steel J-shaped trim, maximum lengths x thickness to suit gypsum board, concealed in the finish work by joint tape and joint compound, 200-A by CGC or other approved manufacture.
 - 2.4.9 Control joint trim: Casing bead as specified above.
 - 2.4.10 Corner bead and reveal trim: Galvanized steel L-shaped trim, maximum lengths, concealed in the finish work by joint tape and joint compound, 200-B by CGC or other approved manufacture.
 - 2.4.11 Use No. 200-A trim or appropriate Beadex trim at reveals.

or

- 2.4.12 Reveal trim: No.200-B by Canadian Gypsum Company.
- 2.4.13 Acoustic sealant: CAN/CGSB 19.21, Acoustical Sealant by Tremco Ltd., or other approved manufacture.
- 2.4.14 Sealant for water-resistant gypsum board cut edges: Sheetrock Brand W/R sealant by Canadian Gypsum Co. Ltd., or other approved manufacture.
- 2.4.15 Sealant at ducts and frames and similar locations: Mono 555 as by Tremco Ltd., or other approved manufacture.
- 2.4.16 Sound insulation: Complying with CAN/ULC S702, "AFB" by Roxul Inc., "Noise Stop" sound attenuation blankets "Thermafibre" by CGC, or other approved manufacture.
- 2.4.17 Neoprene sponge strip: Moisture resistant closed cell insulating material.
- 2.4.18 Thermal break material: Neoprene sponge.
- 2.4.19 Asphalt felt: CAN/CSA A123.2-03(2008)
- 2.4.20 Mineral wool safing insulation: Firebarrier Firestopping by Double A/D Distributors Limited, Fire-Bloc Firestopping by M. W. McGill and Associates Ltd., Thermafibre by United States Gypsum Co., or other approved manufacture.
- 2.4.21 Access Panels: As indicated in Section 10 99 00.

PART 3 - EXECUTION

3.1 INSPECTION

- 3.1.1 Examine the work of other Sections which is to receive the work of this Section and proceed only when conditions are satisfactory.
- 3.1.2 Do not apply gypsum board over mechanical or electrical work which requires inspection and approval by authorities having jurisdiction and the Consultant. Ensure that insulation, if required, has been completed to walls, pipes and other items. Neglect of this instruction will nullify any claims for extra payment for removal and replacement of work of this Section.
- 3.1.3 Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
- 3.1.4 Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

3.2 INSTALLATION - GENERAL

- 3.2.1 Install all materials in accordance with the latest printed directions of the manufacturer and in accordance with CAN/CSA A82.31-M.

- 3.2.2 Perform all work by skilled craftsmen.
 - 3.2.3 Provide partitions of thickness indicated on the Drawings.
 - 3.2.4 Comply with CAN/CSA A82.31-M, except to its clauses referring to nailing.
 - 3.2.5 Extend gypsum board to the underside of the structure above unless otherwise indicated.
 - 3.2.6 Provide gypsum board baffles above ceilings, to underside of structure above, where indicated for sound barriers.
 - 3.2.7 Install access doors supplied by respective Sections. Gypsum board infill at access panels shall have taped edges. Apply gypsum board with adhesive. Ensure finish of access panel is suitable for board, prime for adhesion if required. Fill and sand smooth perimeter edges as specified for joint finishing.
 - 3.2.8 Locate vertical joints at least 300mm from jamb lines of openings.
 - 3.2.9 Where vapour barrier carries over metal framing members ensure that installation of insulation and vapour barrier and perimeter seals is complete before applying gypsum board finish.
 - 3.2.10 Co-ordinate work of this Section with the Sections installing equipment above or in the suspended ceiling areas so as to produce a layout of hangers, carrying channels and furring channels suitable to accommodate fittings and units of equipment in a proper manner. This shall apply especially to flush mounted lighting fixtures, outlet boxes, diffusers and similar material. Failure to follow this procedure will require that the hangers and channels be revised to suit as necessary without extra cost to the Owner.
 - 3.2.11 Provide bulkhead framing and gypsum board, were required, whether shown or not, for ductwork and plumbing. Coordinate with Mechanical Division.
- 3.3 INSTALLATION - PARTITION FRAMING
- 3.3.1 Accurately layout partitions as indicated on drawings. Securely attach floor and ceiling runners at 600mm o.c. to the structure.
 - 3.3.2 Position studs vertically in runners at 400mm o.c. maximum unless otherwise indicated. Locate studs not more than 50mm from all abutting partitions, partition corners and other construction.
 - 3.3.3 Anchor studs located adjacent to door and window frames, partition intersections and corners to runner flanges with lock fasteners or by positive screw arrangement through each stud flange and runner flange.
 - 3.3.4 When necessary, splice studs by nesting two studs with a minimum lap of 200mm and attaching flanges together with two screws in each flange.
 - 3.3.5 Make allowances for deflection at top of partitions to avoid transmission of structural loads to framing system.

- 3.3.6 Locate 2 framing members on each side of framed openings. Frame over and below openings with runner sections at least 6" longer than the rough openings. Cut ends to fit and bend web up and screw anchor to adjacent studs. Install cut to length intermediate vertical studs in same manner and spacing as wall studs over such framed openings. Securely anchor studs to head and jamb anchor of door frames by bolt or screw attachment. Insert intermediate studs above and below channels to support gypsum board.
- 3.3.7 Provide adequate reinforcing for framing to receive wall mounted counters and vanities.
- 3.3.8 Provide double studs or wood blocking and bolts in stud partitions for fastening of handrails, grab bars, to be capable of supporting 230 kg (500 lb) downward pull. Provide double studs and blocking for anchoring of door frames, and other items anchored to stud partitions.
- 3.3.9 At duct openings pack space between framing members and ducts with mineral wool safing insulation and seal with sealant.
- 3.3.10 Provide double stud partitions where indicated.
- 3.3.11 Provide asphalt felt under runners for partitions on slabs on grade.
- 3.3.12 Provide resilient channels at right angles to studs where indicated on special sound proof partitions. Space channels at 400mm o.c.
- 3.3.13 Provide thermal break material to isolate metal studs and furring from steel framing, to eliminate cold bridges.
- 3.4 **INSTALLATION - CEILING FRAMING**
- 3.4.1 Space hangers at centres not exceeding 1200mm each way, in rows parallel with the walls. Area between hangers shall not exceed 1.48 sq.m. Supply hanger inserts or tabs in ample time and with instructions for their proper placement.
- 3.4.2 Use hangers of length required to assure secure anchorage and correct ceiling heights, straight and with a 90° bend at the lower end to engage the runner channels.
- 3.4.3 Do not secure hangers to pipes, ducts or any electrical or mechanical items.
- 3.4.4 Provide a row of hangers adjacent to and parallel with the walls for the support of the ends of runner channels at not more than 150mm from the ends of runner channels.
- 3.4.5 Provide hangers to suspend gypsum board ceilings independent of partitions.
- 3.4.6 Start runners or carrying channels parallel to and not more than 150mm away from edge of the ceiling. Ends of channels shall not contact vertical surfaces. Securely wire channels in parallel rows at not more than 1200mm o.c. to hangers with double strand of tie wire. Twist tie wires up tight without slack.
- 3.4.7 Channels shall be level and true to a tolerance of 3mm in 3600mm in all directions.

- 3.4.8 Provide 1300mm lap at runner channel splice. Secure splice with double strand of tie wire at each end. Clustering or lining up of splices will not be permitted.
- 3.4.9 Frame around fixtures, grilles and other openings. Where ducts, or where a combination of ducts and other items interfere so that hanger spacing exceeds 1200mm increase the size of the main runners and hanger wire accordingly, to sustain increased loading and span. Provide additional hangers as required to support the weight of lighting fixtures, diffusers, grilles and other built-in items occurring in ceilings.
- 3.4.10 Securely install furring channels at right angles to the runner channels and at 600mm o.c. using furring clips or a double strand of tie wire. Fur around ducts, bulkheads and the like.
- 3.5 INSTALLATION - METAL FURRING DIRECT ATTACHMENT TO MASONRY OR CONCRETE
- 3.5.1 Secure metal furring runners to masonry or concrete vertically, spaced 600mm o.c. Fasten runners 600mm o.c. through alternate flanges of runners. Shim runners as required to present a true, plumb line for application of gypsum board.
- 3.5.2 At windows, doors or similar openings having returns, install lengths of notched and 90°bent pieces of channel horizontally at the returns spaced approximately 600mm o.c. Locate runners not more than 50mm away from all openings, interior corners, intersections, frames, jambs, control joints and the like.
- 3.5.3 Mitre furring around all corners. Form mitres by cutting the flanges and bending the web. Do not cut the web to form corners.
- 3.6 APPLICATION - GYPSUM BOARD
- 3.6.1 Take all measurements accurately. Cut boards by scoring the face paper, snapping the core of the board and then cutting the back paper. Smooth the cut edges with a rasp or coarse sandpaper.
- 3.6.2 Erect gypsum board vertically or horizontally whichever results in fewer end joints. Butt joints loosely with maximum gap of 6mm. Do not force boards into position. Place tapered edges next to one another. All end joints shall occur over framing members.
- 3.6.3 Minimize end joints. Align joints with edge of wall openings.
- 3.6.4 Provide approved thermal break material at edges of gypsum board in contact with non-thermally broken metal windows and at exterior door frames.
- 3.6.5 At curved surfaces, score back of gypsum board and wet boards, bend to required radius, and block in position until dry. Apply joint compound and trowel smooth to provide continuous, smooth radius, free from flat spots, facets or trowel marks.
- 3.6.6 Where gypsum board baffle occurs over door or glazed opening, extend baffle across door or glazing opening.
- 3.6.7 Provide special trim as specified at reveals.

- 3.6.8 Apply thermal break material to metal studs, where indicated, before applying gypsum board.
- 3.6.9 In areas where opposite side of partition is open to space below, provide metal lath on concealed side. Install lath with long dimension across the studs. Secure with tie wires at 150mm o.c.
- 3.7 APPLICATION - GYPSUM BOARD LAMINATED TO CONCRETE AND/OR CONCRETE BLOCK MASONRY
 - 3.7.1 Ensure base is straight, dry, uncoated, clean and free from efflorescence. Mix laminating adhesive in accordance with manufacturer's directions. Allow to stand 30 minutes before using.
 - 3.7.2 Apply adhesive with a notched trowel to leave 9mm x 12.5mm ribbons, 30mm apart over entire back side of face layer.
 - 3.7.3 Erect gypsum board immediately after spreading adhesive. Use moderate pressure to develop full adhesive contact with substrate.
 - 3.7.4 Temporarily secure gypsum board in place with concrete nails or bracing. Ensure that joints are accurately aligned. Avoid impact or movement of boards until adhesive sets firmly. Remove temporary support when adhesive has set.
- 3.8 APPLICATION - GYPSUM BOARD (MULTIPLE LAYERS)
 - 3.8.1 Use square edged gypsum board for base layer and tapered edge for face layer. Place face layer at right angles to preceding layer. Apply base layer to framing members so that there will be a minimum number of end joints in the face layer. Offset the joints between the two layers a minimum of 250mm.
 - 3.8.2 Apply base layer to framing members with 25mm screws at 300mm o.c. in the field and 200mm o.c. at the end and edges. End joints may occur on or between framing members provided back blocking with supporting strips is used to assure alignment.
 - 3.8.3 Mix laminating adhesive in accordance with manufacturer's written specifications. Allow to slake.
 - 3.8.4 Cut and fit face layer and spread adhesive over back side with a metal spreader blade that has "V" shaped notches 13mm deep, 8mm wide and spaced 38mm to 50mm o.c.
 - 3.8.5 Apply face layer, loosely butting all joints and temporarily hold in place with fasteners of sufficient length to penetrate framing member 19mm. Wipe off any adhesive forced out along the edges. Place temporary fasteners at 200mm o.c.
- 3.9 APPLICATION - WATER RESISTANT GYPSUM BOARD
 - 3.9.1 Provide water resistant gypsum board to walls in washrooms.
 - 3.9.2 Apply water resistant gypsum board where ceramic tile is scheduled.

- 3.9.3 Provide water resistant gypsum board behind mirrors.
- 3.9.4 Apply water resistant gypsum board in strict accordance with manufacturers' written instructions.
- 3.9.5 Do not apply water resistant board to ceilings.
- 3.9.6 Apply coated water resistant gypsum board with black side out.
- 3.9.7 Give particular attention to sealing of cut edges, utility holes and joints, with approved sealant material. Seal all openings with sealant.
- 3.9.8 Apply tape over joints and angles.
- 3.9.9 Apply full bodied coat of sealer prior to application of fixtures and trim.
- 3.10 APPLICATION - CEILING
 - 3.10.1 Unless otherwise noted, construct ceilings in 1/2" thick gypsum board, screw attached at 8" o.c. maximum.
 - 3.10.2 Suspended gypsum board ceilings with joints taped shall be level, to within 1/8" in 12'-0" in all directions.
 - 3.10.3 Make allowance for air-transfer openings in above ceiling partition construction. Review Mechanical Drawings to establish locations. Provide openings in gypsum board baffle (in plenum space) to accommodate all cross-talk silencer ducts. Refer to Mechanical Drawings and specifications for type and location. Co-ordinate with Partition Type and partition Location Plans.
 - 3.10.4 Where slab to slab or baffle above ceiling partitions occur and large mechanical ducts prevent installation of such, a lead blanket is to be used as an alternate. Ensure complete continuous sound seal is provided.
 - 3.10.5 At all gypsum board ceiling areas, air supply and return shall be via continuous slim-line linear diffusers. Locations as indicated on Mechanical Drawings.
 - 3.10.6 Provide all openings in gypsum board ceilings to accommodate sprinklers, exit lights, access panels, pot lights, air diffusers and speakers.
 - 3.10.7 Caulk perimeter of gypsum board ceilings where suspended with sound isolation hangers.
- 3.11 TILE BACKING PANELS
 - 3.11.1 Install standard gypsum board panels in areas not subject to wetting to produce a flat surface.
 - 3.11.2 Install water resistant gypsum board in locations requiring tile applications in washrooms, and as indicated on the Drawings.

- 3.11.3 Shim surfaces to produce a uniform plane across panel surfaces where tile backing panels abut other types of panels in the same plane.
- 3.12 INSTALLATION - FASTENERS AND FASTENING
- 3.12.1 Apply gypsum board to metal furring, studs, runner channels, angles and other framing with approved screws. Use 1" long screws for fastening gypsum board up to 5/8" thickness to metal and wood furring and framing, and 1-1/4" long screws for fastening gypsum board up to 1" thickness to metal angle and channel runners.
- 3.12.2 Space screws 12" o.c. in field of board and 8" o.c. staggered along abutting edges. Start securing the board in the central portion and work toward the edges and ends. Drive all screws so screw heads provide a slight depression below the surface of the gypsum board without puncturing the face paper. Do not drive screws closer than 3/8" from edges and ends of gypsum board.
- 3.12.3 Use adhesive application for laminating gypsum board direct to other gypsum board in two or more layer construction and direct to concrete and masonry as specified herein before.
- 3.13 FINISHING
- 3.13.1 Finish gypsum board in conformance to CAN/CSA A82.31-M, except as herein specified.
- 3.13.2 Apply corner beads to all external vertical and horizontal corners and edges. Apply casing beads where the gypsum board butts against a surface having no trim concealing the juncture.
- 3.13.3 Erect corner beads and casing beads plumb and level with a minimum number of joints and secured at 6" o.c. with screws in each flange. Stagger fasteners in each flange.
- 3.13.4 Do not treat joints of laminated gypsum board for at least 24 hours after lamination.
- 3.13.5 Mix joint compound in accordance with manufacturer's specifications and allow to stand a minimum of thirty minutes before using.
- 3.13.6 Fill all gaps and screw nail depressions with three coats of joint compound. Allow preceding coat to set before applying subsequent coats.
- 3.13.7 On all corners apply joint compound to one side of corner and allow to set before applying compound to the other side of corner.
- 3.13.8 Apply a thin coat of joint compound over the board on each side of joints and embed the reinforcing tape and roll firmly into place. Cover all edges of tape with a thin coat of joint compound. Neatly crease tape at all internal corners. Allow to dry for 24 hours.
- 3.13.9 Apply joint compound over flanges of all corner beads and casing beads flush with nose of bead and extending at least 3" onto the surface of the board.
- 3.13.10 After bedding coat has set, apply second coat of joint compound feathered at least 6" on each side of butt joints and 4" past flanges of all beads.

- 3.13.11 After second coat has set, apply third coat of joint compound and feather to 8" on each side of butt joints and 5" past flanges of all beads.
- 3.13.12 Feather all coats of joint compound onto adjoining surfaces so that all joints, tape holes and flanges of beads are invisible.
- 3.13.13 After complete treatment has thoroughly set and after at least 24 hours, sand lightly with fine grit sandpaper to leave it smooth and ready for decoration.
- 3.13.14 Make the finished work smooth, seamless, plumb, true, flush and with square, plumb, neat corners and edges.
- 3.13.15 Do not finish joints of non-fire-rated walls in mechanical rooms, above finished ceilings or where acoustic tiles are scheduled.
- 3.13.16 Provide casing beads to edge of gypsum board on demising partitions where board meets ceiling, and convector cabinet enclosures, and at gypsum board terminations at recesses to accept carpet base and gypsum board terminations at coffered ceilings and to perimeter of gypsum board panels.
- 3.13.17 Tape joints in preparation for liquid applied vapour barrier.
- 3.13.18 Prepare surfaces ready for paint. Correct imperfections appearing after application of prime coat of paint.
- 3.14 CONTROL JOINTS
- 3.14.1 Install control joints in gypsum board where it is applied to concrete or masonry, either on furring or by adhesion, in the following locations; at masonry control joints and at junction of dissimilar wall materials.
- 3.14.2 Provide Control Joints at door panels, at each side of jamb, extending above door head.
- 3.14.3 Provide control joints in continuous runs of gypsum board at locations indicated or, if not indicated, spaced 30'-0" o.c. maximum at locations as directed by the Consultant.
- 3.14.4 Install double casing beads, back to back, fitted tightly together, on gypsum board edges at control joints. Finish casing beads but not joint between them.
- 3.14.5 Where application is on studs, double up studs at control and expansion joints, place one stud on each side of joint.
- 3.15 SOUND INSULATION
- 3.15.1 Provide sound attenuation blankets where indicated or required to attain sound attenuation, minimum STC 45 or as otherwise indicated.
- 3.15.2 Completely fill all spaces between studs laterally with blankets, run continuously from floor to ceiling or structure, over door frames and opening and around corners.

- 3.15.3 Provide sound attenuation blankets above ceilings as shown, completely covering ceiling to thickness indicated.
- 3.15.4 Pack sound insulation around cut openings in gypsum board walls and ceilings, behind outlet boxes around plumbing, heating or structural items passing through the system.
- 3.15.5 Pack sound insulation around openings in floors.
- 3.15.6 Secure blankets by adhesive or staples to one interior face of gypsum board.
- 3.15.7 Provide neoprene strips at perimeter of sound partitions as shown.
- 3.15.8 Provide batt insulation at air transfer ducts.

3.16 SEALING

- 3.16.1 Provide perimeter sealant (sound seal) at junction of gypsum board with structure, other partitions and at junction with dissimilar materials and adjacent construction. Apply in concealed locations only. Install in strict accordance with sealant manufacturer's written instructions.
- 3.16.2 Seal shall consist of 2 (STC 48 or less), 4 (STC 51) or 5 (STC 52) beads to meet or exceed partition rating.
- 3.16.3 Seal openings around ducts and similar protrusions passing through drywall system, at walls and ceilings.
- 3.16.4 Gypsum board shall be made air-tight around window and door openings. Return gypsum board at door and window openings and butt into window and door frames. At window stools, return gypsum board under stool. Perimeter edges where gypsum board butts to the frame shall be made air-tight with sealant.
- 3.16.5 In order to provide a continuous air barrier, the gypsum board on the exterior walls shall extend behind interior partitions, ducts, mechanical chases, heating units, etc. Coordinate with all relevant trades.

3.17 CUTTING AND PATCHING

- 3.17.1 Do all cutting, patching and making good as required by the installation of work of other trades and co-operate closely with these trades to assure a satisfactory finish. Remove and make good any work which, in the opinion of the Consultant is defective and not acceptable, at no additional cost to the Owner.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

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

1.1.2 All labour, materials, products, equipment and services to supply and install the porcelain and ceramic tile work required and/or indicated on the Drawings and specified herein.

1.2 REFERENCES

1.2.1 ASTM C206-14 Standard Specification for Finishing Hydrated Lime.

1.2.2 ASTM C207-06(2011) Standard Specification for Hydrated Lime for Masonry Purposes.

1.2.3 CAN/CGSB 19.22-M89 Mildew-Resistant Sealing Compound for Tubs and Tiles.

1.2.4 CAN/CSA A3000-13 Cementitious materials compendium(Consists of A3001, A3002, A3003, A3004 and A3005), Includes Update No. 1 (2014), Update No. 2 (2014), Update No. 3 (2014).

1.2.5 CSA A82.56-M76 Aggregate for Masonry Mortar.

1.3 QUALIFICATIONS

1.3.1 Subcontractor executing work of this Section shall employ installers having a minimum of five (5) years continuous Canadian experience in successful installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.

1.3.2 Work of this Section shall be executed by workers especially trained and experienced in this type of work. Have a full time, senior, qualified representative at the Site to direct the work of this Section at all times. Representative shall meet Consultant's approval.

1.3.3 Ensure proper use of proprietary materials in strict accordance with the material manufacturer's directions. It shall be the responsibility of the material manufacturer or supplier to furnish these directions to the Contractor and to check periodically at the site to ensure that they are being carried out.

1.4 SUBMITTALS

1.4.1 Submit two samples of all materials and products to the Consultant for review.

1.4.2 Submit two full size tile samples of each colour and tile selected.

1.4.3 Maintenance Instructions: Upon completion of the Work, furnish Consultant with copies of maintenance instructions, containing complete detailed and specific instructions for maintaining, preserving and keeping clean the surfaces of this Work and in particular, giving adequate warning of maintenance practices of materials detrimental to the work of this Section for inclusion in the Operation and Maintenance Manual.

1.5 SITE MOCK-UP

- 1.5.1 Following the pre-installation conference, the Contractor shall install a 1500mm x 1500mm (5'-0" x 5'-0") dry sample areas of porcelain tiles, ceramic wall lining tiles and ceramic wall tile showing all colours of tiles and layout in areas designated later by the Consultant.
- 1.5.2 After approval of tile colours and layout the Contractor shall set tile and grout including one caulked joint under the supervision of the material manufacturer's representative.
- 1.5.3 Upon completion and approval, sample areas shall serve as a standard of quality for the balance of the work of this Section. Subsequent work carried out and not in the Consultant's opinion, equal to the quality standard shall be removed and replaced at no additional cost to the Owner.

1.6 EXTRA STOCK

- 1.6.1 At completion of work, deliver to the Owner 5% extra quantity of each type of tile, from same production run as installed tiles. Include cost of extra stock as part of the work of this Section.

1.7 DELIVERY, STORAGE, HANDLING AND PROTECTION

- 1.7.1 Co-ordinate deliveries to comply with construction schedule and arrange ahead for off the ground, under cover storage location. Do not load any area beyond the design limits.
- 1.7.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.
- 1.7.3 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact.
- 1.7.4 Restrict traffic by other trades during installation.
- 1.7.5 Provide adequate protection of completed tiled surfaces to prevent damage by other trades until final completion of this project. Minimum protection shall consist of 4 mil polyethylene sheets lapped 4" and taped.
- 1.7.6 Heavily travelled areas shall have additional 1/2" thick fibreboard sheet protection with taped joints over polyethylene sheet protection as specified above.
- 1.7.7 Protect exposed edges of floor tile with same thickness as tile x 4" wide tapered strip of plywood adhered to floor until adjoining floor finish is to be installed.

1.8 ENVIRONMENTAL REQUIREMENTS

- 1.8.1 Maintain ambient temperature between 10 deg C and 20 deg C, for a period of 72 hours before commencement, during installation and 72 hours after installation.
 - .1 Temperature: Maintain tile materials and substrate temperature between TTMAC recommended minimum and maximum temperature range; unless indicated

otherwise by manufacturer, for 48 hours before and during installation until materials are fully set and cured; provide additional heat during winter months or at any other time when there is a risk that surface temperatures may drop below minimum recommended temperatures.

- .2 Ventilation: Maintain adequate ventilation where Work of this Section generates toxic gases or where there is a risk of raising relative humidity to levels that could damage building finishes and assemblies.

- 1.8.2 Moisture content of floor shall not exceed a maximum of 3 lbs. of water per 1,000 sq. ft. of concrete slab area over a 24 hour period as measured by one of the following methods, as approved by Consultant:

- .1 Does not exceed 3% as measured by Calcium Carbide Hygrometer procedure.
- .2 Does not exceed 5% as measured by normal Protimeter.

1.9 WARRANTY

- 1.9.1 Warrant the work of this Section against defects in materials for a period of five (5) years and in workmanship for a period of two (2) years, except as a result of structural failure of substrate.

- 1.9.2 Materials used for Work in this section are to include, but are not limited to the following criteria:

- .1 All materials under Work of this Section, including but not limited to, coatings, sealants, primers and adhesives are to have low VOC contents, in accordance with Section 01 35 90.
- .2 Materials used in work of this Section are to contain high amounts of recycled content and are to be sourced regionally from within 800 km via truck or 2400 km via rail or ship from jobsite in accordance with Section 01 61 10.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- 2.1.1 Dynamic Coefficient of Friction: Tile installed on walkway surfaces shall achieve a DCOF measurement of 0.42 as determined by testing identical products per ANSI A137.1-2012. Where tile is installed in wet environments, including washrooms and showers, test method shall also be carried out on wet tile.

- 2.1.2 Floor Level Tolerances: Provide materials to attain floor levelness tolerances required by this Section; calculate quantity of materials based on the difference between the specified tolerance and the initial tolerance.

- .1 Standard format floor tile: Tiles having dimensions from 100 mm x 100 mm and less than 400 mm x 400 mm require floor flatness measured to a minimum FF35; equivalent to 5 mm with no more than 2 gaps under a 3000 mm straightedge measurement.

- .2 Large format floor tile: Tiles having dimensions 400 mm x 400 mm and larger require floor flatness measured to a minimum of FF50; equivalent to 3 mm with no more than 2 gaps under the 3000 mm straightedge measurement.
- .3 Wall tiles: Provide wall leveling similar to that specified for floors, for tiles having similar sizes listed above.

2.2 MATERIALS

2.2.1 Porcelain tile: Non-slip, 300 mm x 300 mm (12" x 12") Centura Vitra Dotti (#K835582) Series, by Olympia or equivalent.

2.2.2 Porcelain wall lining: 10mm high (4") Centura Dotti (#K937205) or equivalent.

2.2.3 Ceramic wall tile: 405 mm x 100 mm (16" x 4") Colour & Dimension Collection Glazed Wall, by Olympia or equivalent.

2.2.4 Submit samples and color options and material specifications for Architect's and Client's approvals.

2.2.5 Provide all special units, coves, corners, caps, bullnose as required.

2.3 TRIMS:

2.3.1 Transition Edge Strips: Extruded satin anodized aluminum edge strips; height as required to suit tile installation; with integral perforated anchoring leg for setting the strip into the setting material and sloped profile transition. Basis-of-Design Materials: Schlüter Jolly, Anodized Aluminum finish.

2.3.2 Sloped Transition Strip (Barrier-free/ accessible areas): Schlüter Reno-Ramp/-K, Anodized Aluminum finish

2.3.3 Sloped Transition Strip (Non Barrier-free areas): Schlüter Reno-V, Anodized Aluminum finish

2.3.4 Cove Trims (inside wall corners): Roll formed stainless steel inside corner, cove shaped joint profile with perforated anchoring legs for setting the corner joint into the setting material; heights as required to suit installation, complete with pre-formed outside corners, [pre-formed 3-way inside corners], pre-formed 2-way inside corners, connections, and pre-formed end caps: Basis-of-Design Materials: Schlüter DILEX-HKS, S.S. Finish.

2.3.5 Tile Wall Corners: Schlüter ECK-E, Brushed S.S. Finish

2.4 SETTING BEDS

2.4.1 Cement: CAN/CSA A5, grey or white Portland cement for mortar, white Portland cement for grout.

- 2.4.2 Sand: CSA A82.56-M, sharp, screened concrete sand free from inorganic and deleterious materials.
- 2.4.3 Water: Clean and free from oil, acid, alkali, organic matter or other deleterious substances.
- 2.4.4 Lime: ASTM C206 or ASTM C207, Type S, hydrated lime.
- 2.4.5 Latex mortar additive: "Laticrete 4237" Tile Setting Liquid by Laticrete International Inc., or other approved manufacture.
- 2.4.6 Thin mortar for floors and walls: Latex thin set mortar consisting of 1:1 Portland cement/sand gauged with latex mortar additive.
- 2.4.7 Primer: Undiluted latex.
- 2.4.8 Epoxy setting bed: High strength epoxy mortar, "Latapoxy 210" by Latacrete International Inc., or other approved manufacture.
- 2.4.9 Latex additive for latex underlayment: "Cemtex" by Master Builders Technologies, or other approved manufacture mixed with water for underlayment mix at the rate of 3 parts water to 1 part latex. Primer; undiluted latex.
- 2.4.10 All materials comprising a system shall be from one manufacturer and shall be compatible with each other.
- 2.5 GROUT
 - 2.5.1 Colours will be selected from manufacturer's full range.
 - 2.5.2 Dry curing floor grout: "Laticrete Floor Grout & Joint Filler" by Laticrete International Inc.
 - 2.5.3 Dry curing wall grout: "Laticrete Dry Set Wall Grout" by Laticrete International Inc.
 - 2.5.4 Latex modified grout: "Laticrete Grout and Joint Filler" by Latacrete International Inc., gauged with "Laticrete Grout Admix" or other approved manufacture.
 - 2.5.5 Acid resistant and epoxy grout: "Latapoxy 210" by Laticrete International Inc., or other approved manufacture.
 - 2.5.6 Colour compound for coloured grout: Inorganic non-fading, lime-proof mineral pigment. Pigment: Pure synthetic iron oxide pigment by Elementis Pigment Co. Ltd., or other approved manufacture.
- 2.6 MIXES
 - 2.6.1 Underlayment, by volume: 3 parts sand, 1 part cement and water with latex additive as required for proper trowelling consistency.
 - 2.6.2 Thin set mortar: Mix to manufacturer's recommendations.

2.7 MISCELLANEOUS MATERIALS

- 2.7.1 Primers: As recommended by the manufacturer of the setting bed for the various substrate conditions.
- 2.7.2 Edge moulding: L-shaped extruded aluminum, anodized finish, 1/4" face depth x 7/8" perforated concealed flange, one piece length per location, by Ramca Tile, or other approved manufacture.
- 2.7.3 Polyethylene film: 0.1 mm (4 mil) thick.
- 2.7.4 Sealant and backing: CAN/CGSB 19.22-M, one component silicone, 'DC786' by Dow Corning Canada Limited or other approved manufacture, colour to match grout; tested by sealant manufacturer for non-staining of tile specified. Submit test reports. Joint filler as recommended by sealant manufacturer.

2.8 MEMBRANES

- 2.8.1 Crack Suppression Membranes: Load bearing, premanufactured self adhering lightweight fabric reinforced crack isolation membrane; nominal 1 mm thick manufactured to accommodate in-plane substrate movement in thin set applications meeting requirements of ANSI A108.1 and as follows:

- .1 Flextile Ltd., 1000 Flexilastic Crack Isolation Membrane
- .2 MAPEI Inc., Mapeguard 2

- 2.8.2 Waterproofing Membranes: Load bearing, reinforced, liquid applied membrane; manufactured to accommodate flood testing and reduce the incidence of thermal shock cracking to tiling installations; meeting requirements of ANSI A108.1 and as follows:

- .1 Flextile Ltd., Flex WP-980 Waterproof and Crack Isolation Membrane
- .2 MAPEI Inc. Mapelastic 315 Waterproofing and Reinforcing Fabric
- .3 Custom Building Products Level Quik Waterproof and Anti-Fracture Membrane

2.9 SEALERS

- 2.9.1 Floor sealer and protective coating: Clear, non-slip "Traction Master", or other approved manufacture.

PART 3 - EXECUTION

3.1 INSPECTION

- 3.1.1 Examine the work upon which the work of this Section depends and report any defects to the Consultant.
- 3.1.2 Ensure that backings are structurally sound, level and plumb within the required tolerances.

3.1.3 Tolerance of substrate for thin set mortar or epoxy setting bed is used, ensure that overall surface variations do not exceed plus/minus 3 mm (1/8") and 1.6 mm (1/16") within any single running foot, non-cumulative.

3.1.4 Ensure that access doors are set to provide a flush installation of the tile.

3.2 PREPARATION

3.2.1 Where work is applied to areas having floor drains, apply primer at the rate of 5 sq m to 6 sq m/4.5 (250/300 sq.ft./gal.). Trowel apply underlayment to form a continuous and uniform slope from the room edges to drains provided.

3.2.2 Prime gypsum board before application of dry set mortar setting bed.

3.2.3 Ensure that concrete substrates are free from latency and foreign matter which would impair bond. Grind concrete if necessary to present a sufficiently smooth surface to ensure proper performance of membrane. Vacuum substrate.

3.2.4 Crack Suppression Membranes:

.1 Prepare all surfaces of non-structural and structural cracks in strict accordance with the crack suppression membrane manufacturer's written instructions.

.2 Prime and fill all surfaces of non-structural and structural cracks in strict accordance with the crack suppression membrane manufacturer's written instructions.

3.3 INSTALLATION - GENERAL

3.3.1 Do tile work in accordance with Specification Guide 09 30 00 Tile Installation Manual 2009/2010, produced by Terrazzo Tile and Marble Association of Canada (TTMAC) and Construction Specifications Canada (CSC), except where specified otherwise.

3.4 INSTALLATION - SETTING BED

3.4.1 Use thin set with latex mortar system for application of tile to concrete floors in accordance with TTMAC Detail No. 311F-07.

3.4.2 Thin set mortar system for masonry or concrete walls: Apply slight levelling coat plaster base and bond coat in accordance with TTMAC Detail 303W-02.

3.4.3 Thin set mortar with latex additive for application of tile to water resistant gypsum board in accordance with Detail 304W-02.

3.4.4 Use epoxy setting bed for ceramic wall tile on plywood.

3.4.5 On metal access doors, install ceramic tile using epoxy setting bed with rust-inhibitive additives. Pressure apply setting bed to 1.6 mm (1/16") thickness with trowel and comb it prior to the setting of tiles. Mix setting bed in accordance with the written recommendations of the manufacturer.

3.5 INSTALLATION - TILE

- 3.5.1 Back-mortar, tile larger than 150 mm x 150 mm (6" x 6").
- 3.5.2 Unless otherwise detailed, lay out tile so that fields or patterns are centred on wall and floor areas, or architectural features and so that no tile less than one-half size occurs. Align wall, floor and base tile joints at wall base, if tile sizes are suitable. Do not use cut tiles at finished ceiling level.
- 3.5.3 Schedule delivery of tile so that a homogeneous blend of colours can be achieved throughout entire extent of this work. Colour blend tile.
- 3.5.4 Distribute production run varieties evenly maintaining the continuity of pattern.
- 3.5.5 Unless otherwise detailed, arrange accessories in tile work so that they are evenly spaced, centred with joints and set true with correct projection. Ensure that each tile has continuous solid backing. Saw cut and trim tile as required around fittings, pipes, holdfasts, and fixtures. Cut or drill and set holdfasts, bolts and anchors required for fastening fixtures and fittings in tile areas. Grind cut edges smooth.
- 3.5.6 Back butter all floor tile.
- 3.5.7 Finish tile work clean, free of broken, damaged or defective tiles. Reject warped tiles.
- 3.5.8 Joints in base shall match floor patterns. Joints shall be watertight without voids, cracks or excess grout.
- 3.5.9 Cure tile installations for three days, sponging and wetting down as necessary.
- 3.5.10 Unless otherwise noted, install tile with 4.6 mm (3/16") maximum width joints.
- 3.5.11 Finish exposed edge of tiles with edge moulding at termination of wall, termination of wall tile panels, at external corner and elsewhere as required to provide finished appearance to tile application where bullnosed tile is not used. Secure moulding to substrate straight and true, Grout in perforated flange.
- 3.5.12 Sound tiles after setting and remove and replace tiles not fully bedded.
- 3.5.13 Re-point joints after cleaning to eliminate imperfections. Avoid scratching tile surfaces.
- 3.5.14 Finished tile work shall be clean and free of tiles which are pitted, chipped, cracked or scratched. All damaged tile shall be removed and replaced.
- 3.5.15 Where indicated on Drawings or as required, install continuous single piece metal edge trims centered under doors in closed position and other locations where tile meets other floor finishes.
- 3.6 CONTROL JOINTS AND SEALANT
 - 3.6.1 Provide control joint in tile at locations where substrate changes to different material or construction, between new and existing substrates, where tile abuts other hard material, where areas change direction, at similar joints in structure, where structural substrate

abuts non-structural substrate, at 4.8 m (16'-0") maximum in each direction as determined by tile pattern, around room perimeter and where indicated.

- 3.6.2 Apply sealant around fittings penetrating tile work including pipes and drains, around door frames, between tile and threshold, around fixtures, escutcheon plates, along floor/wall junction, and similar areas. Coordinate sealant application at wall/base junction with floor and base installation.

3.7 GROUTING

- 3.7.1 Ensure setting bed has cured before commencing grouting.
- 3.7.2 Grout floor tile using acid resistant grout.
- 3.7.3 Grout wall tile using dry curing grout.
- 3.7.4 Grout epoxy set tile using epoxy grout.
- 3.7.5 Where indicated, colour grout to match middle range of tile colours, as directed. Grout to suit the contour of the tile. Fill joints, tool and make uniform in appearance without voids or cracks and watertight. Where floor and wall tile are matching, use floor grout on walls.
- 3.7.6 Make joints between tile uniform, plumb, straight, true and aligned with adjacent tile. Ensure sheet layout is not visible after installation. Align patterns.
- 3.7.7 When grout hardens damp cure for next 3 days.

3.8 WATERPROOFING

- 3.8.1 Install waterproofing in accordance with waterproofing manufacturer's written instructions to produce a waterproof membrane of uniform thickness bonded securely to substrate.
- 3.8.2 Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.9 SEALING

- 3.9.1 Seal unglazed floor tile in accordance with manufacturer's instructions to provide a matte sheen.

3.10 FIELD QUALITY CONTROL

- 3.10.1 Sound walls and floors with a solid object. If there is a hollow sound remove grout around that tile and check tile adhesion.
- 3.10.2 Ensure that adhesive containers bear certification of compliance with specified standards.
- 3.10.3 Ensure that tile containers are labelled with grade seals.

3.11 CLEANING AND FINISHING

- 3.11.1 Clean, seal and finish tile works installed under this Section of the work in accordance with TTMAC Maintenance Guide.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

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

1.1.2 This Section includes requirements for supply and installation of ceilings consisting of acoustic panels, complete with exposed suspension system and trim.

1.2 REFERENCES.

1.2.1 ASTM A653/A653M-15 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot-Dip Process.

1.2.2 ASTM C635/C635M-13a Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

1.2.3 ASTM C636/C636M-13 Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.

1.2.4 ASTM E84-15a Standard Test Method for Surface Burning Characteristics of Building Materials.

1.2.5 ASTM E1477-98a(2013) Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.

1.2.6 CAN/CGSB 1.132-M90 Zinc Chromate Primer, Low Moisture Sensitivity.

1.3 QUALITY ASSURANCE

1.3.1 Install ceilings by mechanics skilled in this trade and in accordance with system manufacturer's printed directions to produce a finished ceiling level, in true plane, free from warped, soiled or damaged tile or grid. Where manufacturer's directions are at variance with Drawings, consult the Consultant before proceeding.

1.4 SUBMITTALS

1.4.1 Product Data: Submit product data for each type of product specified.

1.4.2 Submit shop drawings indicating complete layout of sound baffles, hanger spacing, fastening details, splicing method and change in level details. Show areas of co-ordination with other trades and erection sequence.

1.4.3 Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling mounted items indicating the following:

.1 Ceiling suspension system members.

- .2 Method of attaching suspension system hangers to building structure.
 - .3 Ceiling mounted items including light fixtures; air outlets and inlets; speakers; sprinklers; and special mouldings at walls, column penetrations, and other junctures of acoustic ceilings with adjoining construction.
- 1.4.4 Submit 3 copies of manufacturer's maintenance instructions.
- 1.4.5 For special size units, conduct a load test to ensure ceiling grid will not deflect more than 1/360 span. Submit test report.
- 1.4.6 Obtain approval of hydro authorities having jurisdiction for ceiling grid and supports as related to the support of light fixtures. Adjust grid, fixing devices, and support hangers or guy wire to obtain approval. Submit copy of approval in triplicate to the Consultant.
- 1.4.7 Obtain and submit anchor manufacturer's certification for hanger anchors to be used, stating that anchors are suitable for hanger loading, spacing, and other conditions relating to use intended. Submit anchor manufacturer's instructions for anchor installation.
- 1.4.8 Submit representative samples of colour and finish of all exposed materials.
- 1.5 MOCK-UP
- 1.5.1 Erect in area designated a 10'-0" x 10'-0" sample installation. Modify or replace mock-up to obtain approval. After acceptance, retain mock-up as standard of quality for acoustical ceiling installation. Mock-up shall contain typical lighting fixture, and diffusers.
- 1.5.2 Do not begin fabrication and erection of remainder of ceiling system until mock-up has been inspected and approved.
- 1.6 PRODUCT DELIVERY, HANDLING, AND STORAGE
- 1.6.1 Deliver materials in their original wrappings or containers with manufacturer's labels and seals intact and store in a dry area under cover and clear of the ground.
- 1.6.2 Ship grid members and mouldings in rigid crates and avoid damage. Bent or deformed material will be rejected.
- 1.6.3 Suitably wrap members and protect against damage.
- 1.7 ENVIRONMENTAL REQUIREMENTS
- 1.7.1 Do not commence installation until glazing has been completed and exterior openings closed in. Maintain humidity not exceeding 65% where mineral panels are used and temperature in the range of 12°C for 72 hours prior to commencement of work and maintain this temperature until completion.
- 1.8 EXTRA STOCK
- 1.8.1 Leave five (5) percent in sealed cartons of each type of panel upon completion, and two

(2) percent of each suspension system and trim for Owner's maintenance. Panels shall be from same production run as panels installed. Identify cartons as to type and location of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.1.1 Acceptable Materials Manufacturers: Subject to compliance with requirements specified in this Section and CAN/ULC-S101 Design No. P201, manufacturers offering products that may be incorporated into the Work include the following:

- .1 Armstrong World Industries, Inc.
- .2 Chicago Metallic
- .3 CertainTeed
- .4 CGC Interiors, a USG Company

2.2 DESIGN CRITERIA

2.2.1 Superimposed Loads: Determine superimposed loads applied to suspension systems by components of the building and verify that adequate hangers are installed to support additional loads in conjunction with normal loads of the ceiling system, and as follows:

- .1 Maximum Deflection: Limit deflection to L/360 in accordance with ASTM C635 deflection test.
- .2 Fire performance: ASTM E84 and CAN/ULC S102 surface burning characteristics. Flame Spread Index 25 or less. Smoke Development Index 50 or less (UL labelled). Fire Guard: A fire-resistive ceiling when used in applicable UL assemblies.

2.3 SUSPENSION - GENERAL

2.3.1 Suspension system shall support ceiling assembly indicated on the Drawings, or specified herein, with a maximum deflection of 1/360 of the span, in accordance with ASTM C635/C635M intermediate duty classification. Suspension system shall be hot dipped galvanized metal.

- .1 Main and Cross Tees: 9/16" face exposed tee system (closest match to existing tee system to be retained), standard white finish. Basis of design product: Prelude XL Fire Guard, by Armstrong Ceiling Systems.
- .2 Perimeter Wall Molding: Shadow molding to provide a 9/16" face, 15/16" vertical leg and a 3/4" x 3/4" reveal, standard white finish.
- .3 Transition Molding: Shadow molding from acoustic tile to gypsum board ceiling to provide a 9/16" face and 3/4" x 3/4" reveal, standard white finish. Acoustic tile and gypsum board to align at the same elevation.
- .4 Edge Trim: 2" nominal height profile with vertical fin detail, attaching to metal suspension system. Standard white finish. Basis of

- design product: Axiom Vector Trim, 2" Profile, by Armstrong Ceiling Systems.
- .5 Hangers, Braces, Ties: Nominal 14 ga. diameter steel wire, galvanized.
 - .6 Accessories: Stabilizer bars, access splines, and required anchors and attachment to structure, 22 ga. minimum steel.
 - .7 Tie Wire: 3/64" galvanized soft annealed steel wire.
- 2.3.2 Suspension system shall lock together in a positive manner providing pull out values in tension of 300 lb. or greater.
- 2.4 ACOUSTICAL PANELS
- 2.4.1 Acoustic Panels (ACT-1): Provide manufacturer's standard panels of configuration indicated in accordance with ASTM E1264 classifications as designated by the nominal values for types, patterns, acoustic ratings, and light reflectance class listed in this Section; with flame spread rating of 25 or less and smoke developed rating of 50 or less when tested in accordance with CAN/ULC S102 and as follows:
- .1 Physical Properties: Type: III, Form: 2, Fire Class A
 - .2 Dimensions: 24" x 48" x 3/4"
 - .3 Edge Profile: Square
 - .4 Colour: White.
 - .5 Acoustic and Visual Performance (Minimum Nominal):
 - 1. Noise Reduction Coefficient: 0.70
 - 2. Ceiling Attenuation Class: 40
 - 3. Light Reflectance: 0.85
 - .6 Basis of Design Product:
 - 1. 1811 School Zone FINE FISSURED by Armstrong World Industries, Inc.
 - 2. Equivalent product of CGC Interiors, a USG Company
- 2.4.2 Steel members: G60 hot-dipped galvanized in accordance with ASTM A653/A653M, light commercial coating class or coated with rust inhibitive primer complying with CAN/CGSB 1.132-M.
- 2.4.3 Exposed metal surfaces: Baked-on, special white enamel, with a gloss value of 25 when tested in accordance with ASTM E1477.

PART 3 - EXECUTION

- 3.1 INSPECTION
- 3.1.1 Ensure work above ceilings is complete, inspected and approved by authority having jurisdiction before commencing installation.
- 3.2 INSTALLATION WORK
- 3.2.1 Co-ordinate work with all trades affected by work of this Section. Provide a layout of hangers and framing suitable to accommodate fittings and units of equipment. Failure to follow this procedure will require that hangers and channels be revised to suit as

necessary without additional cost to the Owner.

- 3.2.2 Where ducts or other equipment prevent the regular spacing of hangers, reinforce nearest adjacent hangers and all related carrying channels and furring as required to span the greater distance.
- 3.2.3 Lay out work in accordance with reflected ceiling plans. Provide a tolerance of 1/360 of span and 5/64" maximum between adjacent edges of metal pans. Allowable tolerance of finished acoustical ceiling system: 1/8" in 12'-0" and 1/64" between adjacent metal members. Tolerances shall not be cumulative.
- 3.2.4 Install acoustical ceilings in accordance with ASTM C636/C636M, "Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels."
- 3.2.5 Supply hangers or inserts for installation to respective section in ample time and with clear instructions for their correct placement. Provide additional hangers and inserts as required.
- 3.2.6 Design and space hangers and carrying members to support entire ceiling system, including lighting fixtures, diffusers and grilles. Recessed objects shall replace or be centred on acoustical panels, except where indicated otherwise. Consult with mechanical and electrical trades to co-ordinate the work.
- 3.2.7 Secure hangers to structure. Hang suspended ceilings independently of walls, columns, ducts, pipes and conduit. Where carrying members are spliced avoid visible displacement of longitudinal axis of face plane of adjacent members.
- 3.2.8 Centre acoustical ceiling installation on room axis leaving equal border pieces. Provide a row of hangers adjacent to and parallel with walls for support of ends of main tee runners at not more than 6" from ends of runners. Lay directionally patterned tile one way with pattern parallel to longest room axis unless otherwise directed.
- 3.2.9 Install components to form a level ceiling with all parts flush and true, parallel to module lines, and to pattern shown. Install panels in level, uniform plane free from twist, warp, dents and flush, without gaps and exposed face of carrying members. Fit border units neatly against abutting surfaces.
- 3.2.10 Do not support fixtures from main runners or cross runners if weight of fixture causes total dead load to exceed deflection capability of suspension system. In such cases, support fixture load by supplementary hangers located within 6" of each corner, or support fixture independently. Do not install fixtures so that main runners and cross runners will be eccentrically loaded. Where fixtures installation would produce rotation of runners, provide stabilizer bars. Provide carrying channels to transfer fixture load to carrying members as required. Ensure that joints in suspension do not occur at recessed fixture sides. Frame around recessed fixtures, diffusers, grilles, and other openings; provide allowance for thermal movement. Furr around ducts, beams, and bulkheads as required. Suspension of electrical fixtures shall comply with requirements of hydro.
- 3.2.11 Accessibility percentage: 100.

3.3 INSTALLATION - GRID SYSTEM

- 3.3.1 Grid system shall consist of the following components: Hangers, Exposed main tee, exposed cross tee, wall moulding, lay-in panels, and hold-down clips where required.
- 3.3.2 Install hangers of correct length at 4'-0" o.c. maximum in each direction.
- 3.3.3 Install main runners level and in maximum length available. Do not bend hangers as a means of levelling. Form wire loops tightly to prevent vertical movement or rotation within the loop.
- 3.3.4 Join abutting sections of main tees by means of suitable connections such as splices, interlocking ends, tab locks, pin locks. Intersecting tees shall form a right angle. Butt ends of cross tees flush to exposed edge of intersecting member. Fur around ducts, beams and bulkheads as required. Provide edge moulding at intersection of ceiling and vertical surfaces.
- 3.3.5 Provide edge moulding at intersection of vertical surfaces using maximum lengths, straight, true to line and level. Mitre corners. Provide edge transition moulding at junction with gypsum board ceilings as indicated. Where bullnose concrete block occurs, provide preformed closers to match edge moulding.
- 3.3.6 Integrate with existing false ceiling suspension system.
- 3.3.7 Cut out for example, for lights to receive UL fire tested 1 hour fire rated troffer protection covers.
- 3.3.8 Carefully fit acoustic tile in place, no broken edges permitted.
- 3.3.9 Install hold-down clips on all lay-in panels to hold such panels tight to grid system. No. 28 MSG spring steel, placed over cross tees 2'0" OC. Where required, access clips used in lieu of hold-down clips.
- 3.3.10 Recessed items shall replace or be centred on acoustical tiles, except where indicated otherwise. Consult with mechanical and electrical trades to co-ordinate the work.

3.4 ADJUSTMENTS

- 3.4.1 Adjust any sags or twists which develop in suspension system and replace any part of complete system which is damaged or faulty.

3.5 CLEANING

- 3.5.1 Thoroughly clean all acoustic ceiling surfaces upon completion of the installation.
- 3.5.2 Promptly as the work proceeds and on completion, remove all surplus materials and debris resulting from the work of this Section.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

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

1.1.2 This Section includes, but is not limited to, the following:

- .1 Vinyl composition floor tile.
- .2 Static dissipative floor tile.
- .3 Rubber tile flooring.
- .4 Resilient wall bases.
- .5 Resilient accessories for transition strips, area dividers

1.2 REFERENCES

- 1.2.1 CAN/CSA A126.5-87 Resilient Wall Base.
- 1.2.2 ASTM F1066-04(2014)e1, Standard Specification for Vinyl Composition Floor Tile
- 1.2.3 ASTM F 1344-15 Standard Specification for Rubber Floor Tiles
- 1.2.4 ASTM F1516-13, Standard Practice for Sealing Seams of Resilient Flooring Products by the Heat Weld Method (when Recommended)
- 1.2.5 ASTM F1700 Standard Specification for Solid Vinyl Floor Tiles
- 1.2.6 ASTM F1861-08(2012)e1, Standard Specification for Resilient Wall Base
- 1.2.7 ASTM F1869-11, Standard Test Method for Measuring Moisture Vapour Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

1.3 SUBMITTALS

1.3.1 Product Data: Submit one copy of product data for each type of product specified.

1.3.2 Shop Drawings: Submit shop drawings indicating:

- .1 Location of seams and edges
- .2 Location of columns, doorways, enclosing partitions, built-in furniture, cabinets, and cut-out locations
- .3 Type and style of resilient transition strip used between adjacent flooring types

1.3.3 Submit the following samples to the Consultant for approval: 2 samples 300mm x 300 mm (12" x 12") of each colour of sheet flooring, 1 300mm (12") length of edge strip.

1.3.4 Submit three copies of maintenance data for incorporation into maintenance manual. Manual shall give specific warning of any maintenance practice which may damage or disfigure sheet flooring.

- 1.3.5 Site Quality Control Test Results: Submit results or moisture emission testing of concrete subfloors prior to installation of flooring. Results shall include comparison of manufacturer's recommended moisture content to actual moisture vapor emission rate.
- 1.4 SITE MOCK-UP
 - 1.4.1 Following the pre-installation conference, the Contractor shall install a 10'-0" x 10'-0" dry sample areas of flooring material and accessories, indicating all colour variations, and layout in areas designated later by the Consultant.
 - 1.4.2 After approval of tile colours and layout, install flooring materials and accessories, under the supervision of the material manufacturer's representative.
 - 1.4.3 Upon completion and approval, sample areas shall serve as a standard of quality for the balance of the work of this Section. Subsequent work carried out and not in the Consultant's opinion, equal to the quality standard shall be removed and replaced at no additional cost to the Owner.
 - 1.4.4 It shall be the responsibility of the material manufacturer's representative to visit the site during installation, to ensure proper use of proprietary materials and assist the Contractor as may be required.
 - 1.4.5 Co-ordinate work of mock-up with related work of other Sections.
 - 1.4.6 Accepted work may form a part of the final installation.
- 1.5 EXTRA STOCK
 - 1.5.1 Provide 5% of each colour of flooring material and 30' lineal feet coil stock of each colour of base specified, boxed and labelled. Store maintenance materials on the premises as directed by the Owner.
- 1.6 QUALITY ASSURANCE
 - 1.6.1 Contractor executing work of this Section shall have a minimum of five (5) years continuous Canadian experience in successful and installation of work of type and quality shown and specified. Submit proof of experience upon Consultant's request.
 - 1.6.2 Resilient Flooring Installer: Use an installer who is competent in heat welding and have a minimum of five (5) years documented experience in the installation of resilient sheet flooring and seams in accordance with manufacturer's training or certification program:
- 1.7 DELIVERY, STORAGE, HANDLING AND PROTECTION
 - 1.7.1 Coordinate deliveries to comply with Construction Schedule and arrange ahead for off-the-ground, under cover storage location. Do not load any area beyond the design limits.
 - 1.7.2 Materials shall be carefully checked, unloaded, stored and handled to prevent damage. Protect materials with suitable non-staining waterproof coverings.
 - 1.7.3 Store material in original, undamaged containers or wrappings with manufacturer's seals and labels intact.

- 1.7.4 Restrict traffic by other trades during installation.
- 1.7.5 Provide adequate protection of completed tiled surfaces to prevent damage by other trades until final completion of this project. Minimum protection shall consist of kraftpaper.
- 1.8 ENVIRONMENTAL CONDITIONS
 - 1.8.1 Temperature of room, floor surface and materials shall not be less than 21 deg C for 48 hours before, during and for 48 hours after installation. Concrete floors shall be aged for a minimum of 28 days and shall be dry before application of the resilient floor tile.
 - 1.8.2 Moisture content of floor shall not exceed a maximum of 3 lbs. of water per 1,000 sq. ft. of concrete slab area over a 24 hour period as measured by one of the following methods, as approved by Consultant:
 - .1 Rubber Manufacturer's Association (RMA) moisture test using anhydrous calcium chloride.
 - .2 Does not exceed 3% as measured by Calcium Carbide Hygrometer procedure.
 - .3 Does not exceed 5% as measured by normal Protimeter.
 - 1.8.3 Avoid exposure to high humidity, cold drafts and abrupt temperature changes.
- 1.9 WARRANTY
 - 1.9.1 Warrant the work of this Section against defects in materials and workmanship in accordance with the General Conditions but for an extended period of five (5) years and agree to repair or replace faulty materials or work which become evident during warranty period without cost to the Owner. Defects shall include, but not limited to, bond failure, and extensive colour fading.

PART 2 - PRODUCTS

- 2.1 MANUFACTURERS
 - 2.1.1 Basis-of-Design Manufacturers: Manufacturers named in this Section were are approved to provide work specified in this Section. Additional manufacturers offering similar products may be incorporated into the work of this Section provided they meet the performance requirements indicated and provided requests for substitution are provided a minimum of five (5) days in advance of Bid Closing.
 - 2.1.2 Approved manufacturers:
 - .1 Johnsonite
 - .2 Armstrong Flooring
 - .3 Altro Flooring
 - .4 Polyflor
- 2.2 TILE FLOORING MATERIALS
 - 2.2.1 Vinyl Composition Floor Tile (VCT): Asbestos free uniform in thickness with uniform colour and pattern through the full thickness, with straight, sharp and square edges and

corners, accurately cut to size, conforming to ASTM F1066 and the following:

- .1 Classification: Class 2 – Through Pattern
- .2 Colour: To be confirmed by architect
- .3 Thickness: 1/8"
- .4 Size 12" x 12"
- .5 Basis of Design Product: Standard EXCELON by Armstrong Flooring

2.3 TILE FLOORING MATERIALS

2.3.1 Luxury Vinyl Floor Tile (LVT): Asbestos free uniform in thickness with uniform colour and pattern through the full thickness, with straight, sharp and square edges and corners, accurately cut to size, conforming to ASTM F1700 and the following:

- .1 Classification: Class III B
- .2 Minimum wear layer 28 mil/0.71 mm
- .3 Low gloss, no polish, no buff and color to be confirmed by architect/Owner
- .4 Slip resistance : R10
- .5 Thickness: 3mm
- .6 Size 18" x 18" OR 2m x 20m rolls (to be confirmed by architect/ Owner)
- .7 Basis of Design Product: Standard Natural Creations by Armstrong Flooring OR Expona Commercial by PolyFlor.

2.4 RESILIENT ACCESSORIES

2.4.1 Resilient Wall Base (RB 1): Smooth, matte finish exposed face, supplied in maximum practical length, with pre-moulded end stops and external corners to match base, conforming to ASTM F1861 and as follows:

- .1 Type: TP – Thermoplastic Rubber
- .2 Group: 1 – Homogeneous
- .3 Style: B – Cove
- .4 Height: 4" (100 mm)
- .5 Thickness: 1/8" (3 mm)
- .6 Length: Manufacturers standard maximum length.
- .7 Color: [Selected from manufacturers standard range.]

2.4.2 Resilient Transition and Edge Strips: Extruded vinyl shapes meeting or exceeding ADA Recommendations for change of level transitions for transition between floors finishes having different levels, i.e.: between resilient flooring on underlayment to carpet with no cushion or underlayment; acceptable materials as follows:

- .1 The following list is included to indicate the most commonly used transition and edge strip accessories; additional materials may be required where transition heights differ from the products listed and shall be included as a part of the Contract.
- .2 Transition Strip: TS1 – Carpet to Resilient Flooring Transition:
Johnsonite CTA-XX-A Transitional Moulding between flooring materials having dissimilar thicknesses; colour: selected from manufacturer's standard range.
- .3 Transition Strip: TS2 – Ceramic Tile to Resilient Flooring Transition:
Johnsonite CTA-XX-K Transitional Moulding between flooring materials having

- dissimilar thicknesses; colour: selected from manufacturer's standard range.
- .4 Transition Strip: TS4 – Resilient Flooring to Concrete Slab Transition: Johnsonite SSR-XX-B Transitional Moulding between materials having a thickness to materials having no thickness; colour: selected from manufacturer's standard range.
- 2.4.3 Sub-floor leveller system: Johnsonite Leveler Strip, slope as required at carpet and quarry tile, by height difference. Adhesive for use with leveler strip: Johnsonite #965.
- 2.4.4 Primers and adhesives: Waterproof, of the types recommended by resilient flooring manufacturer for applicable substrate.
- 2.4.5 Sub-floor filler: White pre-mix latex requiring water only to produce cementitious paste.
- 2.4.6 Welding rods: As approved by the manufacturer, to match floor, colours selected by Consultant.
- 2.4.7 Metal edge strip: Aluminum extruded, smooth, mill finish with lip to extend under floor finish, shoulder flush with top of adjacent floor finish.
- 2.4.8 Sealer and wax: Type recommended by sheet vinyl flooring material manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

- 3.1.1 Ensure that floors are clean, level and dry, free from cracks, ridges, dusting, scaling and carbonation.
- 3.1.2 Test concrete substrate for excessive moisture content by a method acceptable to the Consultant and material manufacturer.
- 3.1.3 Maintain room and material temperature at 21°C for at least 24 hours before, during and 7 days after flooring installation. Concrete shall be at least 28 days old before commencing application.
- 3.1.4 Do not install sheet flooring until ceiling and partition finishing work are completed.
- 3.1.5 Before spreading primer or adhesive, thoroughly clean the surface of the floor, remove dust and debris.
- 3.1.6 Apply filler as may be required. Prohibit traffic until filler has cured.
- 3.1.7 Prime concrete slabs to flooring manufacturer's recommendations.

3.2 FLOORING INSTALLATION

- 3.2.1 Apply adhesive uniformly using recommended trowel in accordance with flooring manufacturer's instructions. Do not spread more adhesive than can be covered by flooring before initial set takes place.

- 3.2.2 Lay flooring to produce a minimum number of seams. Border widths minimum 1/3 width of full material.
- 3.2.3 Run sheets parallel to length of room. Double cut sheet joints and continuously heat or chemically weld.
- 3.2.4 As installation progresses, roll flooring with 45kg (100lb) roller to ensure full adhesive, according to manufacturer's instructions.
- 3.2.5 Cut flooring and fit neatly around fixed or excessively heavy objects.
- 3.2.6 Provide flush joint transition strip where sheet resilient flooring meets carpet.
- 3.2.7 Terminate flooring with metal edge strips at centreline of door in openings where adjacent floor finish or colour is dissimilar.
- 3.2.8 Layout tile flooring as follows:
 - .1 Lay tile with joints parallel to building lines to produce a symmetrical tile pattern.
 - .2 Install tile flooring so that perimeter tile width is minimum 1/2 full size.
- 3.3 SEAMING
 - 3.3.1 After adhesive has set, groove seams with equipment recommended by flooring manufacturer. Width of groove; 3.5mm (0.14") wide x 2.5mm (1/10") deep.
 - 3.3.2 Clean seams carefully by vacuum.
 - 3.3.3 Use high-speed hot-air welding gun to weld all grooved seams, in accordance with flooring manufacturer's instructions.
 - 3.3.4 Trim off excess surplus material in two operations.
- 3.4 INSTALLATION – BASE
 - 3.4.1 Provide resilient base or cove base as indicated on Room Finish Schedule.
 - 3.4.2 Securely adhere cove base filler at juncture of wall and floor. Spread adhesive up wall, full coverage.
 - 3.4.3 Extended flooring material to form cove base, ensure solid backing behind base.
 - 3.4.4 Terminate top of base in base cap, straight, level and true.
- 3.5 CLEAN
 - 3.5.1 Remove excess adhesive from floor, base and wall surfaces without damage.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

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

1.1.2 Provide all labour, materials, products, equipment and services to supply and install terrazzo work required and/or indicated on the Drawings and specified herein.

1.2 REFERENCES

1.2.1 CAN/CSA A3000-13 Cementitious Material Compound.

1.2.2 CSA A23.1-14/A23.2-14 Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

1.2.3 CAN/CGSB 51.33-M89 Vapour Barrier Sheet, Excluding Polyethylene, for Use Building Construction.

1.2.4 CSA G30.5-M1983(R1998) Welded Steel Wire Fabric for Concrete Reinforcement.

1.2.5 TTMAC Series 1000 Cleaner.

1.2.6 TTMAC Series 2000 Sealer.

1.2.7 TTMAC No.3001 Finish Coat.

1.3 QUALITY ASSURANCE

1.3.1 Work shall be executed by skilled mechanics, specifically trained and qualified for this work (i.e. written proof of minimum five (5) years employment/service with the manufacturer. Individuals to be either employees of the manufacturer and/or workers approved by the manufacturer (i/e. Written proof of minimum five (5) years employment/service with the manufacturer will be required if requested by the Owner).

1.3.2 Provide one (1) thoroughly experienced, reliable, qualified and competent person in charge of the Work. Individual shall be designated for the duration of the Work of this Section. Any changes to the individual shall be by written approval of the Owner.

1.3.3 The supplier shall have adequate plant, equipment and skilled trades people, and is known to have satisfactorily manufactured similar flooring for a minimum of five (5) years in the Province of Ontario and is a registered member of the Terrazzo, Tile and Marble Association of Canada.

1.4 SUBMITTALS

- 1.4.1 Shop drawings: Show placement of divider strips, expansion joints, precast treads related items and required dimensions. Indicate clearly precast terrazzo reinforcement and holes required.
- 1.4.2 Samples: Submit three [300mm x 300mm] 12"x12" samples of the terrazzo flooring for approval. Submit samples of all ingredients of the finished terrazzo flooring for approval.
- 1.4.3 Submit three copies of the maintenance manual issued by the Terrazzo, Tile and Marble Association of Canada at the completion of the Work. Include specific warning or any maintenance practice or materials which may damage or disfigure the terrazzo work.
- 1.5 ENVIRONMENTAL CONDITIONS
 - 1.5.1 Bar traffic and other work from areas where terrazzo is being installed during installation and for at least 48 hours thereafter.
 - 1.5.2 Maintain minimum ambient temperature at 5 deg. C; do not install terrazzo over surfaces that are covered by frost.
 - 1.5.3 Do not start terrazzo work until work of other Sections, which is to pass through, beneath, or behind terrazzo, has been completed.
 - 1.5.4 Moisture content of floor shall not exceed a maximum of 3 lbs. of water per 1,000 sq. ft. of concrete slab area over a 24 hour period as measured by one of the following methods, as approved by Consultant:
 - .1 Does not exceed 3% as measured by Calcium Carbide Hygrometer procedure.
 - .2 Does not exceed 5% as measured by normal Protimeter.
 - 1.5.5 Avoid exposure to high humidity, cold drafts and abrupt temperature changes.
- 1.6 WARRANTY
 - 1.6.1 Warrant the work of this Section against defects in materials and workmanship in accordance with the General Conditions, but for a period of two (2) years, and agree to promptly make good defects which become evident during the warranty period without cost to the Owner. Defects shall include but not be limited to the following; cracking, crazing, discolouration, staining.

PART 2 - PRODUCTS

- 2.1 MATERIALS
 - 2.1.1 Cement: CAN/CSA A3000, grey or white Portland cement. Cement for terrazzo topping shall be white.
 - 2.1.2 Sand: CAN/CSA A23.1/A23.2, Sharp screened concrete sand free from organic materials.

- 2.1.3 Water: Clean and free from oil, acid, alkali, organic mater or other deleterious substances. If not taken from the mains of a municipality, it shall be tested, submit test report for approval.
- 2.1.4 Marble chips: Clean, sound, cube shaped and free from flat or flaky particles.
- 2.1.5 For floors use 25% No. 1 size chips and 75% No. 2 size chips.
- 2.1.6 For bases use 100% No. 1 size chips. All dust – screened out.
- 2.1.7 Terrazzo to match samples submitted for approval and colours and patterns as indicated on Room Finish Schedule, Colour Schedule and Drawings.
- 2.1.8 Mixture of chips: Mater sample No of Terrazzo Tile and Marble Association of Canada.
- 2.1.9 Divider strips for floors: Commercial grade white zinc alloy (stainless steel or brass) [32mm x 3mm| 1-1/4” x 1/8”] one piece heavy top with approved anchoring device, unless otherwise noted.
- 2.1.10 Divider strips for cove bases: Commercial grade white zinc alloy (stainless steel or brass) [3mm|1/8”] wide to suite height base.
- 2.1.11 Base Screeds: white zinc alloy (s) [20mm x 0.8mm|3/4” x 20ga.] projecting hook strips or as detailed.
- 2.1.12 Control Joints: [32mm x 1.6mm|1-1/4” x 14 gauge] strip laminated to both sides of [32mm x 4mm|1-1/4” x 1/8”] black neoprene strips.
- 2.1.13 Colour pigments: Pure mineral pigment, lime-proof, non-staining.
- 2.1.14 Polyethylene film: CAN/CGSB 51.33-M, [0.1 mm| 4mil] thick.
- 2.1.15 Non-slip abrasive aggregate: Aluminium oxide chips of approved manufacture, size and colour as selected.
- 2.1.16 Waterproof membrane: “Glasflex” by Grace Construction Materials Ltd.
- 2.1.17 Primer for waterproofing: “Dehydratine 4” by Grace Construction Materials Ltd.
- 2.1.18 Bituminous mastic: “Dehydratine 10” by Grace Construction Materials Ltd.
- 2.1.19 Waterproof membrane: [1.8kg|4lbs] sheet lead.
- 2.1.20 Bonding agent and admix for non-slip aggregate inserts: “Cemtex” by Master Builders Technologies, or other approved manufacture.

- 2.1.21 Terrazzo cleaner: TTMAC Series 1000, free of acid, alkali and metallic salts harmful to terrazzo.
- 2.1.22 Penetrating terrazzo sealer: TTMAC Series 2000, colourless permanent sealer formulated from raw materials that will not oxidize upon aging. Wax shellac and varnish are not considered permanent sealers.
- 2.1.23 Terrazzo protective finish: TTMAC No. 3001, slip resistant, protective and sealing finish, resistant to discolouration or oxidation.
- 2.1.24 Reinforcement for sand cushion terrazzo: CSA G30.5-M, galvanized electrically welded square [50mm x 50mm x 1.6mm] 2"x2"x16 ga.] mesh.
- 2.1.25 Reinforcement for precast treads: [6mm|1/4"] diam.

2.2 MIXES

- 2.2.1 Underbed: 1 part Portland cement 4 parts sand max. [5L|4 Imp. gallons] of water per [10kg|80 lbs.] cement
- 2.2.2 Topping: [36 kg|80 lbs.] bag of cement, [90 kg|200lbs.] marble chips mixed dry, colour additive as required.

PART 3 - EXECUTION

3.1 INSPECTION

- 3.1.1 Examine substrates. Do not commence terrazzo work until defects which will adversely affect the terrazzo work have been corrected.
- 3.1.2 The terrazzo substrate shall be a broom-finished surface and shall be level to [4mm|1/8"] in any direction when checked with a [3000 mm|10'-0"] straight edge.
- 3.1.3 Verify that substrate follows appropriate slopes and elevations shown on Drawings.

3.2 INSTALLATION - GENERAL

- 3.2.1 Minimum thickness for bonded method: [38 mm|1-1/2"]
- 3.2.2 Minimum thickness for sand cushion method: [64 mm|2-1/2"] including [6 mm|1/4"] layer of sand.
- 3.2.3 At least 80% of the finished surface shall consist of marble chips.

3.3 INSTALLATION - FLOORS

- 3.3.1 For bonded method: Clean concrete slab of foreign matter, then saturate with water. Remove free water prior to application of cement bond coat. Slush with neat Portland cement and broom it in to underbed. Provide bonding agent over slab, where specified.

- 3.3.2 For sand cushion method: Clean slab and cover with [6 mm|1/4"] layer of sand; screed to a uniform level. Lay one film layer of polyethylene film strip sheet over the sand; underbed on the sheet. Place reinforcing mesh; overlap joints at least [50 mm|2"].
- 3.3.3 Place underbed mixture and screed to the level required to allow for [16 mm|5/8"] depth of finished topping.
- 3.3.4 Set divider strips into the semi-plastic underbed straight and at the levels required. Trowel firmly along the edges of the strips to assure anchorage into the underbed.
- 3.3.5 Allow underbed to set firmly, at least overnight, before placing topping.
- 3.3.6 Use a mechanical mixer for mixing of topping.
- 3.3.7 With the mixer in operation, add topping material in the following order:
- .1 One-half total quantity of chips;
 - .2 Portland cement;
 - .3 Water;
 - .4 Remaining chips.
- 3.3.8 After all materials have been added to the mixer, continue mixing for at least 5 minutes.
- 3.3.9 Clean underbed of foreign matter, then saturate with clean water. Remove any free water prior to application of cement bond coat. Slush wet substrate with neat Portland cement grout and broom it into the underbed immediately before placing topping. Where colour pigments are required in the topping, provide uniform appearance throughout.
- 3.3.10 Place topping mixture in areas bounded by divider strips, flush with top of strips.
- 3.3.11 Sprinkle topping surface with additional chips to meet requirements of the sample. Trowel the sprinkled chips uniformly over the finish.
- 3.3.12 Roll the topping with heavy metal rollers until excess water is extracted and surface is covered with cement paste. Hand trowel to and even surface.
- 3.3.13 Provide patterns as per Drawings.
- 3.4 INSTALLATION - BASE
- 3.4.1 Clean scratch coat and saturate with water immediately before applying underbed.
- 3.4.2 Place underbed mixture and hand trowel to the specified base configuration at the level required to allow for the [10 mm|3/8"] depth of the finished topping.
- 3.4.3 Allow underbed to set firmly, at least 12 hours, before placing topping.
- 3.4.4 Finish bases with a cove of [40 mm|1-1/2"] radius at the junction of the floor and vase and finish the top as shown on the drawings.

- 3.4.5 Return cove at all openings.
- 3.4.6 Clean underbed of foreign matter, then saturate with clean water. Slush wet underbed with neat Portland cement grout and broom it into the underbed immediately before placing topping. Where colour pigments are required in to topping, provide uniform appearance throughout.
- 3.4.7 When topping begins to set, roll it with metal rollers, apply sufficient pressure to consolidate the mix, to extract excess water, and until the entire surfaces are covered with cement paste. Hand trowel to an even surface, plumb with the wall finish and level with the finish floor line.

3.5 INSTALLATION – DIVIDER STRIPS

- 3.5.1 Lay divider strips to separate the floor from the base and to divide the floor areas into panels. Where the spacing of the strips is not detailed, space the strips not exceeding [750 mm x 750 mm| 30" x 30"] in the corridor and vestibules and [900 mm x 900 mm|36" x 36"] in all other areas and to match existing.
- 3.5.2 Set cove base dividers in terrazzo to align with divider strips in the floor, where the base is [1500 mm|6'-0"] or more in length. Provide strip at the top and bottom of all bases unless otherwise detailed.
- 3.5.3 Except where otherwise shown or specified for special designs, orient divider strips in floors so that they are perpendicular and parallel to walls.
- 3.5.4 The pattern of strips shall be approved by the Consultant.
- 3.5.5 Set divider strips and cove base dividers into the underbed prior to the initial set with the top edge of the strips flush with the finished surface.
- 3.5.6 Provide control joints at, where corridors meet, where new terrazzo meets existing and at other location shown.

3.6 INSTALLATION- NON-SLIP TERRAZZO AND NON-SLIP INSERTS

- 3.6.1 Install non-slip terrazzo where indicated. Mix one part abrasive aggregate to three parts of marble and sprinkle over the surface of the terrazzo topping while it is still sufficiently plastic to receive and retain chips and sufficiently cured to support the weight of workmen walking on it without indentation. Apply the shake of a rake of [*kg\40lb] of abrasive aggregate to [12 kg/sq.m|100 sq. ft.] of floor, of abrasive aggregate in two passes, the second pass being a right angles to the first. Mechanically float, lightly roll and trowel shake into topping.
- 3.6.2 Apply masking tape around the edges of the slots to be filled. Mix grit in accordance with manufacturer's written instructions and just prior to placing, wet the recess by brushing in the solution. Work the mix into the slot and trim the surface slightly above the adjacent surface. Allow to set for 24 hours before removing tape.

3.6.3 Install non-slip inserts where detailed. Finish inset slightly above adjacent surface. Do not use stone infer than 80 grit.

3.7 INSTALLATION – FLOOR DRAINS

3.7.1 Wherever floor drains occur in the terrazzo floors, slope terrazzo towards drain so that water will not lie on the surface.

3.7.2 Check levels before commencing work and do not proceed unless drain levels are acceptable.

3.8 FINISHING

3.8.1 Grinding

- .1 Flood the grinding area with water during grinding.
- .2 Do not grind floors or bases until they have developed sufficient strength to prevent chips from pulling out.
- .3 For first grinding, use a 24 to 60 grit carborundum stone; follow immediately with a second grinding using an 80 to 120 grit stone.
- .4 After each grinding, thoroughly wash the surface with water and clean residue from holes and recesses. Remove excess water with vacuum or squeegee.

3.8.2 Grouting

- .1 After the second grinding, trowel patching grout onto the surface and work it into voids. Remove excess grout with trowel. Do no apply dry cement to wet terrazzo.
- .2 When patching grout begins to set, rub surface with burlap or excelsior pads to consolidate grout in voids and to remove excess.
- .3 Cover the entire surface with curing materials and allow to cure fully to protect surface from staining.
- .4 Finish surface with 120 grit or finisher stone and water generally, with 80 grit stone, when non-slip finish aggregate is used, not sooner than 3 days after grout was applied.

3.8.3 Cleaning and Sealing

- .1 Thoroughly clean terrazzo after final grinding with a solution of the neutral cleaner to remove dust and fine material; than rinse.
- .2 When the surface is dry, apply the sealer according to the manufacturer's recommendations.

3.8.4 Terrazzo work shall be free of cracks, discolouration and other defects.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- 1.1.1 Comply with Division 1, General Requirements and all documents referred to therein.
- 1.1.2 Provide all labour, materials, products, equipment and services to complete the painting and finishing work required and/or indicated on the Drawings and specified herein.
- 1.1.3 Provide surface preparation to receive painting and finishing specified under this Section of the work, in accordance with the the Master Painters Institute (MPI) Painting Specification Manual and as specified herein.
- 1.1.4 Examine the Specifications and Drawings for the work of other Sections regarding the provisions for prime and finish coats. Paint or finish all materials installed throughout the project which are required to be painted and which are left unfinished or unpainted by other Sections.
- 1.1.5 The only exception to the requirements of the preceding paragraph is where the drawings, Specifications, or Schedules state positively and explicitly that a surface is not to be finished.
- 1.1.6 For areas indicated as unfinished in the specifications, Finish Schedules, and Drawings, painting is not required, except for doors and frames, windows and frames, railings, steel stairs, insulation on mechanical equipment, pipes and fittings, and other items requiring protection including electrical panels.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- 1.2.1 Shop painting of structural, miscellaneous and ornamental metal.
- 1.2.2 Shop coating of hollow metal doors and frames: Section 08 11 00.
- 1.2.3 Colour code markings for identification of piping and ductwork: Division 15.

1.3 REFERENCES

- 1.3.1 ASTM D523-14 Standard Test Method for Specular Gloss.
- 1.3.2 CAN/CGSB 1.213-2004 Etch Primer (Pretreatment Coating or Tie Coat) for Steel and Aluminum.
- 1.3.3 CAN/CGSB 85.100-93 Painting.

1.4 QUALITY ASSURANCE

- 1.4.1 Arrange with the paint manufacturer's and Canadian Paint and Coatings Association (CPCA) representatives to visit the site prior to the commencement of the painting operation to discuss the painting and finishing procedures to be used and to analyse the surface conditions in order that alternative recommendations may be made to the

Consultant should advise if adverse conditions exist.

- 1.4.2 Arrange with the paint manufacturer and CPCA to visit the site at intervals during the surface preparation and painting operations to insure that the proper surface preparation has been completed, the specified paint products are being used, the proper number of coats are being applied and the agreed finishing procedures are being used, and that the paint manufacturer regularly submits written reports to the Consultant.

1.5 QUALIFICATIONS

- 1.5.1 Use only paint manufacturers and products as listed under the Approved Products section of the MPI Manual Architectural Painting Specification Manual.
- 1.5.2 Applicator shall have a minimum of ten (10) years proven satisfactory experience and shall maintain a qualified crew of painters throughout the duration of the work, who shall be qualified to fully satisfy the requirements of this specification. Only qualified journeymen (and apprentices) shall be engaged in painting and decorating work who have Tradesman Qualification certificate of proficiency.

1.6 SUBMITTALS

- 1.6.1 Submit 2 samples of every colour, in the required number of coats on 8"x 8" pieces of hardboard. Include specifications of materials, products and installation procedure used to obtain the finish. Resubmit samples until colours have been approved by the Consultant.
- 1.6.2 Colours shall match those specified in the Colour Schedule.
- 1.6.3 Retain samples at job site until completion of the work.
- 1.6.4 Two weeks after award of Contract submit to the Consultant a complete list of paint and finish materials to be used, showing the name of the manufacturer, the catalogue number, grade and quality of the materials proposed for use.
- 1.6.5 Materials and products delivered to the work shall comply with the approved list.

1.7 MOCK UP

- 1.7.1 A sample installation area located in the building will be designated by the Consultant.
- 1.7.2 Apply samples of finishes in the presence of the Consultant, Contractor and paint manufacturer. Apply samples with the correct material, number of coats, colour, texture and degree of gloss required. Refinish if required, until approval of the Consultant is obtained.
- 1.7.3 Leave sample installation undisturbed until completion of the Work. Approved sample installation shall serve as a standard for similar work throughout the Project. Work which does not match the approved finishes shall be corrected and refinished at no expense to the Owner.

1.8 PRODUCT DELIVERY, STORAGE AND HANDLING

- 1.8.1 Store materials in a single place. Keep storage clean and tidy.
- 1.8.2 Accept only paint and finishing materials and products delivered to the site in the manufacturer's unbroken, sealed containers, with manufacturer's label indicating type of paint, colour and instructions for reducing.
- 1.8.3 Store packaged materials undamaged in their original wrappings or containers with manufacturer's labels and seals intact.
- 1.8.4 Before commencement of work, remove electrical plates, surface hardware, canopies of lighting fixtures, and other escutcheons or appurtenances. Reinstall items in satisfactory condition when painting is completed. Do not clean hardware with solvents which will remove permanent lacquer finish.
- 1.8.5 Use sufficient drop cloth and protective coverings for the full protection of floors and surfaces not to be painted.
- 1.8.6 Protect materials and products from frost.
- 1.9 ENVIRONMENTAL REQUIREMENTS
 - 1.9.1 Atmosphere at the area of work shall be dust free.
 - 1.9.2 Temperatures, humidity, and moisture content of surfaces shall conform to the following:
 - .1 Temperatures; No painting shall be performed when temperatures on the surface, or the air in the vicinity of painting work are below 5°C. The minimum temperatures allowed for latex paints shall be 7°C. for interior work and 10°C for exterior work, unless specifically approved by the Consultant.
 - .2 Relative humidity shall not be higher than 85%.
 - .3 Moisture of surfaces shall be tested by an electronic Moisture Meter.
 - .4 Moisture content of wallboard shall not exceed 12%, of masonry, concrete or concrete block, 12% for solvent type paint.
 - .5 Masonry surfaces shall be tested for alkalinity.
 - .6 Maximum moisture content of wood; 15%.
 - 1.9.3 Masonry and concrete block must be installed at least 28 days prior to painting, with a moisture content not exceeding 12%, before painting commences. This is not to be construed as including a "wetting down" process for latex.
 - 1.9.4 Painting work shall not proceed unless a minimum of 15 candle power/sq ft lighting is provided on the surface to be painted.
 - 1.9.5 All areas where painting work is proceeding shall have adequate continuous ventilation and sufficient heating to maintain temperatures above 7°C. for 24 hours before and after paint application.
 - 1.9.6 Take all necessary precautions to prevent fire hazard and spontaneous combustion.
 - 1.9.7 Where toxic materials, and both toxic and explosive solvents are used, take appropriate

precautions and prohibit smoking.

1.10 INSPECTION AND WARRANTY

1.10.1 General contractor shall carry out inspections in accordance with the Canadian Painting Contractors' Architectural Painting Specification Manual and provide compliance.

1.10.2 Warrantee the work of this Section against faulty workmanship for a period of two (2) years from date of Substantial Completion.

1.10.3 Warrantee shall be in a form acceptable to the Consultant.

1.11 PROTECTION

1.11.1 Adequately protect other surfaces from paint and damage and make good any damage caused by failure to provide suitable protection.

1.11.2 Furnish sufficient drop cloths, shields and protective equipment to prevent spray or dropping from fouling surfaces not being painted and in particular, surfaces within storage and preparation area.

1.11.3 Cotton waste, cloths and material which may constitute a fire hazard shall be placed in closed metal containers and removed daily from the site.

1.11.4 Remove all electrical plates, surface hardware, fittings and fastenings, prior to painting operations. Carefully store, clean and replace these items on completion of work in each area. Do not use solvent that will remove the permanent lacquer to clean hardware.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Paint, varnish, stain, enamel, lacquer, fillers and other finishing materials shall comply with or exceed CAN/CGSB 85.100 for Premium Grade Work, highest grade, top line quality products of the specified manufacturers, and be of a type and brand herein specified and listed under "Paint Product Recommendations" as covered in the CPCA Painting Manual, for the specific purposes

2.1.2 Paints shall use a latex bonding agent.

2.1.3 Paint materials such as linseed oil, shellac, turpentine, etc., and any of the above materials not specifically mentioned herein but required for first class work shall be the highest quality of an approved manufacturer. All coating materials shall be compatible.

2.1.4 Paints, finishing and cleaning products shall be formulated with no petroleum based or other organic solvents (no V.O.C.'s) wherever possible.

2.1.5 The approval of the manufacturer of the painting and finishing materials will be based on his agreement to provide the supervision service herein before specified.

2.1.6 The following manufacturers are acceptable:

- .1 Benjamin Moore Paints
- .2 ICI Paints (Canada) Inc. (The Glidden Company/CIL)
- .3 Pratt and Lambert Inc.
- .4 PPG Canada Inc.
- .5 Sherwin-Williams Company of Canada Limited
- .6 Sico Inc.
- .7 Para Paints
- .8 Color Your World.

2.1.7 For Block Filler and Primers, equivalent of Benjamin Moore's Flat (K571) and Primer (K609) respectively or equivalent products from above listed manufactures.

2.1.8 The Consultant reserves the right to refuse any paint or finishing material if in his opinion it is not suitable or adequate for the use which it is proposed.

2.1.9 Exterior paints: Factory tinted to scheduled colours.

2.1.10 Interior galvanized metal primer: to comply with LEED VOC limit of 250g/L per Green Seal GC-03 Anti-Corrosive Paints.

2.1.11 Etch primer: Complying with CAN/CGSB 1.213.

2.2 MIXING

2.2.1 Paints shall be ready-mixed unless otherwise specified, except that any coating in paste or powder form, or to be field-catalysed shall be field-mixed in accordance with directions of its manufacturer. Pigments shall be fully ground and shall maintain a soft paste consistency in the vehicle during storage that can and shall be dispersed readily and uniformly by paddle to a complete homogeneous mixture.

2.2.2 Paint shall have good flowing and brushing properties and shall dry cure free of sags and runs etc. to yield the desired finish specified.

PART 3 - EXECUTION

3.1 INSPECTION

3.1.1 Examine the work upon which the work of this Section depends prior to commencement of work. If surfaces cannot be put in proper condition by customary cleaning, sanding and puttying, report any defects to the Consultant.

3.1.2 Failure to report defects will constitute acceptance of surfaces. Refinish the faulty work at no expense to the Owner.

3.1.3 Test all surfaces by an approved moisture testing device for moisture content before commencing work. Do not apply paint to substrates when the moisture content exceeds 12%.

3.2 PREPARATION

- 3.2.1 Refer to Canadian Painting Contractors' Architectural (CPCA) Painting Specification Manual for surface preparations.
- 3.2.2 Clean floors, adjacent surfaces and surfaces to be painted before work is commenced.
- 3.2.3 Cut out scratches, cracks and abrasions in wall surfaces and adjoining trim, as required, and fill with an approved non-shrink patching compound flush with adjoining surface. When dry, sand the patch smooth and seal before the application of the prime coat.
- 3.2.4 Fill nail holes, screw holes and other similar defects after the first coat of paint has been applied. The filler shall match the colour of the finish.
- 3.2.5 Surfaces to be finished shall be clean, free from machine, tool, or sanding marks, dust, grease, soil or other extraneous matter which could be detrimental to an acceptable finish.
- 3.2.6 Wood: Prepare in accordance with CAN/CGSB 85.100 Sand smooth, removing all tool marks, and dust clean. Apply one coat of aluminum primer to all knots and sap streaks, on wood if to be painted or one coat of white shellac if to be stained and varnished. Putty nail holes, cracks and defects only after the correct priming coat is dry. Fine sanding and dusting to be carried out between coats.
- 3.2.7 Gypsum board: Inspect to ensure properly filled joints, sand smooth. Remove contamination.
- 3.2.8 Concrete, Masonry: Surfaces shall be clean, free from all contamination. Scrape off all mortar nibs and cement spatter. Remove form oil by washing with Xylol. Remove efflorescence by brushing or washing with a dilute solution of muriatic acid - 1 part commercial muriatic acid to 20 parts water by volume - followed by complete rinsing with clean water. Remove mildew by the application of one part sodium hypochloride (Javex) to three parts water. If dirt is also in evidence, add 1/2 lb. trisodium phosphate to 1 gallon of the above solution. Scrub surface well and follow with a thorough clean water rinse.
- 3.2.9 Wash masonry surfaces which are to be painted with a solution consisting of 2.0 lb. of zinc sulphate to 1 gallon of water. Rinse with clean water and allow to dry thoroughly. Remove mortar spots and sharp edges with a scraper and ensure that patching is done where required.
- 3.2.10 Mildew removal: Scrub with solution of T.S.P. and bleach, rinse with clear water and allow surface to dry completely.

3.3 APPLICATION - GENERAL

- 3.3.1 Apply paint according to accepted trade method.
- 3.3.2 Apply each coat at proper consistency.

- 3.3.3 Sand lightly between coats to provide anchor for successive coat.
- 3.3.4 Do not apply finishes on surfaces that are not sufficiently dry. Each coat of finish shall be dry and hard before next coat is applied unless manufacturer's directions state otherwise. (Refer to polyurethane coatings).
- 3.3.5 Tint filler to match wood when clear finishes are specified. Work filler well into grain and before it has set wipe excess from surface.
- 3.3.6 On exterior work do not paint during temperatures under 5°C, or immediately following rain, frost or dew. On interior work do not paint during temperatures under 5°C, or on surfaces where condensation has formed or is likely to form (unless specifically formulated paints are used). Minimum temperatures allowed for latex paints shall be 7°C for interior work and 10°C for exterior work.
- 3.4 **FIELD QUALITY CONTROL**
 - 3.4.1 Use pink litmus paper for testing surfaces for alkalinity. Where extreme alkali conditions occur, neutralize surface by washing. Wash shall consist of a 4% solution of Zinc Sulphate. Does not apply to surfaces to receive latex paints.
- 3.5 **APPLICATION - PRIMERS**
 - 3.5.1 Apply one coat of primer to exposed ferrous metal surfaces including structural steel, mechanical and electrical equipment, piping, ducts and conduit that have not received a shop coat of primer.
 - 3.5.2 Touch up primed metal work after loose paint and scale have been removed.
 - 3.5.3 Thoroughly clean galvanized steel, including piping and ductwork of oil and grease with mineral spirits, treat with an approved chemical phosphoric metal etch and allow to dry, unless galvanized metal primer is to be used.
 - 3.5.4 Wash masonry surfaces which are to be painted, with a solution consisting of 2.0 lb. of zinc sulphate to 1 gal. of water. Rinse with clean water and allow to dry thoroughly. Remove mortar spots and sharp edges with a scraper and ensure that patching is done where required. Prime masonry block surfaces with primer/block filler to fill all pores including pin holes.
 - 3.5.5 Apply primer to piping having bituminous covering which is compatible with finish paint which will prevent bitumen bleeding through finish.
 - 3.5.6 Apply sealer and prime coat on walls to receive mirrors before installation of mirrors.
 - 3.5.7 When the primer-sealer coat is dry, touch up all visible suction spots before the first finish coat is applied and do not proceed with the work until all suction spots are sealed.
 - 3.5.8 Minimal cracks, holes and imperfections appearing after application of prime coat shall be filled, patched and smoothed to match adjoining surface by Section providing the

surface being painted.

3.6 APPLICATION - FINISH COATS

3.6.1 Mix materials thoroughly before application, apply evenly under adequate illumination and free from sags, runs, crawls and other defects. Do cutting in neatly.

3.6.2 Apply finish coats of the proper consistency as received from the container, and brush well showing a minimum of brush marks.

3.6.3 Sand semi-gloss, medium and high gloss lightly between coats.

3.6.4 Gloss terms shall have the following values when tested in accordance with ASTM D523 "Test for Specular Gloss":

.1	Gloss Term Gloss Value Pittsburgh
.2	Flat 5 to 20 Less than 15
.3	Eggshell 20 to 40 5 to 20
.4	Lo-Lustre 15 to 25
.5	Satin 15 to 35
.6	Semi-gloss 40 to 60 30 to 65
.7	Gloss, medium 60 to 80 over 65
.8	Gloss, High 80 to 90

3.6.5 Finish walls in eggshell, ceilings in flat and frames in semi-gloss, unless noted otherwise.

3.6.6 Apply coats only when the previous coat of paint, varnish or enamel is perfectly dry. Each finish coat shall be a tint lighter than the following. Only the last coat shall match the accepted samples.

3.6.7 Finish tops, bottoms and edges of doors in the same manner as the remainder of the door.

3.6.8 Finish the work uniformly as to sheen, gloss, colour and texture.

3.6.9 Apply materials in accordance with the directions and instructions of the manufacturers of the various materials. Do not use adulterants.

3.6.10 Finish closets and the interior of cabinets the same as adjoining surfaces of rooms, unless otherwise specified. Finish all other surfaces the same as the nearest or adjoining surfaces unless otherwise specified or directed by the Consultant.

3.6.11 Spray painting may be used only with the approval of the Consultant.

3.6.12 Repaint the entire plane of areas showing incomplete coverage. Patching is prohibited.

3.6.13 Paint surfaces and items visible through convactor covers, grilles, heating cabinets, louvres and soffits with two coats black matte paint.

3.6.14 Do not paint over fire rating labels on doors and frames and over identification labels on

mechanical and electrical equipment.

- 3.6.15 Paint reveals the same colour as the surface in which it occurs, unless otherwise indicated.
- 3.6.16 All interior metalwork which is exposed in the completed work, in rooms which are shown on the "Room Finish Schedules" to have a finish on the walls or ceiling shall receive two coats of interior paint over the prime coat. Painting shall include without being limited to, all structural steel, mechanical and electrical equipment, ductwork, and piping.
- 3.6.17 All interior metalwork in unfinished areas shall receive one coat of interior paint over the prime coat. Painting shall include without being limited to structural steel, steel ladders, mechanical and electrical equipment, piping and ductwork.
- 3.6.18 The following generally, will be painted in colour, texture and sheen to match adjacent surfaces:
- .1 Access doors
 - .2 Registers
 - .3 Radiators and covers
 - .4 Prime coated butts
 - .5 Prime painted door closers
 - .6 Exposed piping.

3.7 APPLICATION - EXISTING SURFACES

- 3.7.1 Paint or repaint all existing surfaces of rooms where noted on the "Room Finish Schedule" including "new" work which has been incorporated into the existing work and existing work which has been damaged, altered, or otherwise disturbed during renovation operations.
- 3.7.2 Repaint surfaces or rooms adjacent to rooms where alterations or renovations have been carried out and which have been damaged or otherwise disturbed by the alterations or renovations. Where such damage occurs, repaint completely.
- 3.7.3 Remove from existing surfaces to be coated all rust, scale, oil, grease, mildew, chemicals, and other foreign matter.
- 3.7.4 If coatings on existing surfaces have failed so as to affect the proper performance or appearance of coatings to be applied, or if such coatings can be easily scraped off, remove them and prepare their substrates properly. Dull hard or glossy surfaces by sanding, sandblasting, or by other abrasive methods prior to painting.
- 3.7.5 Repaint surfaces entirely between changes of plane which have been incorporated into the existing work and existing work which has been damaged, altered, or otherwise disturbed during renovation operations. Give existing surfaces two coats of paint or enamel over existing finish to match the previous finish.
- 3.7.6 Paint existing mechanical and electrical items exposed to view in areas indicated.

3.8 CLEANING

3.8.1 Promptly as the work proceeds and on completion of the work, remove all paint where spilled, splashed or spattered. During progress of the work keep premises free from unnecessary accumulation of tools, equipment, surplus materials and debris. At conclusion of the work leave premises neat and clean to the satisfaction of the Consultant, Paint Inspector and/or Owner.

3.9 INTERIOR FINISHES

3.9.1 Finish the various interior surfaces as follows, in addition to previously specified treatments, coatings or primers:

Concrete Block	1 coat masonry block filler and primer 2 coats eggshell latex
Galvanized Steel	1 coat galvanized metal primer or pretreatment 2 coats vinyl latex or epoxy of selected sheen
Gypsum Drywall	1 coat primer-sealer
Ceilings	2 coats flat vinyl-latex paint
Walls	2 coats eggshell latex paint
Steel, Miscellaneous	1 coat rust inhibiting primer 2 coats alkyd enamel of selected sheen
Shop Primed Steel	1 coat vinyl wash primer 2 coats alkyd paint of selected sheen
Piping, Conduit & Ductwork	1 coat metal primer 1 coat fire retardant and mildew resistant paint of selected sheen
Mechanical Equipment	2 coats gloss enamel
High heat areas	2 coats heat resistant paint
Insulation on pipes and ducts	1 coat fire retardant and latex sealer 2 coats latex paint of selected sheen
Metal Convectors & Heating Units	2 coats gloss enamel

3.10 EXTERIOR FINISHES

3.10.1 Finish the various exterior surfaces as follows:

Galvanized Steel	1 coat rust inhibiting metal primer 1 coats exterior epoxy or vinyl enamel of selected sheen
Shop Primed	1 coat vinyl wash primer

Steel 2 coats alkyd paint of selected sheen

Steel 1 coat rust inhibiting primer
2 coats exterior alkyd enamel

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- 1.1.1 Comply with Division 1, General Requirements and documents referred to therein.
- 1.1.2 Provide labour, materials, products, equipment and services to supply and install chalkboards, whiteboards and tackboards.
- 1.1.3 Provide labour, materials, products, equipment and services to supply and install decorative plastic control panels, complete with aluminum trim.

1.2 REFERENCES

- 1.2.1 ANSI/NEMA LD 3-2005 High-Pressure Decorative Laminates.

1.3 QUALIFICATIONS

- 1.3.1 Engage an experienced installer who is an authorized representative of visual display board manufacturer for both installation and maintenance of the type of products required for this Project.

1.4 SUBMITTALS

- 1.4.1 Provide shop drawings as specified in Section 01 30 00, Submittals, clearly indicating the material being supplied and showing all connections, attachments, reinforcing, anchorage and location of exposed fastenings.
- 1.4.2 Provide necessary instructions where fastenings or anchors have to be built in by others.
- 1.4.3 Product Data: Submit product data for each type of visual display board indicated.
- 1.4.4 Samples for Initial Selection: Provide Manufacturer's colour charts showing the full range of colours and textures for initial selection of materials for the following: Chalkboards and Marker Boards: Actual sections of porcelain enamel finish for each type of chalkboard and marker board required.

1.5 SITE CONDITIONS

- 1.5.1 Verify field measurements before preparation of shop drawings and before fabrication to ensure proper fitting and as follows:
 - .1 Coordinate fabrication schedule with construction progress to avoid delaying the Work;
 - .2 Allow for trimming and fitting where taking field measurements before fabrication might delay the Work.
- 1.5.2 Establish dimensions and proceed with fabricating visual display surfaces without field measurements where field measurements cannot be made without delaying the work,

coordinate wall construction to ensure actual dimensions correspond to established dimensions.

1.6 WARRANTY

1.6.1 Provide manufacturers written guarantee, signed and issued in the name of Owner, to replace the following items for defective material and workmanship for the time stated from date of Substantial Performance:

- .1 Framing, Panels and hardware: Failure of performance requirements specified in Contract Documents; 1 year.

1.7 PROTECTION

1.7.1 After installation, chalkboards and tackboards shall be suitably protected and handed over free of scratches and in first class condition.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.1.1 Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- .1 Architectural School Products Ltd.
- .2 Claridge Products and Equipment Inc.
- .3 C.P. Distributors Ltd.
- .4 Crestway Systems Ltd.
- .5 Egan Visual Inc.
- .6 Malem Architectural Specialties Ltd.
- .7 Shanahan's Ltd.
- .8 Moyer Vico Corporation
- .9 Clark Porcelain

2.2 MATERIALS AND PRODUCTS

2.2.1 Aluminum: Extruded Alcan 6063 alloy, T5 temper aluminum.

2.2.2 Trim for chalkboards, whiteboards, control panels and tackboards shall be extruded aluminum, Classic 400 Series by Architectural School Products Ltd., Moyer Vico Corporation or Clarke Porcelain Company, having a clear anodized finish on all exposed surfaces.

2.3 CHALKBOARDS

2.3.1 Three-coat ceramic porcelain on 18 ga. enamelled steel. Porcelain in accordance with P.E.I. Standards. Core shall be 7/16" thick, exterior grade plywood. Backing, of zinc coated steel or aluminium sheet. Colour to be selected by Consultant from manufacturer's standard colour range.

2.3.2 Provide projecting type chalk tray at chalkboards and map rail with integral core insert.

2.4 WHITEBOARDS

2.4.1 Felt marker boards shall be Rite-On Wipe-Off, white porcelain enamel finish on 22 ga. steel bonded to 7/16", thick approved core and 0.018" thick steel back panel. Whiteboards shall be specially finished to permit use of dry marker pens.

2.4.2 Whiteboards shall be provided with tray.

2.5 TACKBOARDS

2.5.1 Tackboards: prelaminated ½" total thickness; 1/4" thick, Composite Fine Cork available from Ontario Cork, ASP natural cork, on 1/4" particle board backing.

2.5.2 Linoleum Faced Tackboards: Balanced, high pressure laminated, linoleum tackboards of 3 ply construction consisting of face sheet, core material, and backing.

.1 Face Sheet: 6 mm thick resilient linoleum tackable surface composed of granulated cork, linseed oil, rosin binders and calendared onto a jute backing with a coloured facing.

.1 Acceptable materials: Forbo Bulletin Board.

2.5.3 Tackboards shall be free of joints in length x 4'-0" high, unless otherwise shown.

2.6 CONTROL PANELS

2.6.1 Control Panels: High pressure decorative laminate, thermally fused to 3/8" thick plywood backing.

2.6.2 High pressure decorative laminate: Complying with ANSI/NEMA LD 3, VGL Grade.

2.6.3 Refer to Drawings for sizes and provide openings to accommodate electrical equipment as shown.

2.7 SLIDING UNITS

2.7.1 Horizontal Sliding Display Board Panels:

.1 Fabricate panels from manufacturer's standard components, with the exception that movable panels require a backing sheet; use any one of the following backing materials to the manufacturer's standard:

.1 0.38 mm thick, aluminum sheet backing.

.2 0.127 mm thick, aluminum foil sheet backing.

.3 0.45 mm thick, galvanized steel sheet backing.

.2 Provide panels required that operate smoothly under manual activation without vibration or chatter using manufacturer's standard horizontal sliding hardware consisting of overhead extruded-aluminum track with nylon ball-bearing rollers and channel-shaped bottom guides.

2.8 FABRICATION

- 2.8.1 Chalkboard, whiteboards, control panels and tackboards shall be complete with extruded clear anodized aluminum frames.
- 2.8.2 Fabricate the work true to dimensions, square, plumb and level. Accurately fit members with hairline joints. Secure intersecting members with adequate fastenings.
- 2.8.3 Shop fabricated display boards in one piece for lengths 3600 mm or less, for longer sections colour match adjacent pieces.
- 2.8.4 Apply pre-finished trim in continuous horizontal and vertical lengths, cut and mitred at corners where indicated on the Drawings.
- 2.8.5 Fabricate the finished work free from distortion and defects detrimental to appearance and performance.

PART 3 - EXECUTION

3.1 EXAMINATION

- 3.1.1 Inspect Work and conditions affecting the Work of this Section. Proceed only after deficiencies, if any, have been corrected.
- 3.1.2 Ensure that all anchors and setting or installing components provided by this Section for installation are properly located and installed.

3.2 INSTALLATION

- 3.2.1 Examine surfaces to receive the work of this Section and proceed only if conditions are satisfactory.
- 3.2.2 Verify all dimensions on the site before preparing drawings or proceeding with shop work. Shop assemble and deliver to the project site in the largest practicable sections.
- 3.2.3 Install the work true to dimensions, square, plumb and level. Accurately secure joints and intersecting members with adequate fastening.
- 3.2.4 Install the finished work free from distortion and defects detrimental to appearance and performance. Provide all components required for anchorage.

3.3 CLEANING

- 3.3.1 At completion and continuously as Work proceeds, remove all surplus materials, debris and scrap.
- 3.3.2 At completion of Work, remove all protective surface covering film and wrappings. Clean all frames and hard surfaces using mild soap or other cleaning agent approved by manufacturer.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- 1.1.1 Comply with Division 1, General Requirements and all documents referred to therein.
- 1.1.2 Provide all labour, materials, products, equipment and services to supply and install washroom accessories required as shown on the Drawings and as specified herein.

1.2 REFERENCE STANDARDS

- 1.2.1 ASTM A167-99(2009) Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip (Withdrawn 2014).
- 1.2.2 ASTM A653/A653M-15 (Galvanized) Standard Specification for Steel Sheet, Zinc-Coated or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- 1.2.3 ASTM B117-11 Apparatus. Standard Practice for Operating Salt Spray (Fog)
- 1.2.4 CAN/CGSB 12.5-M86 Mirrors, Silvered.
- 1.2.5 CSA W55.3-08(R2013) Certification of Companies for Resistance Welding of Steel and Aluminum.

1.3 SUBMITTALS

- 1.3.1 Submit shop drawings, clearly indicating accessory materials, products and finishes and showing in large scale detail the construction, reinforcing, anchorage and location of exposed fastenings, where permitted. Submit a prototype of each accessory for review before delivery to the site.
- 1.3.2 Submit necessary templates and instructions where recesses, openings, fastenings or anchors have to be built in by others.
- 1.3.3 Submit three copies of list of accessories requiring supplies together with names and addresses of local distributors of the supplies.

1.4 DELIVERY AND STORAGE

- 1.4.1 Carefully wrap accessories ensuring protection during shipping and storage.
- 1.4.2 Store accessories inside the building in location directed, and so that their identification is readily visible, and in the general order in which they will be required for installation.
- 1.4.3 Adequately protect the structure and work of other Sections during delivery, storage, handling and execution of the work of the Section.

- 1.4.4 Provide tools, plant and other equipment required for the proper execution of the work of this Section.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- 2.1.1 The following manufacturers may be used for Base Bid:

- .1 Bobrick Washroom Equipment of Canada
- .2 American Standard
- .3 Comac Corporation Inc
- .4 Flexo Products Ltd
- .5 Saferail Products Inc.
- .6 Bobrick Washroom Equipment of Canada

- 2.1.2 Manufacturer's standard products shall be modified to comply with these Specifications unless otherwise stated with bid submission for work of this Section.

- 2.1.3 Washroom accessories shall be as specified in this Section, and shall be of one manufacturer except as otherwise specified or approved. Washroom accessories of the same materials, construction and finishes, and similar in function, design and appearance to those specified of other manufacturers will be considered, in accordance with the requirements of the Contract Documents for proposing substitutions.

2.2 MATERIALS

- 2.2.1 Stainless steel: ASTM A167 Type 304 or Type 316, of one type throughout.
- 2.2.2 Galvanized steel sheet: ASTM A653/A653M, commercial quality sheets, plain commercial galvanized or electro-galvanized.

2.3 FABRICATION

- 2.3.1 Fabricate accessories true, square, rigid, free from distortion and from defects detrimental to appearance and performance.
- 2.3.2 Visible joints, where permitted, shall be straight, accurate, hairline butt joints. Corner joints shall be mitred.
- 2.3.3 Assemble sheet metal accessories by welding in accordance with CSA W55.3. Conceal welds, or grind smooth such as to be invisible in completed work.
- 2.3.4 Except as otherwise specified, assemble fastenings, hardware fixings, and mounting or installation devices shall be concealed in the finished work.
- 2.3.5 Provide fasteners for mounting accessories. Fasteners shall be of non-corrosive, expansion type metal, toggle type or other approved type of positive, mechanical anchor as required to suit the construction to which the accessory is to be mounted. Exposed

fasteners, where permitted, shall be finished to match adjacent accessory surface, and shall be countersunk. Where accessories are mounted to sheet metal, provide 1/8" thick minimum full size metal back plate drilled and tapped to receive machine screws and finished to match the adjacent sheet metal surface.

- 2.3.6 Unless otherwise specified, hinges shall be concealed stainless steel piano hinges and shall extend full length of hinged element. Hinged elements shall have concealed, mechanically retained, rubber bumpers for silent closing, and shall close flush with faces of fronts or frames.
- 2.3.7 Unless otherwise specified, portions of sheet metal accessory items which are visible in the completed work shall be stainless steel. Changes in plane shall be formed or continuously welded and ground smooth.
- 2.3.8 Sheet metal accessory parts concealed in the finished installation shall be electro galvanized sheet metal.
- 2.3.9 Accessories for flange type mounting shall have forged brass, full flanges drilled and countersunk for three mounting fasteners. Fix flanges to tubes using solid silver soldering.
- 2.3.10 Accessory lettering shall be silk screened with durable paint to withstand wear, or shall be engraved. Size, location and typeface of lettering shall selected by Consultant. Edges of letters shall be straight and sharp.
- 2.3.11 Washroom and Custodial Accessories:
 - .1 Surface Mounted:
 - .1 Fabricate units with tight seams and joints, and exposed edges rolled.
 - .2 Hang doors and access panels with continuous stainless steel hinge.
 - .3 Provide concealed anchorage where possible.
 - .2 Recessed Mounted:
 - .1 Fabricate units of all welded construction, without mitred corners.
 - .2 Hang doors and access panels with full length, stainless steel hinge.
 - .3 Provide anchorage that is fully concealed when unit is closed.
 - .3 Workmanship shall be best grade of modern shop practice known to recognized manufacturers specializing in this work. Joints and intersecting members shall be accurately fitted, made in true planes with adequate fastening. Wherever possible fastenings shall be concealed.
 - .4 Isolate where necessary to prevent electrolysis between dissimilar metal to metal or metal to masonry or concrete contact.
 - .5 Keys: Provide universal keys for internal access to accessories for servicing and re-supplying. Provide minimum of six (6) keys to Owner's representative.

2.4 FINISHES

- 2.4.1 Finish stainless steel to a standard No. 4 mechanical finish. Where possible, arrange sheet stainless steel so that the grain of the finish runs vertically in the finished installation. Where accessories consist of stainless steel and brass, finish all visible

surfaces to match a No. 4 stainless steel finish including etching, nickel strike, chromium plating and mechanical finishing.

- 2.4.2 Finish metal surfaces for paint finish visible in the completed installation with a comprehensive pre-treatment including mechanical removal of imperfections, buffing, degreasing, non etch chemical cleaning and 2 baked on coats of thermo setting acrylic enamel. Colour and gloss of enamel finish as designated by the Consultant.

2.5 WASHROOM AND CUSTODIAL ACCESSORY SCHEDULE

No.	Description / Model
CH	Coat Hooks: Satin finished stainless steel, square profiled robe hook with concealed mounting, provide 1 for each washroom, located as directed by Consultant:
ND	Feminine Napkin Dispenser: Surface mounted, equipped for two (2) coin operation, napkin and tampon dispenser, stainless steel construction, handicap accessible: ASI 0464 Frost 608-3
SND	Sanitary Napkin Disposal Unit: Flexo Products Ltd Mounted Napkin Disposals – white R0166
GB1	Grab Bar: Horizontal 1.214mm (0.048") thickness; 610mm (24") long x 38mm (1-1/2") Ø, straight, stainless steel, slip resistant grip, concealed mounting, cap secured with vandal resistant set screws: Bobrick B-6206 Series
GB.L	L Shape Grab Bar: Side "L"-shape grab bar, 760mm (30") long x 760mm (30") high 38mm (1-1/2") dia., stainless steel, slip resistant grip, concealed mounting, cap secured with vandal resistant set screws: Frost 1003 Bobrick B-5898.99
MR	Mirror (Flat): Framed, size as shown on drawings, fixed installation, mounted 1000mm (40") to bottom of frame. 610mm wide , 1000mm high and 6mm thick mirror (with 10 years warranty, heavy gauge galvanised steel back, stainless steel channel frame, tamperproof mounting : Bobrick B-290
TPD	Toilet Paper Dispenser Frost Products Ltd 159 – Roll Toilet Tissue Dispenser

TPD1	Paper Towel Dispenser: Frost Products Ltd 101 Universal Towel Dispenser
MS	Metal Shelf (Barrier-Free WC): 405mm(L) x 100mm(w), 18 Gauge, type 304 stainless steel, satin finish, 19mm return edge, hemmed front edge, 16-gauge supporting brackets.
SD	Soap Dispenser: GOJO Industries Inc Purell FMX-20 Dispenser
SC	Shower Curtain: Opaque, matte white vinyl, 0.2mm (.008") thick, containing antibacterial and flame retardant agents. Complete with grommets every 150mm (6"), and hemmed top, bottom and sides. ASI 1200-V Bobrick 204-2
SCH	Shower Curtain Hook: Fabricated of type 304 stainless steel alloy 18-8, solid formed wire 2.5mm (0.98") in diameter. Hook shall accommodate 25mm to 32mm (1" to 1-1/4") diameter curtain rods. ASI 1200-SHU Bobrick 204-1
SCR	Shower Curtain Rod: Extra-heavy duty rod, 32mm (1-1/4") diameter fabricated of alloy 18-8 stainless steel, type 304, 18 gauge. Flanges fabricated from 20 gauge stainless steel. Satin Finish. Length: As determined on the Drawings. ASI 1204 Bobrick B-6047
C.SH	Convenience shelf: 610mm long, 125mm wide, 18-gauge type 304 stainless steel, satin finish. 19mm return edge, hemmed front edge, 16-gauge supporting brackets. ASI 0692-524 or 0694-24 Bobrick B-295 x 24
TOW	Towel bar: 610mm long 19mm diameter round bar, 13mm x 25mm shelf posts, 18-gauge type 304 stainless steel, satin finish. Concealed mounting plate with set screw to secure towel bar brackets. ASI 7355-24S Bradley 9065 Satin Finish
SD1	Soap dish: Drawn, one piece soap dish welded to support arm and flange, constructed of type 304 stainless steel, with two drain holes and concealed mounting to wall. Satin finish. ASI 7320-S Bobrick B-6807

SS	Wall-mounted folding shower seat: Frame and mounting brackets constructed of type 304 stainless steel with self-locking mechanism. Bench top constructed of solid phenolic panel, with drainage slots. Bench to support up to 163 kg, 840mm wide and 560mm deep. ASI 8206 Bobrick B-5181
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PART 3 – EXECUTION

3.1 EXAMINATION

3.1.1 Inspect surfaces over which the work of this Section is dependent for any irregularities detrimental to the application and performance of the work. Notify Consultant in writing of all conditions which are at variance with those in the Contract Documents and/or detrimental to the proper and timely installation of the work of this Section. The decision regarding corrective measures shall be obtained from the Consultant prior to proceeding with the affected work.

3.1.2 Commencement of work of this Section implies acceptance of surfaces and conditions.

3.2 INSTALLATION

3.2.1 Securely fasten accessories, level and plumb in the locations shown on the Drawings, specified herein and as further directed by the Consultant on the site.

3.2.2 Co-ordinate installation with Work of trades providing adjacent construction as required to achieve reveals or other edge conditions shown on Drawings. Install fully recessed frameless accessories so that their front face is flush with finished wall surface.

3.2.3 Perform drilling of steel, masonry and concrete necessary to install work of this Section.

3.2.4 Insulate accessory surfaces to prevent electrolytic action due to contact with masonry, concrete or dissimilar metal surfaces. Use bituminous paint, building paper or other approved means.

3.3 INSTALLATION – MIRRORS

3.3.1 Do not install mirrors until back up wall has been thoroughly sealed and primed.

3.3.2 Install hand dryers in accordance with manufacturer's recommendations.

3.4 ADJUSTMENT

3.4.1 Upon completion of the work or when directed, remove all traces of protective coatings or paper.

3.4.2 Test mechanisms, hinges, locks and latches and where necessary, adjust and lubricate and ensure accessories are in perfect working order.

3.4.3 Load accessories with initial charge of supplies and leave ready for use.

3.5 CLEANING

3.5.1 Clean and make good surfaces soiled or otherwise damaged in connection with the work of this Section. Pay the cost of replacing finishes or materials that cannot be satisfactorily cleaned.

3.5.2 Upon completion of the Work, remove all debris, equipment and excess materials resulting from the work of this Section from the site.

END OF SECTION

PART 1. GENERAL

1.1 WORK INCLUDED

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

1.1.2 Provide all labour, materials, products, equipment and services to complete.

1.2 RELATED WORK SPECIFIED ELSEWHERE

1.2.1 Electrical systems and components: Division 26 - Electrical

1.3 SUBMITTALS

1.3.1 Submit construction details, dimensions, anchoring and mounting requirements, material and finish descriptions, and electrical requirements.

1.3.2 Submit three copies of and operation and maintenance manual at the completion of the work.

1.3.3 Provide a copy of the manufacturer's standard warranty for parts and labour.

1.4 QUALITY ASSURANCE

1.4.1 Product Certification: ETL listed in accordance with UL 507. National Sanitation Foundation (NSF) Protocol P335 "Hygienic Commercial Hand Dryers" compliant.

1.5 HANDLING, DELIVERY AND STORAGE

1.5.1 Deliver, store, and handle electric hand dryers in manufacturer's protective packaging.

1.5.2 Store electric hand dryers off of ground, under cover, and in a dry location. Handle according to manufacturer's written recommendations to prevent damage, deterioration, or soiling.

1.6 COORDINATION

1.6.1 Coordinate locations of electric hand dryers with other work to prevent interference with clearances required for access, and for proper installation, adjustment, operation, cleaning, and servicing of electric hand dryers.

1.7 WARRANTY

1.7.1 Manufacturer's Standard Warranty: Manufacturer's standard form in which manufacturer agrees to repair, restore, or replace defective electric hand dryer components and labor within specified warranty period. Warranty Period: One (1) year limited for labor and five (5) years for parts.

PART 2. - PRODUCTS

2.1 MANUFACTURERS

- 2.1.1 Basis-of-Design Product: The design for electric hand dryers is based on:
Smart Dry – touch free – World Dryer (Color shall be selected from the full color range).

PART 3. - EXECUTION

3.1 EXAMINATION

- 3.1.1 Verify availability and characteristics of electrical power. Drill minimum two (2) inch diameter holes for electrical service entrance through backplate.
- 3.1.2 Do not begin installation until substrates are complete and ready for installation of electric hand dryers.

3.2 INSTALLATION

- 3.2.1 Locate and install mounting bracket in accordance with manufacturer's written instructions. Use minimum 0.25-inch anchors to mount bracket. Mount electric hand dryer at height above finished floor recommended by manufacturer.
- 3.2.2 Install electric hand dryer in accordance with manufacturer's written instructions, using fasteners appropriate to substrate indicated and recommended by manufacturer. Install electric hand dryers level, plumb, and firmly anchored in locations and at heights indicated.

3.3 CLEANING AND PROTECTION

- 3.3.1 Adjust electric hand dryers for smooth operation. Replace damaged or defective components.
- 3.3.2 Remove protective coverings from finished surfaces.
- 3.3.3 Clean exposed surfaces using materials and methods recommended by manufacturer.

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- 1.1.1 Comply with Division 1, General Requirements and all documents referred to therein.
- 1.1.2 Provide all labour, materials, equipment and services to supply and install manufactured specialties as shown on the Drawings and as specific herein.

1.2 REFERENCES

- 1.2.1 CSA W47.1-09(2014) Certification of Companies for Fusion Welding of Steel.
- 1.2.2 CSA W47.2-11 Aluminum, Certification of Companies for Fusion Welding of Includes Update No. 1 (2011), Update No. 2 (2012).
- 1.2.3 CSA W59-13 Update Welded Steel Construction (Metal Arc Welding), Includes No. 1 (2014), Update No. 3 (2015), Update No. 4 (2015).

1.3 SUBMITTALS

- 1.3.1 Submit shop drawings clearly indicating dimensions, the material being supplied and all connections, attachments, reinforcing, anchorage, hardware and location of exposed fastenings.
- 1.3.2 Maintenance data: Three copies of instructions covering cleaning, replacement and other relevant maintenance data.
- 1.3.3 Submit necessary templates and instructions where supports or anchors have to be built in by others.

PART 2 - PRODUCTS

2.1 FABRICATION - GENERAL

- 2.1.1 Fabricate work true to dimensions and square. Finished work shall be free from distortion and defects detrimental to appearance and performance.
- 2.1.2 Welding shall comply with CSA W59, and be done by a fabricator fully approved by the Canadian Welding Bureau under the requirements of CSA W47.1, and CSA W47.2, as applicable. File or grind exposed welds smooth and flush. Do not leave grinding marks.

2.2 ACCESS DOORS

- 2.2.1 Provide for installation under Sections 04 20 00 and 09 25 00 access doors as located on the Mechanical Drawings.

- 2.2.2 Access doors shall be 2.5mm (12 ga.) prime coat painted steel, flush access door with heavy frame and anchors, heavy duty rust resistant concealed hinges, positive locking screwdriver lock; mounting and finishing provisions to suit the construction in which it is installed. Basis of Design Product: UF-5000 Ceiling and Wall Access Doors by Acudor Products Limited, or other approved manufacture.
- 2.2.3 Recessed access doors: 1.6MM (16 ga.) steel door recess 10mm (5/8") to accommodate gypsum board, in 2.5mm (12 ga.) steel frame. Basis of Design Product: DW-5015 Access Doors by Acudor Products Limited, or other approved manufacture.
- 2.2.4 Access doors in fire rated construction shall be U.L.C. listed, rated, and labelled to maintain the fire separation of the construction.
- 2.3 CORNER GUARDS
- 2.3.1 Provide C/S Acrovyn flush mounted corner guards, model SFS-20 as manufactured by Construction Specialties Inc., or other approved manufacture.
- 2.3.2 Acrovyn cover shall be high-impact vinyl acrylic with matte finish pebblette finish. Colour as selected by Consultant from manufacturer's standard colours. Colours shall be integral through the depth of the material.
- 2.3.3 Cover shall have a minimal wall thickness of 2mm (.078"), and shall securely snap over retainer.
- 2.4 CLOTHES HOOKS
- 2.4.1 Supply and install vandal-resistant clothes hooks in Barrier Free Washroom and elsewhere as shown.
- 2.4.2 Hooks shall be epoxy coated 18 ga. stainless steel. GSH 343 coat hook shall only support weight of coat or jacket, heavier objects shall slip off. Coat hook shall not support loads in excess of 11 kilograms (25 lbs), 2 hooks per section.
- 2.4.3 Coat hooks shall be as supplied by Architectural School Products Ltd., or other approved manufacturer.
- 2.5 METAL BRACKETS
- 2.5.1 Supply and install metal brackets as indicated in millwork drawing.
- 2.5.2 Powder coated 25 mm (1") OD x 12 mm (.049") wall thickness steel tubes, in length to match rack, with form fitting black plastic caps.
- .1 Shelf consisting of four 19 mm (3/4") OD square (18 ga.) powder coated heavy duty cast tubes and protected with form fitting black plastic end caps.

- .2 Two-piece heavy-duty cast brackets, with integral backplates that provide positive grip fastening. All screw fastenings shall colour match bracket finish.
 - .3 Mounting shall be heavy duty dovetail, engineered for a slide fitting vertical adjustment of one full shelf and a length of 330 mm (13"). Spacing as appropriate for structural stability but not to exceed 1016 mm (40"). Coat hooks at the overhead shelves in changing rooms shall be placed as indicated in millwork drawing.
 - .4 Finish, shelf tubes, brackets, and dovetails in high performance electrostatically applied powder coating, baked on to provide uniform, smooth protective finish. Colour as selected by Consultant from manufacturer's standard colour range.
- 2.5.3 Coat racks shall be of Model No.STL 1001 as supplied by Architectural School Products Ltd., or other approved manufacturer.

PART 3 - EXECUTION**3.1 INSTALLATION**

- 3.1.1 Securely fasten miscellaneous specialties, level and plumb in the locations shown on the drawings and as specified herein.
- 3.1.2 Co-ordinate installation with work of trades providing adjacent construction as required.

3.2 ADJUSTMENT

- 3.2.1 Upon completion of the work or when directed, remove all traces of protective coatings or paper.
- 3.2.2 Test operation, hinges, and latches and where necessary, adjust and lubricate and ensure that accessories are in perfect working order.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS:

1.1.2 This section specifies, rough grading, fine grading & finish grading.

1.1.3 All depths of materials indicated on the drawings and in these specifications refer to minimum required depth of materials, after compacting.

1.2 REFERENCES

1.2.2 OPSS 1010 Material Specification for Aggregates-base, Subbase, Select Subgrade, and Backfill Material.

1.2.3 OPSS 1004 Material Specification for Aggregates-Miscellaneous.

1.3 TESTS AND INSPECTIONS:

1.3.2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit in a timely fashion and in an organized and orderly manner as to not cause delay in the Work. Testing to be at the Contractors expense.

1.4 PROTECTION:

1.4.2 Protect site features required to remain undisturbed; man-made and natural.

1.4.3 Protect existing trees to satisfaction of municipality.

1.4.4 Protect buried services that are required to remain undisturbed.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Designation OPSS refers to Ontario Provincial Standard Specifications.

2.2.1 Granular A to OPSS 1010 & TS 1010 and TS 1010

2.2.2 Sand to OPSS 1004 (may be referred to as Concrete Sand) unless specified to be Hutcheson Sand of which the contractor must follow manufacturers recommendations and CSA Z614 Table D.1

2.2.3 Durolawn Base Recipe: 70% ¾"-1 ½" Crushed Clear Stone, 25% Clay Loam (consisting of: gravel <5%, sand 25-30%, silt 20-40%, clay 25-40%), 5% Organic Mater

2.2.4 Limestone Screenings may not be washed and must consist of fines.

2.2.5 Engineered Wood Fibre to conform to manufacturers installation procedures and CSA Z614 Table D.1

- 2.2.6 Shredded Cedar Mulch to be red or white cedar shredded in strands with no chips larger than 50mm
- 2.2.7 Topsoil to be approx 50% sand with silt clay mixture between 30-40% and organic matter not exceeding 10% and may be subject to review by Consultant.
- 2.2.8 Unshrinkable Fill to TS 13.10
- 2.2.9 General fill material: clean, free from debris, organic matter, rocks larger than 75mm and other deleterious material.
- 2.2.10 Other Materials not specifically described but required for complete and proper installation, shall be selected by the Contractor and may be subject to review by the Consultant.

PART 3 - EXECUTION

3.1 ROUGH GRADING

- 3.1.1 Strip topsoil over areas where grade changes are required and stockpile in approved location. Do not handle topsoil in wet or frozen conditions.
- 3.1.2 Cut back areas to be lowered to the grades indicated on the drawings, allowing for placement of topsoil.
- 3.1.3 Where existing grades are to be raised, scarify existing grade to minimum 75mm supply and place fill material approved by the consultant or identified in the drawing in 150mm lifts and compact each lift to 95% Standard Proctor Dry Density.
- 3.1.4 Compact material to 90% Standard Proctor Dry Density under areas to be sodded or planted.

3.2 FINE GRADING

- 3.2.1 Perform all fine grading required to achieve finished elevations indicated on the drawings.
- 3.2.2 Tolerance for fine grade next to finished grade of plus or minus 50mm.
- 3.2.3 Regard all area's that pool water.

3.3 FINISH GRADING

- 3.3.1 Applies to aggregate paths, sod and seed areas, sand and mulch.
- 3.3.2 Ensure that finish grade slopes are met as indicated on the drawings.
- 3.3.3 Grade so that water will drain away from walls and paved areas, to catch basins and other area's as approved by Consultant.
- 3.3.4 Grade to be gradual between finished spot elevations.

- 3.3.5 Topsoil: roll to compact topsoil to 90% Standard Proctor Dry Density.
- 3.3.6 Engineered Wood Fibre to be installed as per manufacturers recommendations to a depth specified on the drawings, hand raked level and compacted.
- 3.3.7 Shredded Cedar Mulch to be installed to a depth specified on the drawings. Where shredded cedar mulch is being used as a walking/play surface the mulch must be compacted.
- 3.3.8 Where soft surfaces meet hard surfaces the contractor must compact the soft surface level with the hard surface to prevent ankle rolling.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 RELATED WORK

1.2.1 Topsoil Supply and Fine Grading Section 32 22 00

1.3 SOURCES QUALITY CONTROL

1.3.1 Obtain the Consultant's approval of supplier of sod

1.3.2 If required by the Consultant, top soil shall be tested for including but not limited to the following; N, P, K, other minor element values, soluble salts contents, organic matter contents and pH value. Arrange for assume all costs for such testing. Testing shall be carried out by a reputable testing company as approved by the Consultant.

1.3.3 Submit soils analysis report to the Consultant prior to commencement of the work of this Section. When the source of such top soil is exhausted, top soil from new source shall not be used until it has been tested and approved by the Consultant.

1.4 DELIVERY AND STORAGE

1.4.1 Schedule delivery in order to keep storage on the job site to a minimum without causing delays.

1.4.2 Deliver, unload and store sod on pallets. Deliver sod to site within 24 hours of being lifted and lay sod within 36 hours of being lifted.

1.4.3 Do not deliver small, irregular or broken pieces of sod.

1.4.4 During dry weather protect sod from drying and water sod as necessary to ensure its vitality and prevent dropping of soil in handling. Sod which has dried out will be rejected.

1.5 SCHEDULING OF WORK

1.5.1 Schedule sod laying to coincide with topsoil operations.

1.6 ACCEPTANCE

1.6.1 Sodded areas will be accepted by the Consultant:

.1 Sod is properly established.

.2 Turf is free of dead spots and weeds.

.3 Sodded areas have been cut within 24 hours prior to acceptance inspection.

.4 Minimum of 30 days have elapsed following laying.

.5 A minimum of two cuts has taken place.

1.7 WARRANTY

- 1.7.1 Warrant the work of this Section against defects in materials and workmanship in accordance with the General Conditions for a period of one (1) year, and agree to promptly make good defects which become evident during the warranty period without cost to the Owner. Any sod which, during the warranty period, shows deterioration, bare spots or damage resulting from faulty materials and/or workmanship, shall be replaced at no cost to the Owner. Also, erosion occurring as a result of faulty workmanship and/or materials shall be repaired at no cost to the Owner.
- 1.7.2 During the warranty period, provide monthly inspections and replace all sod which is dead or is not in a vigorous growing condition.

PART 2 - PRODUCTS**2.1 MATERIALS**

- 2.1.1 Turf grass nursery sod: specially sown and cultivated in nursery fields in compliance with the specifications of the latest issue of the Nursery Sod Growers Association of Ontario (B) number one Kentucky Bluegrass-Fescue Sod.
- 2.1.2 Fertilizer shall be slow release, 10/20/20 commercial type fertilizer unless specified otherwise, containing not less than 60% urea-formaldehyde and the following percentages by weight;
- .1 Nitrogen: 10.
 - .2 Phosphoric Acid: 20.
 - .3 Potash: 20.
- 2.1.3 Sod Pegs: Sod pegs shall be solid hardwood type, 1" x 1" square x minimum 9" long, with pointed end at one end. Ensure that sod pegs are of sufficient length to ensure satisfactory anchorage of the sod.
- 2.1.4 Top Soil: Shall be friable, fertile natural loam, capable of sustaining vigorous plant growth, containing not less than 4% organic matter for clay loams and not less than 2% organic matter for sandy loams to a maximum 15%, free of subsoil contamination, free of roots and weeds, free of rocks and stones over 2" in diameter and having a pH ranging from 6.0 to 7.5.

PART 3 - EXECUTION**3.1 WORKMANSHIP**

- 3.1.1 Keep site well drained.
- 3.1.2 Clean up immediately any soil or debris spilled onto pavement and dispose of deleterious materials off the site.
- 3.1.3 Lay sod in areas as shown on the Drawings.

3.2 INSTALLATION OF TOP SOIL

- 3.2.1 Spread top soil during dry weather, over dry, unfrozen subgrade where sod is to be installed.
- 3.2.2 Fine grade top soil eliminating rough and low areas, and ensuring positive drainage.

- 3.2.3 Roll spread top soil with a roller to compact and retain surfaces. Finished depth of prepared top soil shall be minimum of 4". Keep top soil 1" below finished grade for sodded areas.
- 3.2.4 Ensure that finished top soil surface is smooth and firm against footprints, with a fine, loose texture before sod is installed.
- 3.2.5 Obtain approval of Consultant of the finished top soil surface prior to proceeding with installation of sod.
- 3.3 LAYING OF SOD
- 3.3.1 Lay sod during growing season. Sodding at freezing temperatures or on frozen ground is not permitted.
- 3.3.2 Sodding during dry weather is acceptable only if sufficient and continuous watering is assured.
- 3.3.3 Where necessary, sod shall be pegged to assure non-slippage is obtained and shall be at no extra cost to the Owner.
- 3.3.4 Obtain the approval of the Consultant of finished grade prior to beginning sodding.
- 3.3.5 Lay sod even with adjoining areas. The rows shall have staggered joints. Butt sections closely without over-lapping or leaving gaps between sections. Cut out irregular or thin sections with a sharp tool.
- 3.3.6 Provide close contact between sod and soil by means of light roller. Heavy rolling to correct irregularities in grade is not permitted.
- 3.3.7 Water immediately after laying to obtain moisture penetration through sod into top 100mm of topsoil.
- 3.3.8 Provide adequate protection of sodded areas against erosion and other damage. Remove this protection after sod has become established and if approved by the Consultant.
- 3.3.9 As necessary, peg sod to prevent movement. When sod is established, drive pegs flush with sod.
- 3.4 MAINTENANCE
- 3.4.1 Maintain sodded areas for a minimum of two (2) cuts following installation. Maintain at 75mm height.
- 3.4.2 Water and apply fertilizer to sustain healthy growth and prevent deterioration.
- 3.4.3 Remove silt traps installed around existing catch basins after completion of sodding work.

END OF SECTION

Appendix '1'

Finishing Hardware List
39 pages

Finishing Hardware Schedule

Joseph Gibbons PS RENO , 2021, HDSB
49 Moore Cres. Georgetown

Architect
NGA architects

Detailer: **Riley Rykoff**
Consultant: **Ross Ruprecht B.A., A.H.C**
Submittal Date: **June 21/21, Rev July 27/21**



Commercial Doors & Hardware Ltd.
43 Millwick Dr.
Toronto, ross@cdh.ca

Joseph Gibbons PS RENO , 2021, HDSB
49 Moore Cres. Georgetown

Submittal Date: June 21/21, Rev July 27/21

Manufacturers & Finishes

Manufacturers

Camden
Crowder
Fleming Door Products Ltd.
Gallery
Glynn-Johnson
HORTON
Ives
K.N. Crowder
LCN
Schlage
Von Duprin

Finishes

626 - Satin chromium plated
over nickel
652 - Satin chromium plated
over nickel
689 - Aluminum painted
US26D - Satin chromium plated
over nickel
US32D - Satin stainless steel



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Openings Schedule

Opening Number(s)	Qty	Location 1	To/ From	Location 2	Hand	Degree of Opening	Door Catalog	Nominal Width	Nominal Height	Door Thickness	Type	Label	Hardware Group	Heading Num.	Remarks
D-101A	1	CORR	TO	CLASS RM	LH	90°	<Wood>	36"	80"	1 3/4"	Single		CLASS RM	1	
D101B	1	CORR	TO	CLASS RM	RH	90°	<Wood>	36"	80"	1 3/4"	Single		CLASS RM OH	2	
D101D	1	CORR	TO	RESORCE	RH	90°	<Wood>	36"	80"	1 3/4"	Single		CLASS RM	1	
D-101E	1	CORR	TO	UNIV WR	LH	90°		40"	80"	1 3/4"	Single		WR, 1100, OP	3	ADO
D-101F	1	CORR	FROM	SLOP	LHR	100°		36"	80"	1 3/4"	Single		STORAGE,915 ,WS	4	
D-101G	1	CORR	TO	WORK RM	LH	90°	<Wood>	36"	80"	1 3/4"	Single		CLASS RM	1	
D-102A	1	CORR	TO	KINDERGARTEN	RH	90°	<Wood>	36"	80"	1 3/4"	Single		CLASS RM	1	
D-EX114	1	LOBBY	FROM	CORR	LHRA/RHRA	90°		36", 36"	80"	1 3/4"	Pair		EMHO ONLY	5	EMHO-LHR, EXIST DR/FR
D-115	1	CORR	To/From	CORR	LHR/LHR-CS	90°		38", 34"	80"	1 3/4"	Pair		VEST. OP, PP	6	ADO, CONTRA SWING
D-117C	1	CORR	TO	CALMING	LH	90°	<Wood>	36"	80"	1 3/4"	Single		TIME OUT	7	
D-117D	1	LIBRARY	TO	RESORCE	LH	100°	<Wood>	36"	80"	1 3/4"	Single		CLASS RM	1	
D-119A	1	WORK	TO	CLASS RM	LH	100°	<Wood>	36"	80"	1 3/4"	Single		CLASS RM OH	2	
D-119B	1	WORK	TO	CLASS RM	LH	100°	<Wood>	36"	80"	1 3/4"	Single		CLASS RM OH	2	
D-119C	1	WORK	TO	CLASS RM	RH	90°	<Wood>	36"	80"	1 3/4"	Single		CLASS RM OH	2	
D-119D	1	WORK	TO	CLASS RM	LH	90°	<Wood>	36"	80"	1 3/4"	Single		CLASS RM OH	2	
D-119E	1	WORK	TO	CLASS RM	RH	90°	<Wood>	36"	80"	1 3/4"	Single		CLASS RM OH	2	
D-119F	1	WORK	TO	CLASS RM	RH	90°	<Wood>	36"	80"	1 3/4"	Single		CLASS RM	1	
D-EX122	1	CORR	FROM	CORR	LHRA/RHRA	90°		36", 36"	80"	1 3/4"	Pair		EMHO ONLY	5	EMHO-LHR, EXIST DR/FR
TC-LOCK	1												TEACHERS CLOSETS	8	
MISC	1												MISC	9	



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49 Moore Cres. Georgetown

Submittal Date: June 21/21, Rev July 27/21

Hardware Schedule

Heading #1

Item #1	1 Single door D-101A, CORR TO CLASS RM	90° LH
Item #2	1 Single door D101D, CORR TO RESORCE	90° RH
Item #3	1 Single door D-101G, CORR TO WORK RM	90° LH
Item #4	1 Single door D-102A, CORR TO KINDERGARTEN	90° RH
Item #5	1 Single door D-117D, LIBRARY TO RESORCE	100° LH
Item #6	1 Single door D-119F, WORK TO CLASS RM	90° RH

36" x 80" x 1 3/4" - WD DR x HM FR

18	Standard Hinge	Ives 5BB1 4 1/2" x 4" 652	652
6	Lockset	Schlage ND70PD RHO 626 MK TO EXISTING	626
6	Kick Plate	Gallery GSH 80A 8" X 2" LDW C32D	US32D
6	Wall Door Stop	Gallery GSH 240B C32D	US32D

Heading #2

Item #7	1 Single door D101B, CORR TO CLASS RM	90° RH
Item #8	1 Single door D-119A, WORK TO CLASS RM	100° LH
Item #9	1 Single door D-119B, WORK TO CLASS RM	100° LH
Item #10	1 Single door D-119C, WORK TO CLASS RM	90° RH
Item #11	1 Single door D-119D, WORK TO CLASS RM	90° LH
Item #12	1 Single door D-119E, WORK TO CLASS RM	90° RH

36" x 80" x 1 3/4" - WD DR x HM FR

18	Standard Hinge	Ives 5BB1 4 1/2" x 4" 652	652
6	Lockset	Schlage ND70PD RHO 626 MK TO EXISTING	626
6	Kick Plate	Gallery GSH 80A 8" X 2" LDW C32D	US32D
6	Overhead Door Stop	Glynn-Johnson 904S US26D	US32D



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Heading #3

Item #13

1 Single door D-101E, CORR TO UNIV WR

90° LH

40" x 80" x 1 3/4" - HM DR x HM FR

1		Wiring Diagram	
3	Standard Hinge	Ives 5BB1HW 5" x 4 1/2" 652	652
1	Lockset	Schlage ND80PD RHO 626 MK TO EXISTING	626
1	Electric Strike	Von Duprin 5100-3FP FS CON 12/24 689	689
1	Electronic Closer	HORTON AUTO OPERATOR 7900LE X PULL SIDE MTD DR WIDTH HEADER 628	
2	Kick Plate	Gallery GSH 80A 8" X 2" LDW C32D MTD BOTH SIDES	US32D
1	Wall Door Stop	Gallery GSH 240B C32D	US32D
1	Miscellaneous Hardware	Camden CM-160/23 MTD IN OPERATOR HEADER	
1	Miscellaneous Hardware	Camden CX-EMF-2	
1	Miscellaneous Hardware	Camden CX-WC13AXFM	
1	Miscellaneous Hardware	Camden CX-WEC10K2	

HARDWARE SUPPLIER DIV 08710 TO SUPPLY AND INSTALL AUTO OPERATORS.

ELECTRICAL CONTRACTOR TO PROVIDE 120 VAC TO HEAD OF FRAME AND PROVIDE ALL LVW IN CONDUIT TO 3 PUSH BUTTON LOCATIONS , ELECTRIC STRIKE AND ALL ELECTRICAL COMPONENTS LISTED AND SHOWN ON WIRING DIAGRAM SUPPLIED BY HARDWARE SUPPLIER.
PROVIDE 2 2 X 4 BACK BOXES.

MODE OF OPERATION.

CORRIDOR MOUNTED ACTUATOR BUTTON OPENS DOOR AUTOMATICALLY. ONCE INSIDE WR PUSH TO LOCK BUTTON SHUNTS POWER TO CORRIDOR ACTUATOR AND LUMINATES ACTUATOR , STORAGE RM LOCK ON DOOR PROVIDES USER PRIVACY.
WR MOUNTED ACTUATOR BUTTON OPENS DOOR FROM INSIDE WR AUTOMATICALLY , EMF-2 WR RELAY RESETS SYTEM FOR NEXT USER.
UPON POWER FAILURE / FA DOOR HAS FREE EGRESS FROM EITHER SIDE BY SIMPLY PUSHING OR PULLING ON DOOR..
3 POSITION KEYSWITCH TURNS UNIT ON/OFF/HOLD OPEN.



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Heading #4

Item #14 1 Single door D-101F, CORR FROM SLOP 100° LHR

36" x 80" x 1 3/4" - HM DR x HM FR

3	Standard Hinge	Ives 5BB1 4 1/2" x 4" 652	652
1	Lockset	Schlage ND80PD RHO 626 MK TO EXISTING	626
1	Surface Closer	LCN 1461 S- CUSH AL	AL
1	Kick Plate	Gallery GSH 80A 8" X 2" LDW C32D	US32D
1	Wall Door Stop	Gallery GSH 240B C32D	US32D

Heading #5

Item #15 1 Pair of doors D-EX114, LOBBY FROM CORR 90° LHRA/RHRA

Item #16 1 Pair of doors D-EX122, CORR FROM CORR 90° LHRA/RHRA

36", 36" x 80" x 1 3/4" - HM DR x HM FR

REFER TO FLOOR PLAN. INSTALL ON LEAF SHOWN

4	Electro-Magnetic Holder	LCN SEM 7810-514 AL X 7810-E200	AL
4	Electro-Magnetic Holder	LCN SEM 7850 AL	AL



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Heading #6

Item #17 1 Pair of doors D-115, CORR To/From CORR 90° LHR/LHR-CS
38", 34" x 80" x 1 3/4" - HM DR x HM FR

INSTALL OPERATOR AT DR LEAF NEXT TO NEW RESOURCE RM 1 (38" DR LEAF)

1		WIRING DIAGRAM	
6	Standard Hinge	Ives 5BB1HW 5" x 4 1/2" 652	652
2	Push Bar	Von Duprin 350 US28	US26D
1	Surface Closer	LCN 4040XP CUSH AL	AL
1	Electronic Closer	HORTON AUTO OPERATOR 7900LE X PULL SIDE MTD DR WIDTH HEADER 628	
2	Kick Plate	Gallery GSH 80A 8" X 2" LDW C32D	US32D
1	Miscellaneous Hardware	Camden CM-160/23 MTD IN OPERATOR HEADER	
2	Miscellaneous Hardware	Camden CM-60/4	
2	Miscellaneous Hardware	Camden CM-89S	

HARDWARE SUPPLIER SECTION 08710 TO SUPPLY AND INSTALL AUTO OPERATOR .

3KSE 3 POSITION KEY SWITCH MOUNT IN OPERATOR HEADER IN LIEU OF TOGGLE SWITCH

ELECTRICAL CONTRACTOR TO PROVIDE 120 VOLT TO HEADER OF FRAME AND RUN CONDUIT AND LOW VOLTAGE WIREING TO PUSHBUTTONS,ELECTRIC STRIKES, KEYSWITCH, AND ALL ELECTRONIC COMPONENTS LISTED IN THE HARDWARE SCHEDULE. . GC TO PROVIDE 2 X 4 BACKBOXES FOR PUSHBUTTONS.
MODE OF OPERATION.

UNLOCKED POSITION: ACTUATOR BUTTONS EITHER SIDE OPEN DOOR AUTOMATICALLY .

EGRESS IS ALWAYS FREE.

3 POSITION KEYSWITCH MTD. IN OPERATOR HEADER TURNS UNIT ON/OFF.

Heading #7

Item #18 1 Single door D-117C, CORR TO CALMING 90° LH
36" x 80" x 1 3/4" - WD DR x HM FR

4	Standard Hinge	Ives 5BB1HW 114 x 102 652	652
1	Lockset	Schlage ND45 ATH 626 XN12-317-TIME OUT LOCK	626
1	Surface Closer	LCN 4040XP EDA AL SN	AL
2	Kick Plate	Gallery GSH 80A 8" X 2" LDW C32D MTD BOTH SIDES	US32D
1	Wall Door Stop	Gallery GSH 240B C32D	US32D
1	Weatherstripping	K.N. Crowder W-24S- 48" AI	CA
1	Weatherstripping	Crowder W-50 C.A. 1X 1200, 2 X 2150	C.A.

PREPARE DOOR AND FRAME FOR 4 HINGES



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Heading #8

Item #19

1 Elevation TC-LOCK

___ x ___ x ___ - HM DR x HM FR

8 TEACHERS CLOSETS

16 Dead Lock Schlage B560 626 MK X KA TO CLASS RM KEY 626

BALANCE OF HARDWARE BY MILLWORK SUPPLIER
DOORS MUST BE MIN 1 3/8" (35 MM) THICK

Heading #9

Item #20

1 Elevation MISC

___ x ___ x ___ - HM DR x HM FR

2 CHANGE KEYS PER LOCK



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CM-60

6" ROUND ALL-ACTIVE SWITCHES



CM-60/2



CM-60/3



CM-60/4

FEATURES

- LARGE, EASY TO OPERATE SWITCHES
- 6" ROUND
- ALL-ACTIVE DESIGN REQUIRES MINIMAL ACTUATION FORCE
- DURABLE STAINLESS STEEL OR SOLID BRASS CONSTRUCTION
- MEETS ADA REQUIREMENTS
- FLUSH MOUNT OR SURFACE MOUNT
- UL/CSA APPROVED SPDT MOMENTARY SWITCH, RATED 15 AMPS @ 30V DC
- VARIOUS LOGOS & MESSAGES
- ARCHITECTURAL FINISHES

DESCRIPTION

Camden Door Controls CM-60 Series all-active switches are heavy-duty, ADA-compliant door controls. The 6" round faceplates are stainless steel or solid brass, and the assembly is designed for easy installation in single-gang electrical boxes, or, with included adapter plate – double-gang and 4x4 boxes. The SPDT and optional DPDT switches are UL/CSA approved, and rated 15 amps @ 30 VDC.

APPLICATION

Camden all-active switches are designed for areas where an easy-to-activate, high-visibility switch is desired. Ideal for high-traffic areas, hospitals, wheelchair access, seniors' residences, etc. They can be surface or flush mounted.

Camden all-active switches are designed to control electric strikes, electromagnetic locks and automatic doors. They may also be used for shunting, bypassing alarms, request to exit, timed functions and many other applications.

The switches are made for high frequency usage, for both indoor and outdoor environments. Camden switches are versatile, and can be supplied in various configurations and finishes, to suit any commercial, industrial or residential application.

ARCHITECTS / ENGINEERS SPECIFICATIONS

The switches to be used throughout the complex shall be Camden Door Controls CM-60 all-active switches.

The switches shall be easy-to-activate, ADA compliant and 6" round in diameter. Switches shall be all-active, whereby pressing any part of the faceplate will activate the device. Faceplates shall be constructed of 18-gauge stainless steel or solid brass, and have concealed mounting screws for tamper resistance. Switches shall use plastic spacers and rubber dampers for noise reduction. Switches shall be rated at a minimum of 15 amps @ 30 VDC.

Their design shall allow mounting in single-gang electrical boxes, or, with included adapter plate – double-gang and 4x4 boxes.



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KEY SWITCHES

PUSH BUTTONS

MOUNTING OPTIONS

RF CONTROLS

HANDS-FREE SWITCHES

SPECIAL PURPOSE SWITCHES

KEYPADS

ACCESSORIES



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CM -160/170/180
AUTOMATIC DOOR KEY SWITCHES



CM-160/23



CM-170/23



CM-180/24

FEATURES

- 3 FORMATS: JAMB, HEADER OR SINGLE GANG MOUNT
- 2, 3, OR 4 POSITION MAINTAINED AND 2 POSITION MOMENTARY MODELS
- VARIOUS LOGOS, AND LANGUAGES
- KEY REMOVABLE IN ALL MAINTAINED POSITIONS
- UL/CSA APPROVED SWITCH RATED 4 AMPS @ 28V DC

DESCRIPTION

Camden Door Controls CM-160/170/180 Series key switches are economical, automatic door controls. All key switches are keyed alike, and keys are removable in all maintained positions. The switches are UL/CSA approved, and rated 4 amps @ 28 VDC.

The CM-160 1 11/16" x 3" compact lamacoid faceplate is designed for easy installation directly in the aluminum jamb or operator header.

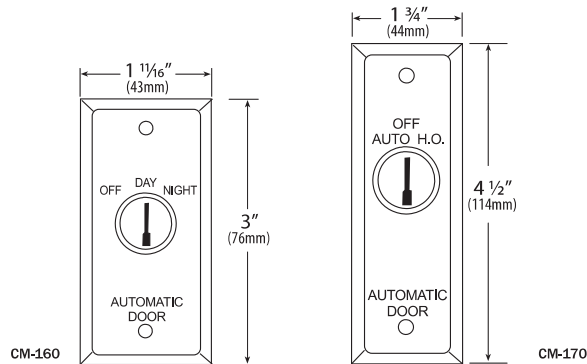
The CM-170 narrow stainless steel faceplate is 1 1/2" x 4 1/2", and is designed to mount in the aluminum jamb.

The CM-180 stainless faceplate is 2 3/4" x 4 1/2" and will fit on any standard electrical box, flush or surface.

APPLICATION

Camden automatic door key switches are designed to control automatic pedestrian & overhead doors.

They may also be used for shunting, bypassing alarms, request to exit, timed functions and many other applications. Camden key switches are versatile and can be supplied in various logos and languages to suit any commercial, industrial or residential application.



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KEY SWITCHES

PUSH BUTTONS

MOUNTING OPTIONS

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CX-EMF-2 MULTI-FUNCTION RELAY



CX-EMF-2



CX-EMF-2ABM

FEATURES

- MICROPROCESSOR CONTROL
- USER SELECTABLE MULTI-APPLICATION DESIGN
- PLUG-IN CONNECTORS FOR WIRING
- ACCEPTS UP TO 7 DRY INPUTS
- 5 FORM C, 3 AMP RELAY OUTPUTS
- 12/24V AC/DC OPERATION
- ALSO AVAILABLE IN ATTRACTIVE METAL CABINET

DESCRIPTION

Camden Door Controls EMF-2 is a microprocessor-controlled relay designed to easily and quickly handle a variety of specialized door-control tasks.

The dip switches let you choose functions such as:

- ABM Vestibule interface
- Single Restroom Door in Shared Use Facility
- Man Trap
- Normally Secure Restroom Door
- 2 Door Shared use Restrooms
- 2 - 5 Door Airlocks/Interlocks

This smart new design also allows for future development by utilizing expandable technology, and reprogrammable IC 's.

All wiring connections and adjustments are made on the exterior of the plastic case with removable terminals to facilitate installation. Simple yet effective potentiometers enable settings to meet varied requirements.

A power LED, 1 status LED, and five relay LEDs aid in set-up and troubleshooting.

A sturdy plastic enclosure is standard, while a handsome metal cabinet with lighted control switches is also available.

ELECTRIC STRIKES

CABINET LOCKS

MAGNETIC LOCKS

DOOR ALARMS

RELAYS & TIMERS

TRANSFORMERS & POWER SUPPLIES

ANNUNCIATORS



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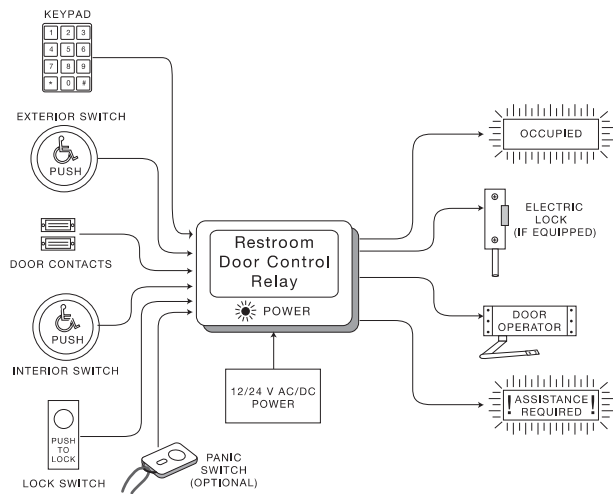
CX-EMF-2 MULTI-FUNCTION RELAY

APPLICATION 3 - SINGLE DOOR, NORMALLY SECURED RESTROOM DOOR

This application is a shared-use single (normally locked) restroom door in facilities such as doctors offices, hospitals, shopping malls, etc. The relay provides control of the lock, operator, and switches, to provide the utmost in facility security, safety for the occupants, yet still be easy to install and program.

In this application the door is normally locked whether occupied or not. It may be unlocked by key-switch, keypad, or another credential. The EMF-2 can be configured to activate the door operator immediately, or after pressing the wall-switch within the (adjustable) time period. Once the door has closed, pressing the "Push to Lock" button removes the exterior keypad/key-switch from the circuit. The electric lock will pulse twice to let the user know that the door is secure, and an output is available to light an Occupied LED (s).

To exit the restroom, simply push the interior wall switch. The door unlocks, opens and resets the system. Should the door be opened manually, the magnet switch will reset the system. Unique to the EMF-2 is the emergency input, which allows a panic button to unlock, open the door (optional), and send an emergency signal for assistance. The output can be maintained or pulsed. As an added safety feature, the EMF-2 can be set to automatically reset (and unlock) after 15 minutes time.



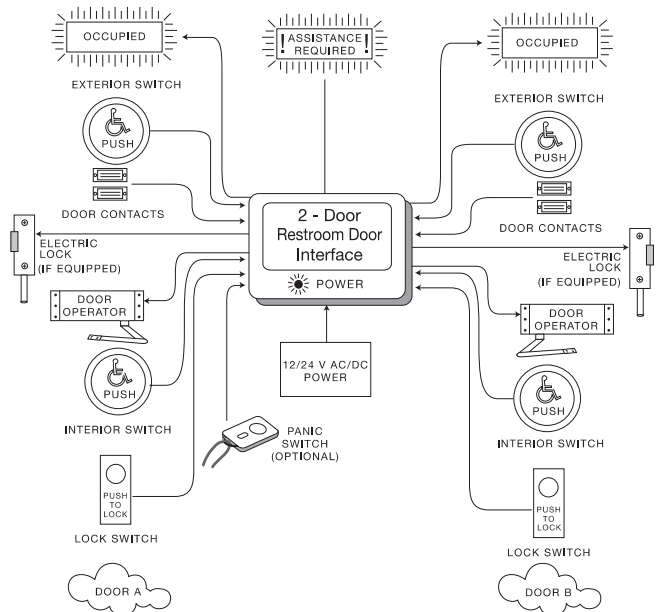
APPLICATION 4 - 2 DOOR SHARED-USE RESTROOM

This application is a shared-use (normally unlocked) restroom between two suites (and therefore utilizing two doors), in facilities such as nursing homes & hospitals, etc. The relay provides control of both locks, operators, and all switches, to provide the utmost in flexibility, safety for the occupants, yet still be easy to install and program.

Either door is opened automatically by pressing the respective exterior wall switch. Once the door has closed, pressing either "Push to Lock" button inside then locks both doors – the strike is energized, and exterior switches are removed from the circuit. To exit the restroom, simply push either interior wall switch. The respective door unlocks, opens and resets the system. Should either door be opened manually, the magnet switch will reset the system.

Unique to the EMF-2 is the emergency input, which allows a panic button to unlock, open (one or both) door(s), (optional), and send an emergency signal for assistance. The output can be maintained or pulsed. As an added safety feature, the EMF-2 can be set to automatically reset (and unlock) after 15 minutes time.

It is strongly encouraged to utilize the dry contact output (Relay #5) or the LED output to indicate "Occupied" on the exterior of both doors to let others know the restroom is in use.

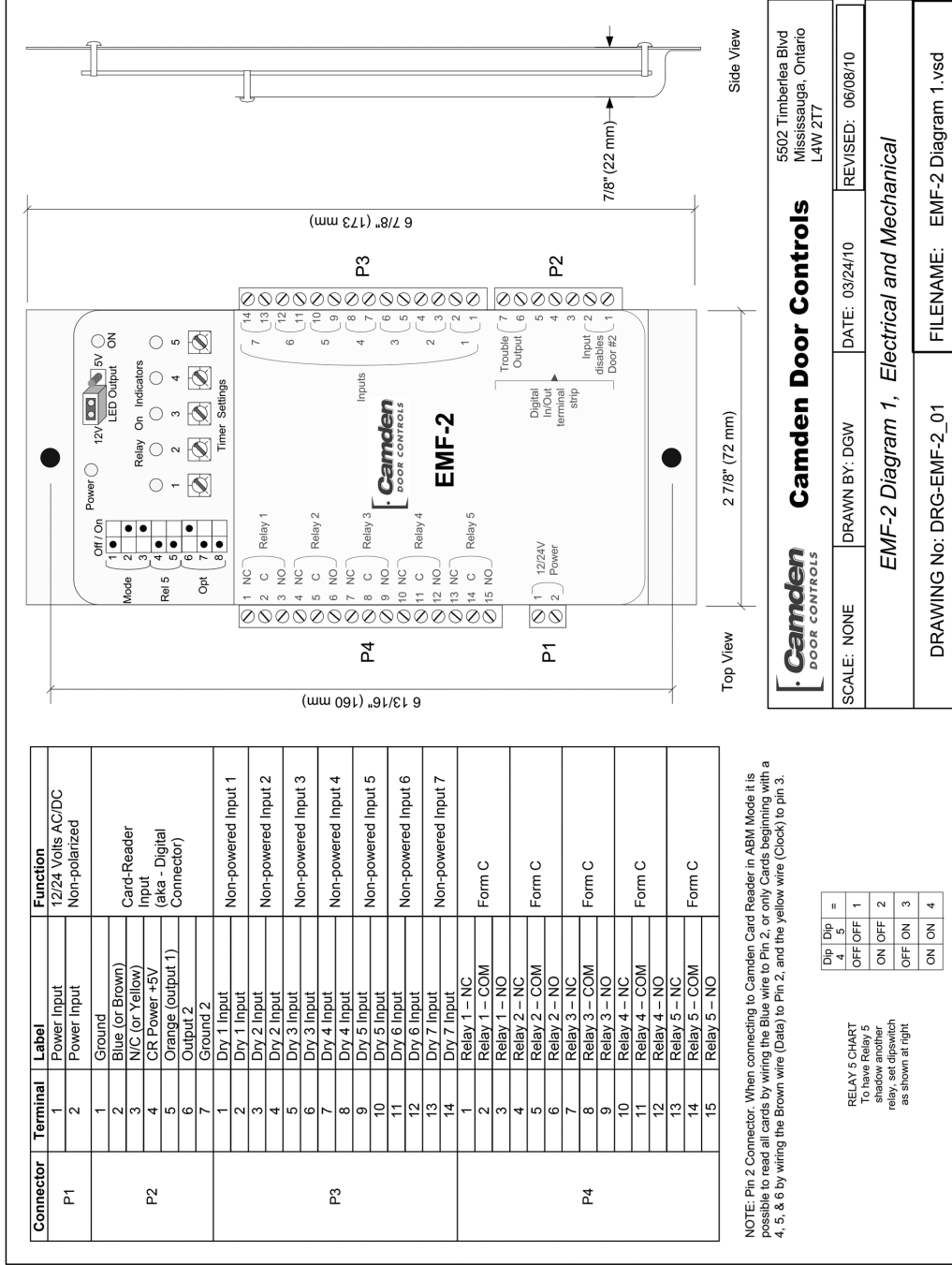


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CX-EMF-2 MULTI-FUNCTION RELAY



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REVISIONS:
 DATE: 03/24/10
 REVISED: 06/08/10

SCALE: NONE
 DRAWN BY: DGW

EMF-2 Diagram 1, Electrical and Mechanical

DRAWING No: DRG-EMF-2_01
 FILENAME: EMF-2 Diagram 1.vsd

Connector	Terminal	Label	Function
P1	1	Power Input	12/24 Volts AC/DC
	2	Power Input	Non-polarized
P2	1	Ground	
	2	Blue (or Brown)	Card-Reader Input
	3	NC (or Yellow)	Input (aka - Digital Connector)
	4	CR Power +5V	
	5	Orange (output 1)	
	6	Output 2	
P3	7	Ground 2	
	1	Dry 1 Input	Non-powered Input 1
	2	Dry 1 Input	
	3	Dry 2 Input	Non-powered Input 2
	4	Dry 2 Input	
	5	Dry 3 Input	Non-powered Input 3
	6	Dry 3 Input	
	7	Dry 4 Input	Non-powered Input 4
	8	Dry 4 Input	
	9	Dry 5 Input	Non-powered Input 5
	10	Dry 5 Input	
	11	Dry 6 Input	Non-powered Input 6
	12	Dry 6 Input	
	13	Dry 7 Input	Non-powered Input 7
14	Dry 7 Input		
P4	1	Relay 1 - NC	
	2	Relay 1 - COM	Form C
	3	Relay 1 - NO	
	4	Relay 2 - NC	Form C
	5	Relay 2 - COM	
	6	Relay 2 - NO	
	7	Relay 3 - NC	Form C
	8	Relay 3 - COM	
	9	Relay 3 - NO	
	10	Relay 4 - NC	Form C
	11	Relay 4 - COM	
	12	Relay 4 - NO	
	13	Relay 5 - NC	Form C
	14	Relay 5 - COM	
	15	Relay 5 - NO	

NOTE: Pin 2 Connector. When connecting to Camden Card Reader in ABM Mode it is possible to read all cards by wiring the Blue wire to Pin 2, or only Cards beginning with a 4, 5, & 6 by wiring the Brown wire (Data) to Pin 2, and the yellow wire (Clock) to pin 3.

Dip	Dip	=
4	OFF	1
5	OFF	2
1	ON	3
2	ON	4

RELAY 5 CHART
 To have Relay 5 shadow another relay, set dipswitch as shown at right



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Certified ISO 9001: 2008

LIT-SP-EMF2R1

FS 541752



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EMERGENCY CALL SYSTEM FOR UNIVERSAL & BARRIER FREE RESTROOMS

ORDERING INFORMATION

EQUIPMENT PACKAGE

- CX-WEC10** UNIVERSAL RESTROOM KIT FOR USE WITHOUT AUTOMATIC DOOR OPERATOR, OR WITH CX-WC 10, 11, 12, 13 & 14 BARRIER-FREE RESTROOM CONTROL KIT.
 - CM-450R/12 'PRESS FOR EMERGENCY ASSISTANCE' MUSHROOM PUSH BUTTON
 - CM-AF501SO LED ANNUNCIATOR WITH SOUNDER
 - CM-AF141SO DOME LIGHT WITH SOUNDER
 - CM-SE21A WHITE PANEL SIGN 6" H X 10 5/8" W (152MM X 270MM).
 ADD SUFFIX 'F' TO MODEL NUMBER FOR FRENCH LANGUAGE.
- CX-WEC10FE** BILINGUAL UNIVERSAL EMERGENCY CALL KIT FOR USE WITHOUT AUTOMATIC DOOR OPERATOR, OR WITH CX-WC 10, 11, 12, 13 & 14 BARRIER-FREE RESTROOM CONTROL KIT.
 - CM-450R/12FE 'EMERGENCY ASSISTANCE' MUSHROOM PUSH BUTTON
 - CM-AF501SOFE LED ANNUNCIATOR WITH SOUNDER,
 - CM-AF141SOFE DOME LIGHT WITH SOUNDER
 - CM-SE21A ENG. WHITE PANEL SIGN AND CM- SE20A FR. WHITE PANEL SIGN 6" X 10 5/8" (152 X 270MM).
- CX-WEC10K2** UNIVERSAL RESTROOM KIT WITH DOUBLE GANG SWITCH/ ANNUNCIATOR COMBO. FOR USE WITHOUT AUTOMATIC DOOR OPERATOR, OR WITH CX-WC 10, 11, 12, 13 & 14 BARRIER-FREE RESTROOM CONTROL KIT.
 - CM-AF540SO 'PRESS FOR EMERGENCY ASSISTANCE' MUSHROOM PUSH BUTTON AND LED ANNUNCIATOR WITH ADJUSTABLE SOUNDER (DOUBLE GANG),
 - CM-AF141SO LED DOME LIGHT WITH ADJUSTABLE SOUNDER,
 - CM-SE21A WHITE PANEL SIGN 6" X 10 5/8" (152MM X 270MM)
 ADD SUFFIX 'F' TO MODEL NUMBER FOR FRENCH LANGUAGE.
- CX-WEC11** UNIVERSAL RESTROOM KIT FOR USE WITH CX-WC15 BARRIER-FREE RESTROOM CONTROL KIT.
 AS ABOVE WITHOUT CM-4150R/12 PUSH BUTTON.
 - CM-450R/12 'PRESS FOR EMERGENCY ASSISTANCE' MUSHROOM PUSH BUTTON
 ADD SUFFIX 'F' TO MODEL NUMBER FOR FRENCH LANGUAGE.
- CX-WEC12** UNIVERSAL EMERGENCY CALL KIT WITH PUSH BUTTON RESET. FOR USE WITH MOMENTARY 'PRESS FOR EMERGENCY ASSISTANCE' SWITCHES (EXTRA)
 - CM-AF501SO LED ANNUNCIATOR/SOUNDER
 - CM-AF141SO DOME LIGHT/SOUNDER
 - CM-SE21 WHITE PANEL SIGN
 - CX-LRS 24V LATCHING RELAY ASSEMBLY
 - CM-8010/13 MOMENTARY, 'PRESS TO RESET' 1" RED PUSH BUTTON.
 ADD SUFFIX 'F' TO MODEL NUMBER FOR FRENCH LANGUAGE.
- CX-WEC13** UNIVERSAL EMERGENCY CALL KIT WITH KEY SWITCH RESET. FOR USE WITH MOMENTARY 'PRESS FOR EMERGENCY ASSISTANCE' SWITCHES (EXTRA)
 - CM-AF501SO LED ANNUNCIATOR/SOUNDER
 - CM-AF141SO DOME LIGHT/SOUNDER
 - CM-SE21 WHITE PANEL SIGN
 - CX-LRS 24V LATCHING RELAY ASSEMBLY
 - CM-1205/14 MOMENTARY, 'W/C SYSTEM RESET' KEY SWITCH AND
 - CM-1000/60KD, KEY CYLINDER.
 ADD SUFFIX 'F' TO MODEL NUMBER FOR FRENCH LANGUAGE.

IN THE EVENT OF AN EMERGENCY PUSH EMERGENCY BUTTON AND AUDIBLE AND VISUAL SIGNAL WILL ACTIVATE



CX-WEC10/10FE

IN THE EVENT OF AN EMERGENCY PUSH EMERGENCY BUTTON AND AUDIBLE AND VISUAL SIGNAL WILL ACTIVATE



CX-WEC10K2

IN THE EVENT OF AN EMERGENCY PUSH EMERGENCY BUTTON AND AUDIBLE AND VISUAL SIGNAL WILL ACTIVATE



CX-WEC11

IN THE EVENT OF AN EMERGENCY PUSH EMERGENCY BUTTON AND AUDIBLE AND VISUAL SIGNAL WILL ACTIVATE



CX-WEC12

IN THE EVENT OF AN EMERGENCY PUSH EMERGENCY BUTTON AND AUDIBLE AND VISUAL SIGNAL WILL ACTIVATE



CX-WEC13



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FS 541752



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Submittal Date: June 21/21, Rev July 27/21

CAMDEN MOUNTING BOXES

MODEL: CM-59S

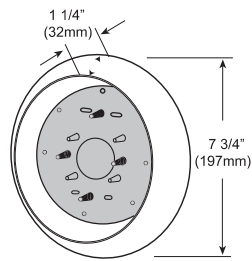
Size: 7 3/4" round, std. depth

Type: Surface mount escutcheon

Construction: Heavy gauge stainless steel

Application: Vandal resistant indoor/outdoor, wired.

For Switch Series: CM-40



MODEL: CM-49

Size: 8 3/4" round, 1 13/16" depth

Type: 2 pcs. surface or semi flush. Gasket and adapter plate included

Construction: Flame and impact resistant black polymer (ABS)

Application: Indoor/outdoor wired or wireless

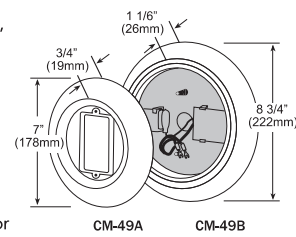
- CM-49A: Semi flush on single gang electrical box

- CM-49B: Surface must be used with CM-49A

- CM-49C: Adapter plate for double gang and 4" square box

- CM-49G: Gasket

For Switch Series: CM-40



4 1/2" ROUND MOUNTING ENCLOSURES - FLUSH

MODEL: CM-57GR

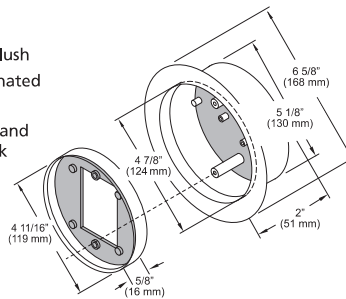
Size: 6 5/8" Round, flush

Type: AURA™ Illuminated flush box

Construction: Flame and Impact resistant black polymer (ABS)

Application: Flush 4 1/2" round push plate switch enclosure, room for wireless

For Switch Series: CM-40, SPDT models only



MODEL: CM-57CBL

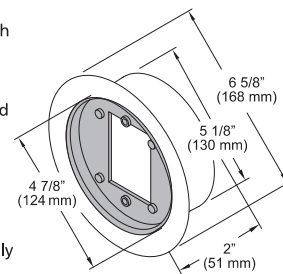
Size: 6 5/8" Round, flush

Type: Flush mount box, 2 pcs.

Construction: Flame and impact resistant black polymer (ABS)

Application: Indoor/outdoor

For Switch Series: CM-40, SPDT models only



6" ROUND MOUNTING ENCLOSURES - SURFACE

MODEL: CM-69S

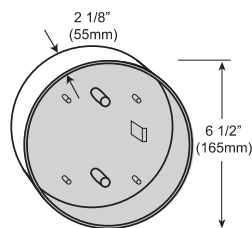
Size: 6 1/2" round, std. depth

Type: Surface mount box

Construction: Flame and impact resistant black polymer (ABS)

Application: Indoor/outdoor, wired or wireless

For Switch Series: CM-60



MODEL: CM-89S

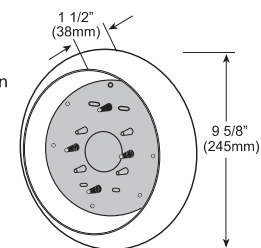
Size: 9 5/8" round, std. depth

Type: Surface mount escutcheon

Construction: Heavy gauge stainless steel

Application: Vandal resistant indoor/outdoor, wired.

For Switch Series: CM-60



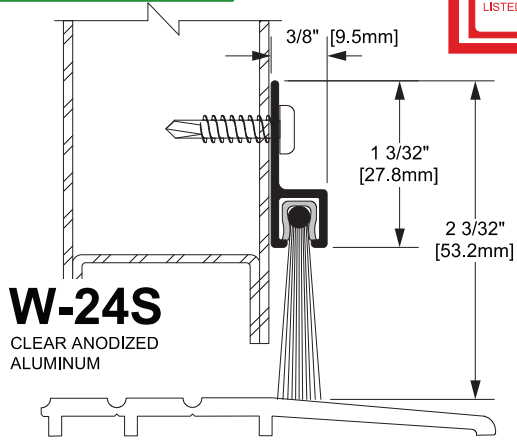
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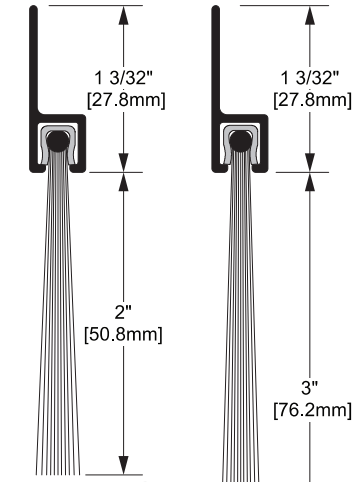
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Submittal Date: June 21/21, Rev July 27/21

SWEEPS

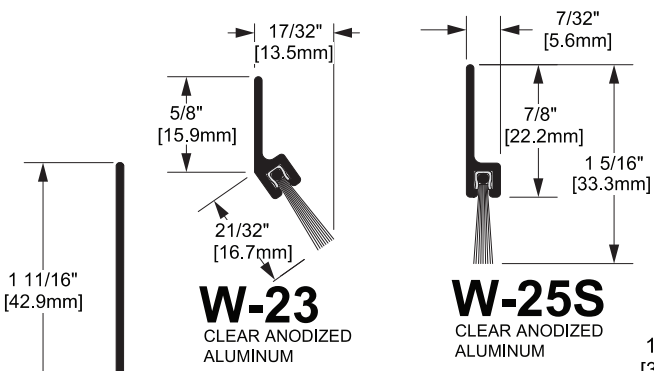


W-24S
CLEAR ANODIZED ALUMINUM



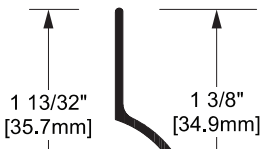
W-33S
CLEAR ANODIZED ALUMINUM

W-34S
CLEAR ANODIZED ALUMINUM



W-23
CLEAR ANODIZED ALUMINUM

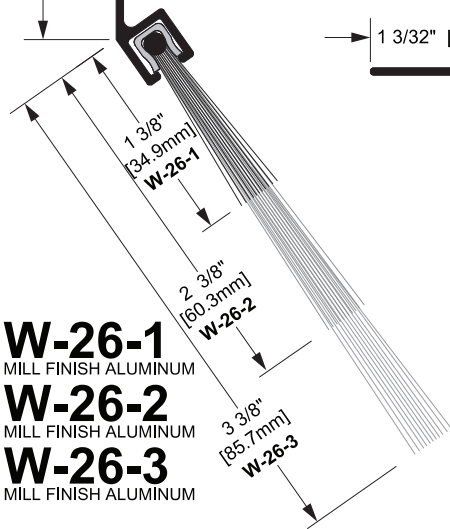
W-25S
CLEAR ANODIZED ALUMINUM



W-35-1
CLEAR ANODIZED ALUMINUM

W-35-2
CLEAR ANODIZED ALUMINUM

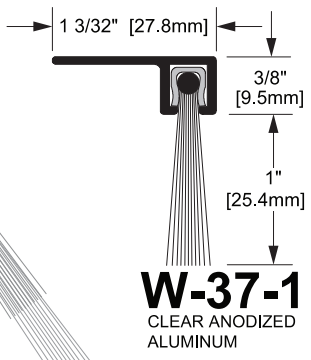
W-35-3
CLEAR ANODIZED ALUMINUM



W-26-1
MILL FINISH ALUMINUM

W-26-2
MILL FINISH ALUMINUM

W-26-3
MILL FINISH ALUMINUM



W-37-1
CLEAR ANODIZED ALUMINUM



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STANDARD POWDER COAT FINISHES

LCN powder coating provides superior protection against the effects of weather conditions and is an environmentally friendly process. The high quality, chip resistant finish is far superior to any previously offered. Corrosion resistance surpasses 100 hours salt spray testing (four times the industry standard). Non-metallic components also provide the same high resistance to the effects of the elements. All LCN products must be shipped with a finish.

**LCN STANDARD FINISHES
(CLOSEST BHMA EQUIVALENT):**

ALUM ALUMINUM (BHMA 689)



DKBRZ DARK BRONZE (BHMA 695)



STAT STATUARY BRONZE (BHMA 690)



LTBRZ LIGHT BRONZE (BHMA 691)



BLK BLACK (BHMA 693)



BRASS BRASS (BHMA 696)



OPTIONAL CUSTOM POWDER COAT FINISHES

LCN offers custom powder coating to provide a custom appearance and all the corrosion resistance of standard powder coat finishes at a nominal additional cost. LCN uses the RAL numbering system for the 150+ custom colors available. Contact your local SSC representative for a brochure showing the available custom colors. Note: Custom powder coat finishes require a metal cover.

OPTIONAL PLATED FINISHES

Visible components such as metal covers, arms, fasteners, and finish plates are plated to match the selected finish. Surface mounted tracks are powder coated to compliment the plated finish. Hidden assemblies such as cylinders, tracks, and mounting plates are supplied with a powder coated finish. Plated finishes require handing of closers.

LCN PLATED FINISHES:

US 3	Bright Brass (BHMA 632)
US 4	Satin Brass (BHMA 633)
US 10	Satin Bronze (BHMA 639)
US 11	Satin Bronze (BHMA 643)
US 15	Satin Nickel (BHMA 646)
US 26	Bright Chrome (BHMA 651)
US 26D	Satin Chrome (BHMA 652)

LCN PAINTED FINISHERS

Aluminum	ALUM (BHMA 689)
Dark Bronze	DKBRZ (BHMA 695)

SPECIAL RUST INHIBITING (SRI) PROCESS

For installations where a higher level of protection against weather conditions, or the effects of a potentially corrosive atmosphere is required, LCN offers a special rust inhibiting (SRI) process. Ferrous metal components receive an SRI pretreatment and a standard powder coat finish of your choice, or a custom powder coat finish for a nominal additional cost. Closers treated with the SRI process exceed the 100 hour protection level available with standard LCN powder coated finishes. For details, contact your local SSC representative or the LCN factory.

STANDARD ANODIZED FINISHES

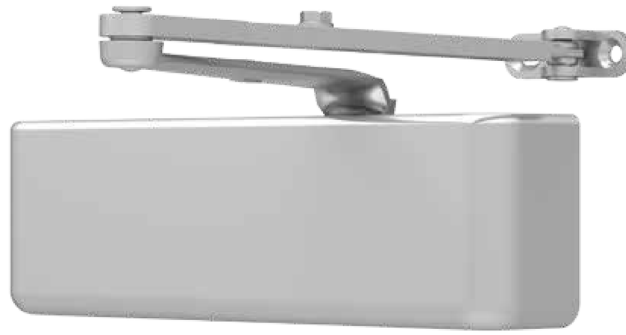
LCN Senior Swing & Benchmark electromechanical power operators are offered with an anodized finish. Anodizing is an electrochemical process that thickens and toughens the protective oxide on aluminum metal.

LCN ANODIZED FINISHES:

Aluminum	ANCLR (BHMA 628)
Dark Bronze	ANDKBRZ (BHMA 710)

4040XP Series

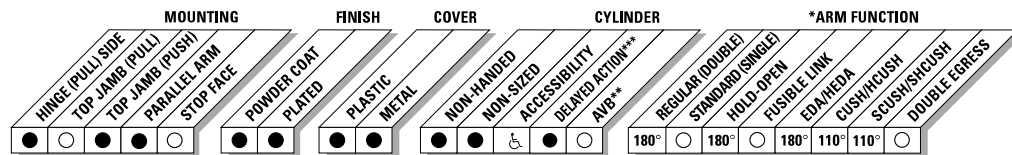
Features



The 4040XP is LCN's most durable and flexible heavy duty closer designed for institutional and other demanding high traffic applications.

Certifications	Grade 1 - ANSI A156.4, UL 10C, ADA, 100 Hour Salt Spray, Meets BAA - Buy American Act	Cover	<ul style="list-style-type: none"> ■ Plastic, Standard ■ Metal, Optional
Body Construction	<ul style="list-style-type: none"> ■ Cast Iron Body ■ Full Complement Bearings ■ 1-1/2" Diameter Piston ■ 3/4" Diameter Double Heat Treated Pinion Journal 	Fasteners	Self Reaming and Tapping Screws (SRT)
Fluid	All Weather Liquid X Fluid	Mounting	Hinge (Pull Side), Top Jamb (Push Side), Parallel Arm (Push Side)
Handing	Non-Handed	Arms	Regular Arm
Templating	Peel-n-Stick templates - 2-1/4" x 5" Mounting Hole Pattern	Finishes/Colors/ Powder Coat	<ul style="list-style-type: none"> ■ Aluminum (689) ■ Statuary Bronze (690) ■ Light Bronze (691) ■ Black (693) ■ Dark Bronze (695) ■ Brass (696) ■ Custom colors optional ■ Optional SRI primer - powder coat only ■ Optional plated finishes
Size	Adjustable Spring Size 1-6, includes Patented Green Dial		
Warranty	30 years		

Special Templates | Customized installation templates or products may be available to solve unusual applications. Contact LCN Product Support for assistance.



● AVAILABLE
○ NOT AVAILABLE

♿ Closer available with less than 5.0 lbs. opening force on 36" door.
* Maximum opening/hold-open point with standard template.
** Advanced Variable Backcheck.
*** Delay feature incorporates standard 4040 cylinder (not XP).

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Arms

4040XP Series

Accessories



4040XP-3077
Regular Arm

- Non-handed
- Mounts pull side or top jamb with shallow reveal P4041 closer includes PA SHOE, 4040XP-62PA required for parallel arm mounting



4040XP-3077L
Long Arm

- Non-handed
- Includes LONG ROD AND SHOE, 4040XP-79LR for top jamb mount
- Optional



4040XP-3077ELR
Extra Long Arm

- Non-handed
- Includes EXTRA LONG ROD AND SHOE, 4040XP-79ELR for top jamb mount with deep reveal
- Optional



4040XP-3049
Hold-Open Arm

- Non-handed
- Mounts pull side or top jamb with shallow reveal, hold-open adjustable shoe
- 4040XP closer includes 4040XP-62PA shoe required for parallel arm mounting
- Optional



4040XP-3049L
Long Hold-Open Arm

- Non-handed
- Includes LONG HEAD AND TUBE, 4040XP-3048L for top jamb mount
- Optional



4040XP-3077EDA
Extra Duty Arm

- Non-handed
- Features forged, solid steel main and forearm for potentially abusive installations
- Optional



4040XP-3049EDA
Hold-Open Extra Duty Arm

- Handed
- Parallel arm features forged, solid steel main and forearm for potentially abusive installations
- Hold-open function is adjusted at the shoe
- Optional



4040XP-3077EDA/62G
Extra Duty Arm with 62G

- Non-handed
- Features forged, solid steel main and forearm for potentially abusive installations
- 62G shoe provides additional blade stop clearance
- Optional



4040XP-3049EDA/62G
Hold-Open Extra Duty Arm with 62G

- Handed
- Features forged, solid steel main and forearm for potentially abusive installations
- 62G shoe provides additional blade stop clearance. Hold-open function is adjusted at the shoe
- Optional



4040XP-3077CNS
Cush-N-Stop® Arm

- Non-handed
- Features solid forged steel main arm and forearm with stop in soffit shoe.
- Optional



4040XP-3049CNS
HCUSH Arm

- Non-handed
- Hold-open function with templated stop/hold-open points
- Handle controls hold-open function
- Optional



4040XP-3077SCNS
Spring CUSH Arm

- Non-handed
- For abusive applications features solid forged steel main arm and forearm with spring loaded stop in the soffit shoe
- Optional



4040XP-3049SCNS
Spring HCUSH Arm

- Non-handed
- For abusive applications features solid forged steel main arm and forearm with spring loaded stop in the soffit shoe
- Handle controls hold-open function
- Optional

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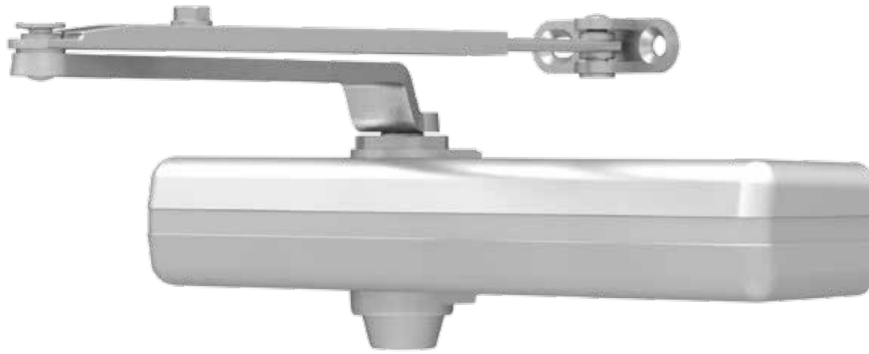
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1460 Series

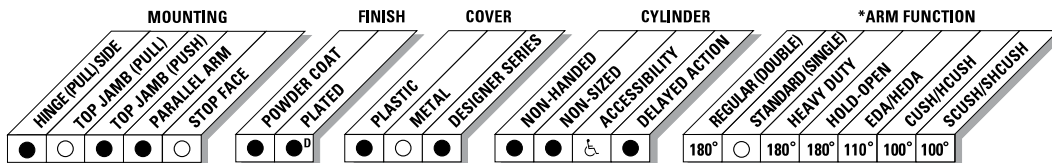
Features



Designed for maximum versatility, the 1460, available with multiple cover options, can be used for both commercial and institutional applications. This fully universal closer offers a wide variety of options and fast and accurate installation.

Certifications	Grade 1 - ANSI A156.4, UL 10C, ADA, 100 Hour Salt Spray, Meets BAA - Buy American Act	Cover	<ul style="list-style-type: none"> ■ Slim Line Plastic, Standard ■ Full Plastic and Metal Designer Series, Optional
Body Construction	<ul style="list-style-type: none"> ■ Cast Iron Body ■ Full Complement Bearing ■ 1-1/4" Diameter Piston ■ 3/4" Diameter Single Heat Treated Pinion Journal 	Fasteners	Self Reaming and Tapping Screws (SRT)
Fluid	All Weather Fluid	Mounting	Hinge (Pull Side), Top Jamb (Push Side), Parallel Arm (Push Side)
Handing	Non-Handed	Arms	Standard regular pull side, and top jamb
Templating	Peel-n-Stick templates - 1" x 7-1/2" Mounting Hole Pattern	Finishes/Colors/ Powder Coat	<ul style="list-style-type: none"> ■ Aluminum (689) ■ Statuary Bronze (690) ■ Light Bronze (691) ■ Black (693) ■ Dark Bronze (695) ■ Brass (696) ■ Custom colors optional ■ Optional SRI primer - powder coat only ■ Optional plated finishes
Size	Adjustable Spring Size 1-6, Includes Patented Green Dial		
Warranty	30 years		

Special Templates | Customized installation templates or products may be available to solve unusual applications. Contact LCN Product Support for assistance.



● AVAILABLE
○ NOT AVAILABLE

♿ Closer available with less than 5.0 lbs. opening force on 36" door.
* Maximum opening/hold-open point with standard template.
D = For designer series only.

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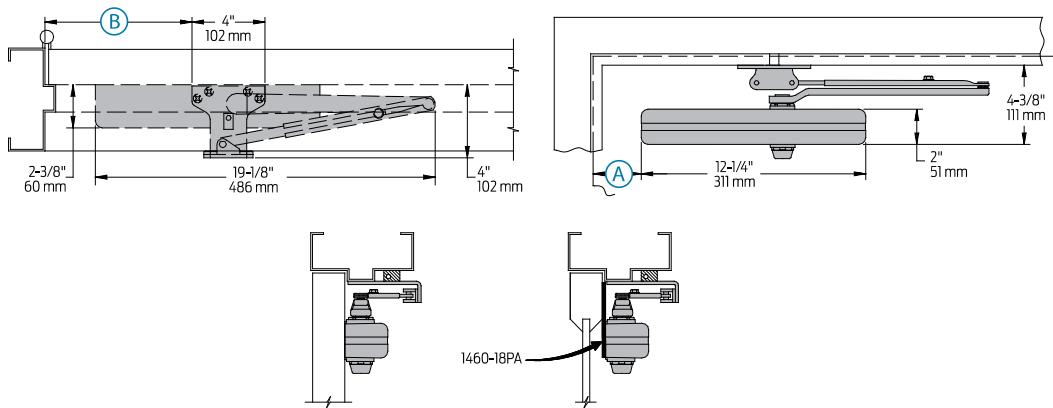
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1460 Series

Mounting details

Parallel Arm (Push Side) Mounting



Butt Hinges	Should not exceed 5" (127 mm) in width
Auxiliary Stop	Recommended at hold-open point, where a door cannot swing 180°, or where CUSH-N-STOP arm is not used
Top Rail	<ul style="list-style-type: none"> Less than 4-3/8" (111 mm) measured from the stop requires PLATE, 1460-18PA. With Full cover, use PLATE, 1460-18PAFC Plate requires 1-3/4" (44 mm) minimum. Plate requires 1-1/4" (32 mm) minimum With Designer Series metal cover, use PLATE, 1460-18PADSI
Clearance	1460-62PA shoe projects 4" (102 mm) from door face
Head Frame	Flush or single rabbeted requires PA SHOE ADAPTER, 1460-419
Stop Width	Minimum 1" (25 mm)
Blade Stop	Clearance, requires 1/2" (13 mm) BLADE STOP SPACER, 1460-61
Auxiliary Shoe	<ul style="list-style-type: none"> 1460-62A allows installation of regular arm with overhead holder/stop Special templating required
Delayed Action	<ul style="list-style-type: none"> Add suffix "DEL" to selected cylinder (eg, P1460 DEL) Delays closing from maximum opening to approximately 75° Delay time adjustable up to approximately 1 minute
Maximum opening	Regular or hold-open arm can be templated to 100°: A = 4-1/4" (108 mm) B = 9-1/4" (235 mm) or 180°: A = 1-3/4" (44 mm) B = 6-3/4" (171 mm) Hold-open points up to maximum opening with hold-open arm.

Notes:

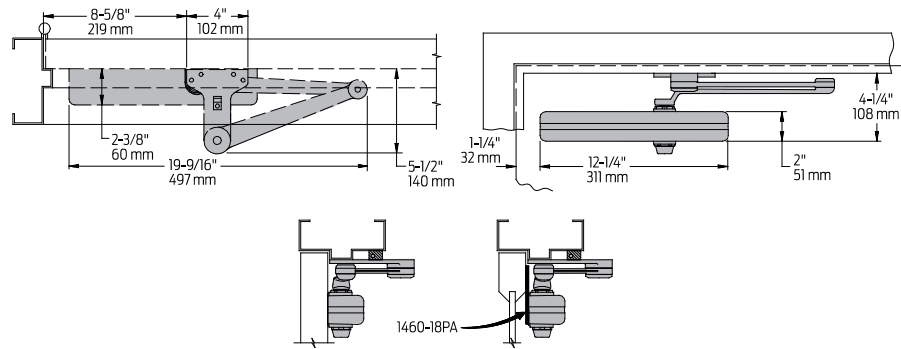
- Optional mounting requires PA SHOE, 1460-62PA for REGULAR or HOLD-OPEN arms. Add prefix "P" to closer description (e.g. P1460)
- P1460 closer includes 1460-201 FIFTH HOLE SPACER to support PA SHOE.

1460 Series

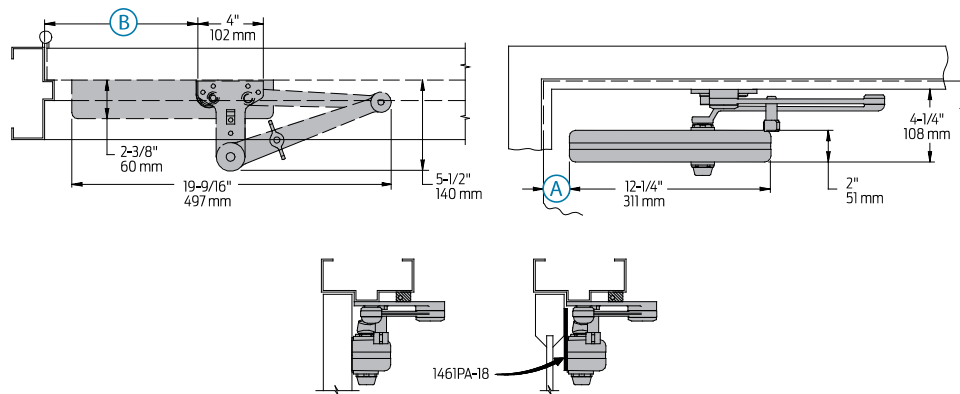
Mounting details

EDA and CUSH mounting

EDA mount



CUSH mount

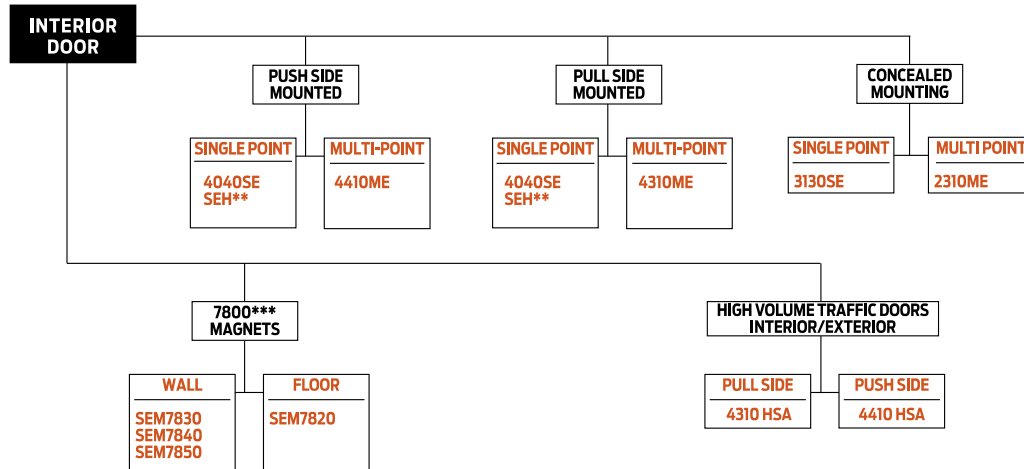


Spring CUSH	Hold open points are approximately 5° less than dead stop point
Clearance	1460-62EDA or CUSH shoe projects 5-1/2" (140 mm) from door face
Head Frame	Flush or rabbeted requires PA FLUSH PANEL ADAPTER, 1460-419
EDA or CUSH ARM	Requires SHOE SUPPORT, 1460-30 for fifth screw anchorage where reveal is less than 3-1/16" (78 mm)
Maximum opening	EDA template allows 110° Hold-open point up to maximum opening
	CUSH arms can be templated for maximum opening/hold-open point at
	85°: A = 2-3/8" (60 mm) B = 9-9/16" (243 mm)
	90°: A = 1-5/8" (41 mm) B = 9-1/16" (230 mm)
	100°: A = 5/8" (16 mm) B = 8-1/16" (205 mm)

Note:
• 1460 closers ordered with EDA, CUSH or SPRING CUSH arms include 1460-201 FIFTH HOLE SPACER to support the shoe

Product selection guide

SENTRONIC® Series LCN closer/holders combine heavy duty closers with electrically controlled hold-open functions to control fire and smoke barrier doors. This guide is based on the desired mounting of the unit.



** See SEH section (cylinder not included).
*** SEM 7800 Series are die cast.

Product comparison

This chart shows a basic comparison of Sentronic closer/holders. Refer to the specific product chapter for complete details.

CLOSER SERIES	MOUNTING					FINISH		COVER		CYLINDER			*ARM FUNCTION									
	HINGE (PULL) SIDE	TOP JAMB (PUSH)	STOP FACE (PUSH)	CONCEALED (FRAME)	CONCEALED (DOOR)	POWDER COAT	PLATED	PLASTIC	METAL	HANDED	NON-SIZED	SIZED	SINGLE POINT HOLD-OPEN	MULTI-POINT HOLD-OPEN	BYPASS 80/140	STANDARD (SINGLE)	REGULAR (DOUBLE)	SWING FREE	DOUBLE EGRESS			
3130SE	○	○	○	○	●	●	●	○	○	●	○	●	○	○	○	○	○	○	110°	○	○	○
4040SE	●	○	●	○	○	●	●	●	●	○	●	○	○	○	○	○	○	○	110°	○	○	95°
2310ME	○	○	○	●	○	●	●	○	○	●	○	○	○	○	○	○	○	○	160°	○	○	○
4310ME	●	○	○	○	○	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	160°	95°
4410ME	○	●	○	○	○	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	150°	○
4310HSA	●	○	○	○	○	●	●	○	○	○	○	○	○	○	○	○	○	○	160°	○	○	95°
4410HSA	○	●	○	○	○	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	150°	○

● AVAILABLE
○ NOT AVAILABLE

* Maximum hold-open with standard template. See individual closer series for degrees of opening and hold-open per installation.

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**Fire/
Life Safety
Closers/
Holders Series**

SENTRONIC® CLOSER/HOLDERS

Automatic detection and containment of fire and smoke are the best ways to minimize danger to life and property. Patented Sentronic door closer/holders are designed to hold swinging doors open in normal use and release and automatically close the doors under fire conditions. Conforms to major building codes, life safety codes (eg. NFPA 101) and ANSI A156.15.

SINGLE POINT HOLD-OPEN (SE)

SE Series offers adjustable single point hold-open function controlled by solenoid assembly located in the SE track.

MULTI-POINT HOLD-OPEN (ME)

ME Series offers infinitely adjustable, multi-point hold-open function controlled by solenoid on the cylinder assembly.

HOLDER SCANNER ACTIVATED (HSA)

Electronically controlled closer/holder designed to provide easy passage for groups of pedestrians through high traffic doors. Best suited for high traffic emergency exit doors.

MAGNETS (SEM) - ELECTROMAGNETIC DOOR HOLDERS

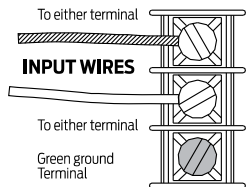
SEM Series magnets work with manual door closers to provide single point hold-open. Now available in new **tri-voltage** with 35 lbs. of holding force.

APPLICATIONS

- For fire and smoke barrier doors.
- Integrated into larger system.
- Surface and concealed mountings.
- Remote control hold-open function of executive and conference area doors.
- Adapter plates and other installation accessories available for unusual conditions.

GENERAL NOTES

- Note 1: For installations where 120V AC input voltage is supplied, 120V/24V transformer, 4040SE-3210, is required to reduce line voltage for 24V holding solenoid. Units are available in either 24V or 120V input, please specify.
- Note 2: Transformer 4040SE-3210 mounted on cover plate to fit 4" (102 mm) x 4" x 2-1/8" (54 mm) junction box (by others).
- Note 3: SE track quick-connector is required for 1/2" conduit.
- Note 4: SE test switch assembly includes fuse to protect solenoid. Works with ionization, photoelectric and heat sensing detectors (by others).



SE WIRING DIAGRAM

LISTINGS AND APPROVALS

Sentronic closer/holders are listed by Underwriters Laboratories, Inc. in the following product categories under FIRE DOORS (GSNV), Combination Door Closers and Holders (GTIS) file R7050, SEM 7800 Series magnets are listed under Door Holders (GTPR) file R8327.

Consult the factory for other listings, such as; cUL, Department of Labor and Industry of the Commonwealth of Pennsylvania, The Board of Standards and Appeals of the City of New York, Fire and Panic Safety Standards of the California State Fire Marshal.

HOLDING SOLENOIDS CURRENT DRAW

SE/ME

24V AC/DC (+10% -15%) @ 90 mA max.
120V AC/DC (+10% -15%) @ 30 mA max.

SEM (TRI-VOLT)

12V DC (+10% -15%) @ 30 mA max.
24V AC/DC (+10% -15%) @ 20 mA max.
120V AC (+10% -15%) @ 20 mA max.

HSA

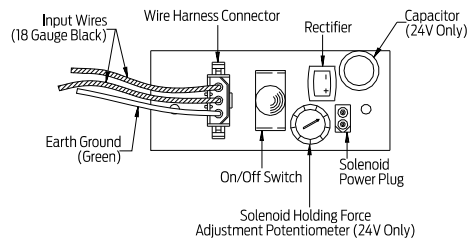
24V AC/DC (+10% -15%) @ 120 mA max.

TRANSFORMER DATA

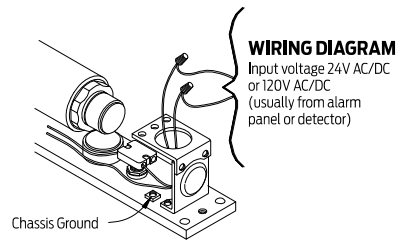
120V AC 50-60 Hz (primary); 24V AC @ 400 mA max. (secondary)
An LCN supplied transformer will power (recommended) 2 SE, 3 SE/ME, and 15 SEM.

ME WIRING

ME "ON/OFF" switch assembly includes trim pot to adjust pull out force and fuse to protect solenoid.



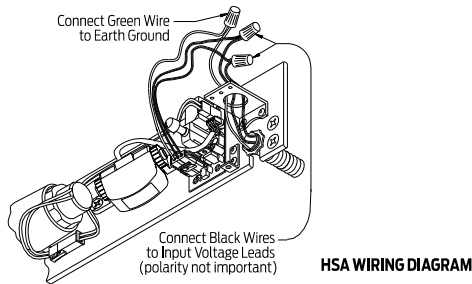
ME (4310, 4410) WIRING DIAGRAM (24V only)



ME (2310) WIRING DIAGRAM

HSA WIRING

HSA "On/Off" switch assembly includes trim pot to adjust hold-open time and fuse to protect solenoid.



FEATURES COMMON TO FIRE/LIFE SAFETY CLOSERS

- 24V AC/DC or 120V AC input, please specify for SE or ME.
- When current is interrupted, hold-open releases and door closes.
- Adjustable hydraulic backcheck cushions opening swing prior to 90°.
- Separate regulation of general closing speed and latching speed.
- Available in a wide range of powder coated finishes to blend with door and frame. SEM magnets available in Aluminum and Dark Bronze only.
- Circuit automatically handles AC or DC input.
- Can be pushed safely and easily out of hold-open.
- Functions as a full rack and pinion door closer when hold-open is not engaged or current is interrupted.
- Works with ionization, photoelectric and heat sensing detectors (by others).

WARRANTY

2 year limited warranty. See General Information Section for complete warranty details.

SPECIFICATIONS

Refer to "SPECIFICATIONS" section for suggested architectural specifications.

DESIGN ASSISTANCE

LCN has been providing reliable solutions to unique door control problems since 1925.

Contact LCN for assistance or technical information at **877-671-7011** or FAX **800-248-1460 (order entry)**, Fax **815-879-1495** for Application Engineering.

MATERIALS

- High strength **cast iron** cylinder.
- **Forged steel** main arm.
- One piece **forged steel** piston.
- **All weather fluid** eliminates seasonal adjustments.
- **High efficiency, full complement**, low friction bearings.
- Tamper resistant regulating screws.
- Quiet, low friction track and roller combination for all single lever arm closers.

FINISHES

- Available in six standard or a wide selection of optional custom powder coat finishes to blend with door and frame.
- LCN's powder coat finishes surpass 100 hours of salt spray which is over four times the ANSI standard for corrosion resistance.
- Plated finishes are available as an option to accent door and frame.

MAINTENANCE

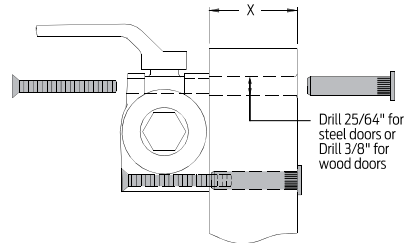
Closers mounted according to LCN installation instructions require no periodic adjustments. Quarterly inspections are recommended. Refer to the installation instructions for complete, product specific details.

POSITIVE PRESSURE

LCN closers have been certified for three hours by UL to be in compliance with UL 10 C. Contact LCN for specific details on door closer fire ratings.

FASTENERS

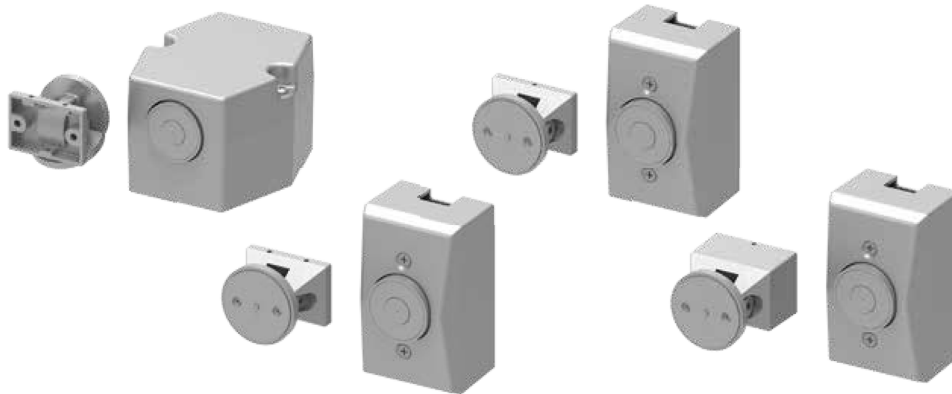
Standard WOOD and MACHINE SCREW (WMS) pack contains phillips head wood and machine screws to install the closer. Thru Bolts and/or TORX® machine screws are available for most closers. LCN thru bolts (TB) can be installed on 1-3/4" thick doors with either the 1/4-20 machine screws or optional TORX screws supplied with the closer. Optional sizes are available for 1-5/8" or 1-3/8" door thicknesses, but this must be specified when ordering.



NOTE 1: For Thru Bolts, specify door thickness if other than 1-3/4" (44 mm).
NOTE 2: Phillips head, metric machine screws are available on special order.

SEM7800 Series

Magnets



The Sentronic® SEM 7800 Series are heavy duty, electrically controlled door holding magnets. Magnets are fail safe and hold until the current is interrupted. A manual door closer is used to control and close the door. A choice of floor, recessed wall, or surface mounted wall magnets are available.

Certifications	Grade 1 - ANSI A156.15, UL 10C for metal smoke barrier or labeled door, ADA, Life Safety Code, NFPA 101, 100 Hour Salt Spray, Meets BAA - Buy American Act
Voltage	Tri-voltage design with 35 lbs. of holding force
Housing	Die cast
Fasteners	Wood and machine screw pack
Finishes/Colors/ Powder Coat	Available in Aluminum and Dark Bronze only
Options	Now available with armature extensions (see page 11)

LCN Door Control Catalog

phone: 877-671-7011 ■ fax: 800-248-1460 ■ www.allegion.com/us ■ 009426 rev.2/16

LCN®

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CDH

Commercial Doors & Hardware Ltd.
43 Millwick Dr.
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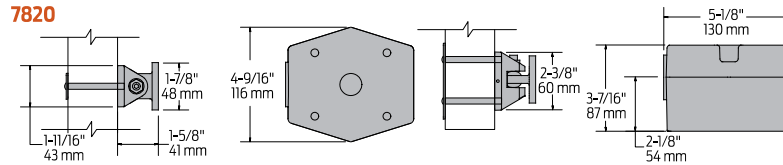
Submittal Date: June 21/21, Rev July 27/21

SEM7800 Series

Magnets

Features and mounting details

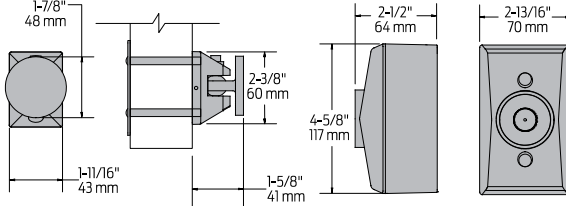
7820



Mounting Floor mounted

Total Projection 6-3/4" (171 mm)

7830

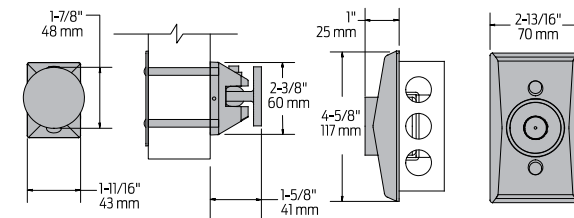


Mounting Surface wall mounted

Total Projection 4-1/8" (105 mm)

- Suitable for use in pocket door installations

7840



Mounting

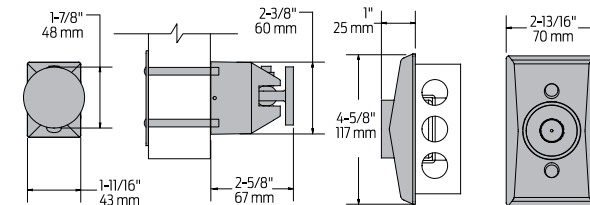
- Low profile recessed wall mount
- 2" (51 mm) x 4" (102 mm) x 1-1/2" (38 mm)

Total Projection 2-5/8" (67 mm)

- Suitable for use in pocket door installations

Note:
Outlet box not included.

7850



Mounting

- Standard profile recessed wall mount
- 2" (51 mm) x 4" (102 mm) x 1-1/2" (38 mm)

Total Projection 3-5/8" (92 mm)

- Suitable for use in pocket door installations

Note:
Outlet box not included.

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LCN

LCN Door Control Catalog

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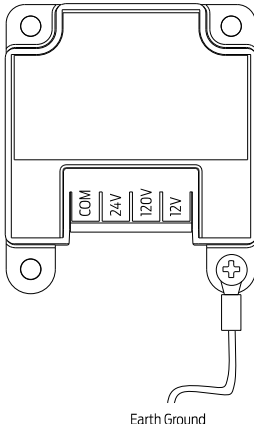
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Voltage input



Electrical schematic

Operation:
Electromagnets are typically used with fire alarm systems. Doors are held open in the non-alarm condition. When the fire alarm panel enters the alarm condition, power to the electromagnets is removed, the doors close under door closer control, and function as a manual door. When the fire alarm panel returns to the non-alarm condition, power is reapplied to the electromagnets and the doors can be held open again.

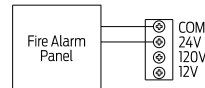


Fig. 1 24V AC/DC Wiring
Polarity is inimportant

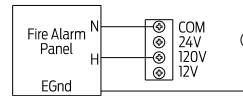


Fig. 2 120V AC Wiring

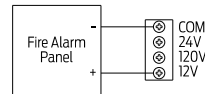


Fig. 3 12V DC Wiring
Polarity as shown

Electrical Specifications
Max. Current Draw
.030A @ 12VDC
.020A @ 24VAC/DC
.020A @ 120VAC

Holding Force	35 lbs. @ nominal input voltage
Maximum Current Draw	<ul style="list-style-type: none"> ■ .020A @ 24VAC/DC, 120VAC ■ .030A @ 12VDC

SEM Series

Accessories

Magnets



- SEM7820-516**
Floor Magnet
- Magnet coil
 - Standard



- SEM7830-516**
SEM7840-516
SEM7850-516
Wall Magnet
- Magnet coil
 - Standard

Armatures



- SEM7820-825**
SEM7830-825
SEM7840-825
Door Armature
- Die cast low profile armature
 - Standard



- SEM7850-828**
Door Armature
- Die cast armature
 - Standard

Cover



- SEM7830-72**
SEM7840-72
SEM7850-72
Standard Cover
- Die cast cover
 - Standard

Box



- SEM7830-268**
Wall Box
- Die cast surface wall mount box
 - Standard

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LCN[®]

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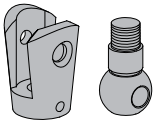
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Extensions



SEM7810-514
Coupler Assembly Kit

- Required for each door needing extension(s)
- Kit includes coupler link and ball pivot (alone serves as a 1-1/2" extension)



SEM7810-E050
Extension - 1/2"

- Metal
- Standard



SEM7810-E075
Extension - 3/4"

- Metal
- Standard



Extension, SEM7810-E100
Extension - 1"

- Metal
- Standard



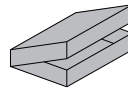
SEM7810-E200
Extension - 2"

- Metal
- Standard



Extension, SEM7810-E400
Extension - 4"

- Metal
- Standard



SEM7810-517
Extension kit

- Extension kit includes:
- 107810SEM-E050
 - 107810SEM-E075
 - 107810SEM-E100
 - 57810SEM-E200
 - 207810SEM-514

*Note: Using just the Coupler Assembly Kit (SEM7810-514) will create a 1-1/2" link.
Extension Links are available in different lengths and can be combined together to achieve the desired length. Max. recommended length = 12"*

SEM Series

Ordering Information

How-to-order SEM 7800 series magnets

Select magnet series

- SEM7820
- SEM7830
- SEM7840
- SEM7850

Specify finish

- Standard Powder Coat _____
- Aluminum, Dark Bronze

Magnets will be shipped with:

- Die cast housing
- Cover
- Armatures
- WMS screw pack

How-to-order SEM 7810 extensions

Select magnet series

- SEM7810-514 (qty.) _____
- SEM7810-E050 (qty.) _____
- SEM7810-E075 (qty.) _____
- SEM7810-E100 (qty.) _____
- SEM7810-E200 (qty.) _____
- SEM7810-E400 (qty.) _____
- SEM7810-517 (qty.) _____

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LCN Door Control Catalog

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Deadbolt designs

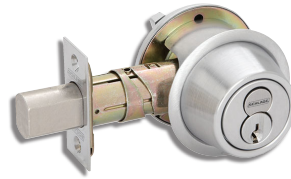
B500 Series

A versatile and economical Grade 2 deadbolt for medium duty commercial and heavy duty residential applications.

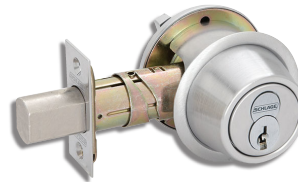
Furnished with conventional cylinder standard.

Available with Primus XP high security cylinder, Primus XP UL437 Listed high security cylinder, full size interchangeable core cylinder, Primus XP interchangeable core cylinder, or small format interchangeable core (SFIC) cylinder.

Fits 2 1/8" (54 mm) prep standard and anti-pry shield can be removed to fit 1 1/2" (38 mm) prep. See function charts for required cross bore dimensions.



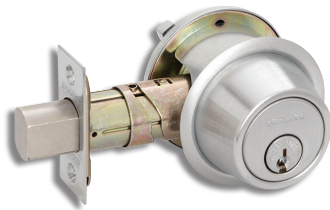
Full size interchangeable core



Small format interchangeable core



Thumbturn for B500

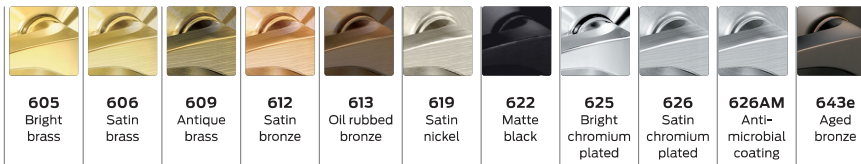


Design shown in 626 satin chrome plated



B500 Series with occupied indicator (B571); 61-509 Emergency key included

Deadbolt finishes



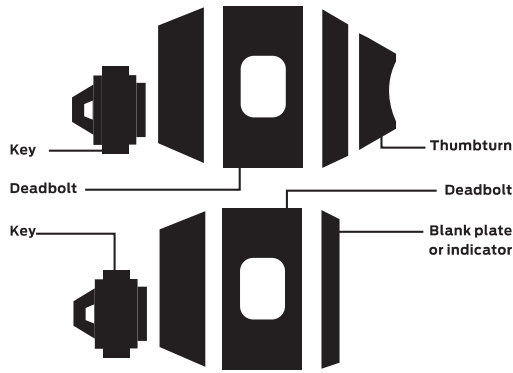
Product	605	606	609	612	613	619	622	625	626	626AM	643e
B500	•	•	•	•	•	•	•	•	•	•	•

e = an equivalent finish to the BHMA standard.



Deadbolt functions

ANSI A156.36 bored deadbolt locks



- Standard cylinder.
- FSIC - full size interchangeable core option.
- SFIC - small format interchangeable core option.
- Complies with ADA Accessibility Guidelines.

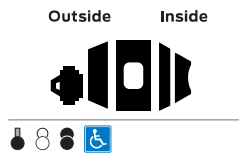
***Caution:**

Double cylinder locks on any door are a life safety hazard in times of emergency and their use is not recommended. Installation should be in accordance with existing codes only.

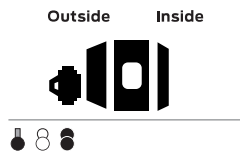
ADA compliant:

Schlage Lock Company offers a wide selection of locks designed to meet the Americans with Disabilities Act.

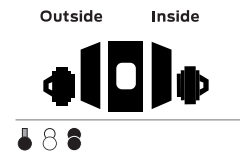
Schlage	ANSI
B560P	E0152
Single cylinder deadbolt	
<ul style="list-style-type: none"> ▪ Deadbolt thrown or retracted by key outside or thumbturn inside 	



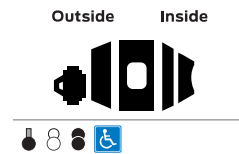
Schlage	ANSI
B561	E0162
Cylinder only x blank plate deadbolt	
<ul style="list-style-type: none"> ▪ Deadbolt thrown or retracted by key outside ▪ Blank plate with exposed screws inside 	



Schlage	ANSI
B562P*	E0142
Double cylinder deadbolt	
<ul style="list-style-type: none"> ▪ Deadbolt thrown or retracted by key either side ▪ Not UL rated 	



Schlage	ANSI
B563	E0172
Classroom deadbolt	
<ul style="list-style-type: none"> ▪ Deadbolt thrown or retracted by key outside ▪ Inside units retracts bolt only 	



Schlage	ANSI
B571	-
Door bolt occupancy indicator	
<ul style="list-style-type: none"> ▪ Deadbolt thrown or retracted by thumbturn inside ▪ Outside indicator displays "In use" or "Vacant" ▪ Requires 1 1/2" cross bore prep ▪ Not UL rated ▪ 61-509 Emergency key included 	

Schlage	ANSI
B580	E0192
Door bolt	
<ul style="list-style-type: none"> ▪ Deadbolt thrown or retracted by trim unit only ▪ Requires 1 1/2" cross bore prep 	

Schlage	ANSI
B581	E01112
Door bolt with trim	
<ul style="list-style-type: none"> ▪ Deadbolt thrown or retracted by trim unit only ▪ Blank plate outside ▪ Requires 1 1/2" cross bore prep 	

B500

Schlage · B Series · 15



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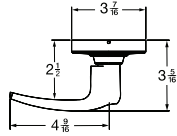
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Designs and finishes

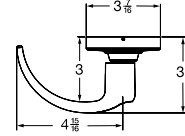
Lever designs and finishes

Athens (ATH)²



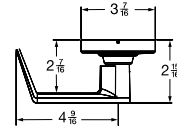
- Mechanical
- Wired electrified
- Wireless electronic

Sparta (SPA)^{1,2}



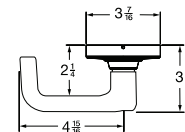
- Mechanical
- Wired electrified
- Wireless electronic

Rhodes (RHO)^{1,2}



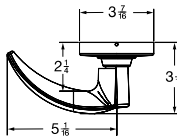
- Mechanical
- Wired electrified
- NDE wireless electronic

Tubular (TLR)^{1,2}



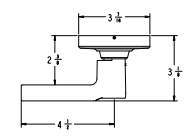
- Mechanical
- Wired electrified
- Wireless electronic

Omega (OME)¹



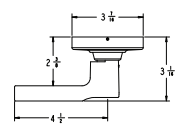
- Mechanical
- Wired electrified
- Wireless electronic

Latitude (LAT)



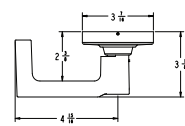
- Mechanical
- Wired electrified
- Wireless electronic

Broadway (BRW)



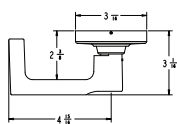
- Mechanical
- Wired electrified
- Wireless electronic

Longitude (LON)



- Mechanical
- Wired electrified
- Wireless electronic

Boardwalk (BWK)



- Mechanical
- Wired electrified
- Wireless electronic

All levers comply with the Americans with Disabilities Act (ADA).

- 1 Boardwalk, Longitude, Omega, Rhodes, Sparta and Tubular levers comply with California State code for return within 1/2" of door face.
- 2 Athens, Rhodes, Sparta and Tubular levers support cylinders from other manufacturers, see cylinder section on page 24 for details.

Finish options										
Color	Bright brass	Satin brass	Satin bronze	Oil rubbed bronze	Satin nickel	Matte black	Bright chrome	Satin chrome	Aged bronze	
ANSI/BHMA number	605	606	612	613	619	622	625	626/626AM	643e	
US number	US3	US4	US10	US10B	US15	US19	US26	US26D	US11	
Mechanical	■	■	■	■	■	■	■	■	■	■
Wired electrified	■	■	■	■	■	■	■	■	■	■
Wireless electronic	■	■	■	—	■	■	■	■	■	■

Product information and specifications contained in this catalog are subject to change without notice. Please consult the factory.



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33A/35A Mechanical options

Dogging options

LD Less dogging

Less Dogging is available in all 33A/35A Panic Exit devices to remove the dogging option.

To order, specify: 1. Use prefix LD, example LD33AL

CD Cylinder dogging

Cylinder dogging is available on all 33A/35A Panic Exit devices to replace the standard hex key dogging. Unit requires a standard 1 1/4" (32mm) mortise cylinder with a straight cam (Schlage Cam B502-191 reference).

To order, specify: 1. Use prefix, CD, example CD33AL

CDK Cylinder dogging kit

For field conversion, a cylinder dogging conversion kit is available. Cannot be added to fire exit hardware.

Order: 33A/99CDK or 35A/98CDK, specify finish



Dummy pushpad

The 330 dummy pushpad is designed as a companion unit for all 33A devices. The 350 dummy pushpad is a companion unit for all 35A devices. The pushpad is rigid or nonfunctioning. A push/pull operation can be accomplished by using 386DT, 360L-DT, 550DT, 392-6 trim or any Ives Pull.

The 330/350 can be equipped with a functional pushpad and will accommodate an RX switch. Specify RX-330. May also be equipped with the RX2, double RX switch. Specify RX2-330

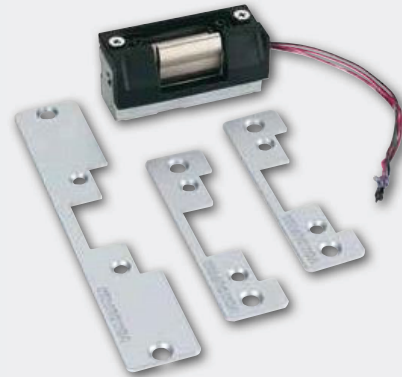
To order, specify:

- 1, 330 or 350
- 2, Size 3' or 4' (914mm or 1219mm)
- 3, Finish, US3, US4, US10, US26, US26D, US28, 313AN, 315AN, 350 Only US32D.

VON DUPRIN®

5100 Series

Electric strike for cylindrical locksets and deadlatches



Overview

The Von Duprin 5100 Series electric door strike has been designed to offer flexibility and convenience for locksmiths and security professionals alike. This easy-to-install electric strike was created for medium-duty applications, specifically to control traffic flow through interior and exterior openings in retail and commercial environments.

The 5100 electric strike is compatible with a wide range of cylindrical devices and is extremely versatile for field conversions. The combination of three faceplate options plus field selectable voltage and power fail modes allows it to be changed on the job site to create as many as 12 different configurations. An adjustable keeper also improves fit for applications with weather stripping or tight door preps. In short, the 5100 provides added convenience by ensuring the right parts are in the box to get the job done.

Like other Von Duprin strikes, the 5100 was developed to meet high standards and engineered for reliability and quality. Its durable construction and tamper-resistant design stands up to abuse and is tested to over one million cycles.

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Features and benefits

- Designed for cylindrical applications
- Capable of 12 in-field configurations
- Three faceplates standard in every box
- Field selectable 12/24 voltage
- Non-handed, internal solenoid design
- Field selectable power failure mode (fail-safe/fail-secure)
- Adjustable keeper improves fit on tight door preps
- Options include 12 and 24 VAC to VDC rectifier kits
- Available in three finishes to suite with existing hardware
- Suitable for interior and exterior doors
- UL 1034 listed for burglary-resistant electric door strikes
- Meets ANSI/BHMA A156.31, Grade 1 for endurance and dynamic strength
- Meets ANSI/BHMA A156.31, Grade 2, 1300 lbs static strength
- Dynamic strength 70 ft-lbs
- Endurance 1,000,000 cycles

5100 Series power requirements

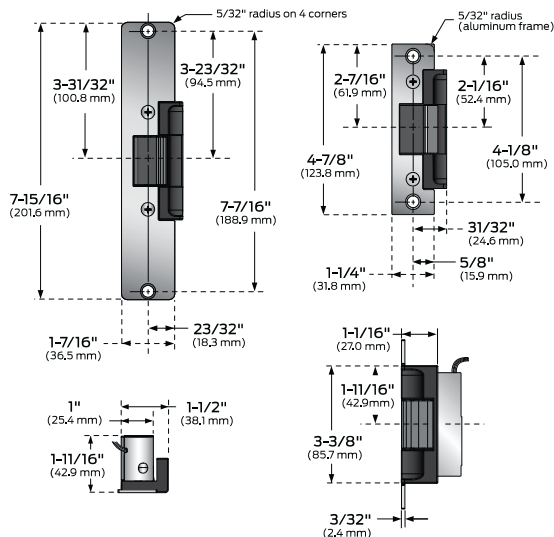
Model	Voltage	Current	Duty	Amps	Ohms
5100	12V	DC	Continuous	0.38	32
5100	24V	DC	Continuous	0.19	128

Continuous duty = Energized 1 minute or more

Model specifications

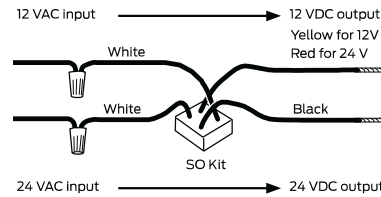
Model number	5100
Retrofits model	HES 5200, 7000, RCI 7 Series
Latchbolt throw	1/2" to 5/8" (1/2" keeper depth)
Face plate length	4 7/8" or 7 15/16"
Backbox depth	1 11/16"
Lockset	Cylindrical and deadlatch
Number of doors	Single
Frame type	Hollow metal, aluminum and wood
Certifications	UL 1034 burglary listing
Application notes	Versatile electric strike for aftermarket, covering multiple applications in one SKU.

Lockset compatibility: Keeper depth of 1/2" is sufficient to accommodate all cylindrical locks up to 5/8" throw and most aluminum narrow stile deadlatches.

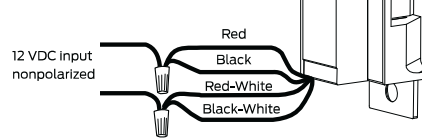


Solenoid power requirements; 12VDC, 0.38 A, 24 VDC, 0.19 A

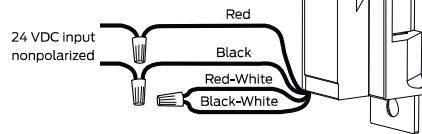
For DC operation, Von Duprin PS902 series power supply is recommended.
For AC operation, Von Duprin SO24 kit is recommended.



12 VDC strike wiring



24VDC strike wiring



Ordering information

5100-689-S024

Model	Finish	Rectifier kit*
1	2	3

* Optional

Selections correspond with the numbers above

1	Model
5100	Electric strike for cylindrical locksets
2	Finish
BHMA 689/US SP28	Aluminum
BHMA 622/US 19	Flat Black
BHMA 695/US SP313	Dark brown
3	Rectifier kit (optional)
S012	Converts 12 VAC voltage to 12 VDC to operate the solenoid
S024	Converts 24 VAC voltage to 24 VDC to operate the solenoid

Standard features

- Power failure mode: Field configurable fail-secure/fail-safe
- Voltage: Field configurable 12VDC/24 VDC dual voltage solenoid
- Mounting tabs and shims
- Self-adhesive neoprene filler for retrofits

About Allegion

Allegion (NYSE: ALLE) is a global pioneer in safety and security, with leading brands like CISA®, Interflex®, LCN®, Schlage® and Von Duprin®. Focusing on security around the door and adjacent areas, Allegion produces a range of solutions for homes, businesses, schools and other institutions. Allegion is a \$2 billion company, with products sold in almost 130 countries. For more, visit www.allegion.com.

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Submission Date: June 21/21, Rev July 27/21

Appendix '2'

Designated Substance Audit Report
71 pages

**ASBESTOS ABATEMENT SPECIFICATIONS
PAULINE JOHNSON PUBLIC SCHOOL**

ASBESTOS ABATEMENT SPECIFICATIONS
Pauline Johnson Public School

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At Rear:

Drawing No. 30089648-1 – Locations of Work Areas – First Floor Plan

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1.0 PART 1 – GENERAL

1.1 GENERAL

- .1 The requirements as set out in these specifications may, at times, exceed the procedures detailed in the various applicable regulations. All work shall be done in compliance with the specifications AND the regulations. Should there be any discrepancy or conflict between the documents, the most stringent shall apply.

1.2 OUTLINE OF WORK

- .1 The intent of the work is to remove select asbestos-containing materials to the extent practicable, in designated areas in the facility prior to renovations.
- .2 Replacement of removed materials is not part of this contract unless otherwise noted.
- .3 Coordinate all work with the General Contractor and sub trades as required.
- .4 Refer to architectural, mechanical and electrical drawings for additional details.
- .5 All mechanical and electrical isolations and disconnects required to facilitate asbestos abatement work will be performed by the General Contractor's sub trades prior to commencement of remedial work.
- .6 Florescent light tubes in ceiling assemblies being demolished by the asbestos abatement contractor will be removed by the General Contractor's sub trades prior to commencement of remedial work.
- .7 If required, electrical hookups of GFI panels will be performed by the General Contractor's licensed electrician in compliance to all regulatory requirements and codes.
- .8 Each negative pressure unit shall be integrity tested at the work site prior to commencement of asbestos removal operations.
- .9 Provide all supervision, labour, equipment, tools, materials, waste management, haulage and disposal, and other services, as required, for undertaking and completing all the work, as detailed below.
- .10 **Work Area 1 – Rooms 1, 1D, 2B, 3, 4, 14, 18, 18A, 18B, 20, 22, 25, 26, 28, 30 31, 31A, 31B and 32**
 - .1 Prepare the areas as indicated above and on the attached floor plans for Type 2 enclosure asbestos removal operations.
 - .2 Refer to Architectural Demolition Drawing A103 for additional details.
 - .3 Supply and install scaffolding in accordance with all applicable regulations, to provide sufficient and safe access to the work areas.
 - .4 Remove and dispose as clean demolition waste, select sections of T-Bar ceiling assemblies, as required, to access gypsum board enclosing ventilator units in Rooms 1, 2B, 3, 4, and 30 and to access gypsum board ceilings and bulkheads in Rooms 14, 20, 22, 28 and 32.

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- .5 Remove and dispose the following as asbestos waste:
 - .1 Entire gypsum board ceiling assemblies and bulkheads, including but not limited to, gypsum board and associated asbestos-containing joint compounds, light fixtures and ceiling and bulkhead support systems in Rooms 1D, 14, 18, 18A, 18B, 20, 22, 25, 26, 28, 31, 31A, 31B and 32. Light fixtures and ceiling and bulkhead support systems may be disposed as clean demolition waste provided, they are thoroughly cleaned of all dust and debris.
 - .2 Ceiling-mounted ventilator unit enclosures, including but not limited to, 12" non-asbestos-containing acoustic ceiling tiles, gypsum board and associated asbestos-containing joint compounds and enclosure support systems in Rooms 1, 2B, 3, 4 and 30. 12" acoustic ceiling tiles and enclosure support systems may be disposed as clean demolition waste provided, they are thoroughly cleaned of all dust and debris.

- .11 **Work Area 2 – Rooms 4A and 13A**
 - .1 Prepare the areas as indicated above and on the attached floor plans for Type 2 enclosure asbestos removal operations.
 - .2 Refer to Architectural Demolition Drawing A105 for additional details.
 - .3 Establish a measurable negative pressure differential in the enclosure work areas by using fan/filter units equipped with High Efficiency Particulate Air (HEPA) filters. Units must be integrity-tested on site and are to be exhausted directly outdoors.
 - .4 Remove and dispose as clean demolition waste, all baseboards.
 - .5 Using hand tools, remove and dispose as asbestos waste, all asbestos-containing vinyl floor tiles and associated asbestos-containing mastic.
 - .6 Using power tools (power grinders) that are attached to dust collecting devices equipped with HEPA filters, remove and dispose as asbestos waste, all asbestos-containing vinyl floor tile mastic applied to concrete floors. Mastic is to be completely removed from concrete floors.
 - .1 Dust collecting devices with HEPA filters (HEPA vacuums) that are attached to power tools, must have adequate CFM capacity to properly collect mastic and residual dust generated by the power grinding operations.
 - .2 All power tools used to remove mastics, must have an integral shrouding system designed to properly contain dust and debris generated by the power grinding operations.

- .12 **Work Areas 3 – Locations To Be Determined**
 - .1 Prepare locations pre-determined by the General Contractor for Type 2 asbestos removal operations.
 - .2 Supply and install scaffolding, in accordance with all applicable regulations, in order to provide sufficient and safe access to the work areas.

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- .3 During the rebuild phase, assist General Contractor's sub trades in attaching items to gypsum board applications with asbestos-containing joint compounds.
 - .4 Using power tools attached to dust collecting devices equipped with HEPA filters, mechanically fasten items supplied by the General Contractor to gypsum board applications with asbestos-containing joint compounds. The General Contractor will supply mechanical fasteners and items to be fastened and will clearly identify locations where attachments are required.
 - .5 For costing purposes, allow for two workers over a 10-hour shift (including travel time) per mobilization. Allow for two (2) separate mobilizations.
- .13 **Work Area 5 – To Be Determined**
- .1 Prepare locations pre-determined by the General Contractor for Type 2/glovebag asbestos removal operations.
 - .2 Supply and install scaffolding, in accordance with all applicable regulations, in order to provide sufficient and safe access to the work areas.
 - .3 Remove and dispose, as asbestos waste, accessible asbestos-containing thermal insulation from select piping to allow for modifications to mechanical systems and mechanical tie-ins. The General Contractor will clearly mark all locations for thermal insulation removals. For costing purposes, allow for twelve glovebag removal operations of less than one square metre of asbestos thermal insulation per glovebag location per mobilization. For costing purposes allow for two workers over a 10-hour shift (including travel time) per mobilization. Allow for one (1) separate mobilization.
- .14 Vinyl floor tiles contain 0.97% chrysotile asbestos. Vinyl floor tile mastic contains 5% chrysotile asbestos. Joint compounds on gypsum board applications contain 1.6% chrysotile asbestos. Thermal insulation on pipe fittings contains 60% chrysotile asbestos.
- .15 All waste is to be removed from the site and disposed. Asbestos waste disposal bins are not to be left on School property unless fully enclosed with an integral metal roof system and locked. Disposal bins must be removed immediately on completion of work.
- .16 **Schedule**
- | | | |
|----|------------------------------|---|
| .1 | Mobilization | To be Coordinated with the General Contractor |
| .2 | Complete Work and Demobilize | To be Coordinated with the General Contractor |

1.3 GENERAL REQUIREMENTS

- .1 The location and availability of utilities including water, sewer and electrical power is to be determined on site. The Asbestos Contractor shall co-operate with all others on site. Should there be any disagreement, or should Contractors be unable to reach a satisfactory working arrangement, the Asbestos Consultant shall determine the manner for proceeding. The Asbestos Contractor shall not be entitled to any additional payment.

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- .2. The Asbestos Contractor is responsible for making all arrangements, and for paying for the disposal of all waste materials in accordance to all applicable government laws and regulations including local, provincial and federal.
- .3. The Asbestos Contractor is advised that extended hours of work may be required to meet the schedules as detailed in the Scope of Work and shall allow for the cost thereof including shift premiums and overtime. The Asbestos Consultant shall be advised in writing at least four days in advance of the proposed working hours.
- .4. The Asbestos Contractor shall furnish and post on site the name and current phone number of an authorized representative(s) who can be contacted on a 24-hour basis in case of an emergency.
- .5. All precautions will be taken to prevent the spread of contaminated material and to protect all parties including Asbestos Contractor's personnel, Owner's employees and the public from asbestos dust exposure during the course of the work. The documents outline the minimum levels of precaution to be taken.
- .6. **All work shall be done in compliance with the specifications and the Ontario Regulation 278/05 – Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations – made under the Occupational Health and Safety Act.** Should there be any discrepancy or conflict between the documents, the most stringent shall apply.
- .7. Contract conditions include, but are not limited to, complying with all Regulations, taking all precautions necessary to control the release of asbestos fibres within the work areas, preventing the release of asbestos fibres outside the work areas, and providing appropriate protection from exposure to asbestos fibres for all parties. Failure to meet any of these conditions will be considered a fundamental breach of the Contract.
- .8. The Asbestos Consultant will visit the site at his/her discretion to familiarize himself/herself with the progress and quality of the Work and to determine if the Work is proceeding in accordance with the Contract Documents.
- .9. The Asbestos Consultant shall have the authority to immediately stop the Work through a written instruction if, in his opinion, the Work does not conform to the requirements of the Contract Documents, or if continuance of the Work could subject the Owner, his employees or the public to a hazardous condition. The Work shall not recommence until such time as the deficiency or hazardous situation has been corrected and a written notice to proceed has been issued by the Asbestos Consultant.
- .10. If the Asbestos Contractor fails to comply with requirements dealing with the control of asbestos fibres and the health and safety of Asbestos Contractor employees, Asbestos Consultant and Owner personnel or the Public, the Owner, or the Owner's representative, may verbally instruct the Asbestos Contractor to cease work immediately with written confirmation to follow within two working days. If the Asbestos Consultant gives a written statement to the Owner and the Asbestos Contractor that sufficient cause exists, the Owner may notify the Asbestos Contractor in writing that he is in default of his contractual obligations.
- .11. Any employee shall be replaced, at the written request of the Asbestos Consultant, if working, or causing others to work, in violation of O.Reg. 278/05.

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- .12 The Asbestos Contractor's insurance coverage limits, per occurrence, shall equal or exceed the following and shall name the Owner and Arcadis Canada Inc. as additional insureds:
 - .1 General Liability \$5 million;
 - .2 Automotive Liability \$2 million;
 - .3 Pollution Liability \$5 million including asbestos operations.
- .13 The supervisor must have proven experience and proficiency in the type of Work being undertaken under this Contract.
- .14 The supervisor shall be replaced, at the written request of the Asbestos Consultant, if found to be incompetent or inattentive to the needs of the project.
- .15 Where standards of performance are specified or implied and the Work does not comply with the performance specified or implied, such deficiencies shall be corrected as directed by the Asbestos Consultant. Any subsequent testing shall be done at the Asbestos Contractor's expense.

1.4 DEFINITIONS

- .1 *HEPA Vacuum:*
 - .1 High Efficiency Particulate Aerosol (HEPA) filtered vacuum equipment acceptable to Health and Welfare Canada and meeting U.S. Military Standard 282. This vacuum equipment shall have a filtering system capable of collecting and retaining asbestos fibres to an efficiency of 99.97% for fibres of 0.3 micrometer or larger.
- .2 *Polyethylene sheeting sealed with tape:*
 - .1 Polyethylene sheeting of thickness specified sealed with tape along all edges, around penetrating objects, over cuts and tears, and elsewhere as required to provide a continuous polyethylene membrane to protect underlying surfaces from water damage or damage by sealants, and to prevent escape of asbestos fibres through the sheeting into a clean area.
- .3 *Inspector:*
 - .1 Representative of Arcadis Canada Inc. (Arcadis) designated by the owner to provide inspection and air monitoring of the Contractor's work.
- .4 *Authorized Visitor:*
 - .1 Representative of the building owner, Arcadis, and/or persons representing regulatory agencies.
- .5 *Amended Water:*
 - .1 Water with a non-ionic surfactant added to reduce water tension to allow thorough wetting of asbestos fibres.
- .6 *Airlock:*

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- .1 A system for permitting ingress or egress without permitting air movement between a contaminated area and an uncontaminated area typically consisting of two curtained doorways at least 1.5 m apart.

- .7 *Curtained Doorways:*
 - .1 An arrangement of closures to allow ingress and egress from one room to another while permitting minimal air movement between rooms, typically constructed by placing two overlapping sheets of polyethylene over an existing or temporarily framed doorway, securing each along the top of the doorway, securing the vertical edge of one sheet along one vertical side of the doorway and securing the vertical edge of the other sheet along the opposite vertical side of the doorway.
 - .2 All free edges of polyethylene shall be reinforced with duct tape and the bottom edge shall be weighted to ensure proper closing. Each polyethylene sheet shall overlap openings an additional 1/3 of the doorway width.

- .8 *Operating Area:*
 - .1 Area where no removal or repair Work is underway.

- .9 *Clean Area:*
 - .1 Either an operating area or an area in which removal Work has already been completed.

- .10 *Work Area:*
 - .1 Where the actual removal of asbestos-containing materials take place.

- .11 *Negative Pressure:*
 - .1 A system which extracts air from the work area and discharges this air directly outside the building, sufficient to maintain a minimum pressure differential of 0.5 mm (0.02 inch) of water column relative to adjacent areas outside of work areas. This air extraction system is to be equipped with a High Efficiency Particulate Aerosol filtering system before discharge.

- .12 *Confined Space:*
 - .1 A fully or partially enclosed space,
 - .1 that is not both designed and constructed for continuous human occupancy, and
 - .2 in which atmospheric hazards may occur because of its construction, location or contents or because of work that is done in it.

1.5 REGULATORY AGENCIES

- .1 Comply with Federal, Provincial, and local requirements pertaining to asbestos, provided that in any case of conflict among those requirements or with these Specifications the more stringent requirement shall apply. These include, but are not limited to, the following:

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- .1 Ontario Ministry of Labour, Occupational Health and Safety Division, *Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations*, O.Reg. 278/05 – made under the *Occupational Health and Safety Act*.
 - .2 Ontario Ministry of the Environment *Regulation 347* (previously 309) under the Environmental Protection Act (as amended by O.Reg. 175/83; O.Reg. 574/84; O.Reg. 322/85), June 17, 1985.
 - .3 Government of Canada *Regulations Respecting the Handling, Offering for Transport and Transporting of Dangerous Goods*. (Extract from the Canada Gazette Part II, dated February 6, 1985.)
 - .4 Government of Ontario *Occupational Health and Safety Act, 1978 and Regulations for Construction Projects*.
 - .5 Office of the Fire Commissioner of Canada.
 - .6 Ontario Electrical Safety Code.
 - .7 Regulation 647 RRO '70 of the Plumbing Code.
- .2 *Patents:*
- .1 It shall be the Contractor's responsibility to ensure that all applicable patent laws are complied with.

1.6 FIRE SAFETY PLAN

- .1 Prior to initiating any work on the site, the Contractor shall prepare and submit in writing to the Engineer a Fire Safety Plan. The Plan shall be in accordance to the requirements set forth in Section 2.14, Construction and Demolition Sites, of the National Fire Code and shall include:
 - .1 the designation and organization of site personnel to carry out fire safety duties, including fire water services if applicable;
 - .2 the emergency procedures to be used in the case of fire, including:
 - .1 sounding the fire alarm;
 - .2 notifying the fire department;
 - .3 instructing site personnel on procedures to be followed when the alarm sounds; and
 - .4 fire fighting procedures;
 - .3 the control of fire hazards in and around the building;
 - .4 maintenance of fire fighting facilities; and
 - .5 special requirements as may be identified by the building owner.

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- .2 Implementation of the Fire Safety Plan shall be the sole responsibility of the Contractor, and the above shall, in no way, limit the Contractor's statutory and regulatory obligations. During the work, the Fire Safety Plan shall be prominently displayed at the site and its requirements included in site safety training and awareness programs.

1.7 SUBMITTALS

1.7.1 Submittals Before Commencing Work

- .1 The following documentation shall be submitted to the Inspector with a dated covering letter listing attachments a minimum 48 hours prior to commencement of the Work:

.1 *Permits and Notifications:*

- .1 All necessary permits for transporting and disposal of asbestos waste. Submit proof satisfactory to Inspector that suitable arrangements have been made to receive and properly dispose of asbestos waste. Copies of all Notifications required by Section 1.11.

.2 *Material Safety Data Sheets:*

- .1 Material Safety Data Sheets, or equivalent, for any sealant, surfactant or other material proposed for use. Include a separate attachment for each sheet indicating the specific worker protective equipment proposed for use with the material indicated.

.3 *Supervisory Personnel:*

- .1 Names of supervisory personnel who will be responsible for work area(s). **One of these supervisors must remain on site at all times asbestos removal or cleanup is occurring.** Submit proof that supervisory personnel have over 2000 hours experience on asbestos abatement projects, have performed supervisory functions on at least two other asbestos projects and have achieved the level of training as set out by the Regulation.

.4 *Schedule:*

- .1 Provide a bar chart indicating planned progress for critical activities as required under **Scope of Work** as well as additional information listed below a minimum of 48 hours prior to commencement of any preparatory work indicating:

- .1 shifts to be worked;
.2 proposed workforce;
.3 starting date;
.4 estimated date of commencement of asbestos removal;
.5 estimated date of completion of asbestos removal;
.6 estimated completion date.

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- .5 *Insurance:*
- .1 Provide a Certificate signed by the insurance agency naming the Owner and Arcadis Canada Inc. as co-insureds.
 - 2. The Asbestos Contractor's insurance coverage limits, per occurrence, shall equal or exceed the following:
 - .1 General Liability \$5 million;
 - .2 Automotive Liability \$2 million;
 - .3 Pollution Liability \$5 million including asbestos operations.
 - .3 The Asbestos Contractor must provide thirty (30) days notice of cancellation or amendment of coverage.
- .6 *Fire Safety Plan:*
- .1 In accordance to Article 1.6 above.
- .7 *Confined Space:*
- .1 If a work area, or part thereof, is a confined space, the contractor shall submit:
 - .1 a co-ordination document (see Section 1.13.1.1);
 - .2 a written program (see Section 1.13.1.2);
 - .3 a written plan (see Section 1.13.1.4).
- .8 *Asbestos Training:*
- .1 A letter certifying that:
 - (a) *every worker involved in a Type 3 operation has successfully completed the Asbestos Abatement Worker Training Program approved by the Ministry of Training, Colleges and Universities; and*
 - (b) *every supervisor of a worker involved in a Type 3 operation has successfully completed the Asbestos Abatement Supervisor Training Program approved by the Ministry of Training, Colleges and Universities. O.Reg. 278/05, s. 20(1).*

1.7.2 Submittals Before Commencing Asbestos Removal

- .1 Proposed Work Area emergency exit procedures.
- .2 Evidence (letter or other suitable documentation) of proper construction, inspection and installation of GFI panel by licensed electrician in compliance to all regulatory requirements and codes.

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1.7.3 Submittals Upon Completion of Work

- .1 Asbestos waste haulage and disposal documentations including Bills of Lading, waste transfer documents and dump receipts.
- .2 All documentation as specified in the contract General Conditions including, but not limited to, Workplace Safety and Insurance Board Certificate, Statutory Declarations and Proof of Publication of Substantial Performance.

1.8 EXISTING CONDITIONS

- .1 Vinyl floor tiles contain 0.97% chrysotile asbestos. Vinyl floor tile mastic contains 5% chrysotile asbestos. Joint compounds on gypsum board applications contain 1.6% chrysotile asbestos. Thermal insulation on pipe fittings contains 60% chrysotile asbestos.
- .2 Existing conditions are documented in a report prepared by Arcadis Canada Inc. for the Halton District School Board entitled "*Pre-Renovation Designated Substances and Hazardous Materials Survey, Pauline Johnson Public School, 4350 Longmoor Drive, Burlington, Ontario*" dated July 12, 2021, which is included with the tender documents.
- .3 Masonry applications may contain silica. Paint applications may contain lead and mercury. Appropriate dust control procedures and respiratory protective equipment are to be used if disturbing these materials.

1.9 RESTRICTIONS

- .1 Do not allow smoking, eating or drinking in the work area.
- .2 Do not allow entry to work area by unauthorized persons.
- .3 Compressed air shall not be used in the work area.
- .4 Open flames will not be permitted in the work area (including but not limited to torches and propane-fired heaters).

1.10 WORKER PROTECTION

- .1 *Instructions:*
 - .1 Before commencing Work, instruct workers in all aspects of work procedures and protective measures.
- .2 *Respiratory Protection:*
 - .1 Provide workers with personally issued and marked respiratory equipment acceptable to the Occupational Health and Safety Division of the Ontario Ministry of Labour, suitable for the asbestos exposure in the work area.
 - .2 Ensure that suitable respiratory protective equipment is worn by every worker who enters the work area. A respirator provided by an employer and used by a worker:
 - .1 shall be in accordance to O.Reg. 278/05, Section 13, respirators.

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- .2 shall be fitted so that there is an effective seal between the respirator and the worker's face;
 - .3 shall be assigned to a worker for the worker's exclusive use;
 - .4 shall be used and maintained in accordance with the procedures specified by the equipment manufacturer;
 - .5 shall be cleaned, disinfected and inspected after use on each shift, or more often if necessary;
 - .6 shall have damaged or deteriorated parts replaced prior to being used by a worker; and
 - .7 when not in use, shall be stored in a convenient, clean and sanitary location.
- .3 *Protective Clothing:*
- .1 Provide workers with protective clothing which shall:
 - .1 be worn by every worker who enters the work area,
 - .2 be made of a material which does not readily retain nor permit penetration of asbestos fibres,
 - .3 consist of full body covering including head covering with snug fitting cuffs at the wrists, ankles and neck,
 - .4 include suitable footwear, and
 - .5 be repaired or replaced if torn.

1.11 NOTIFICATIONS

- .1 Notify, in writing, the local Fire Department of the extent of the work, including a copy of the Fire Safety Plan detailed in Article 1.6 above.
- .2 Notify, orally and in writing, an inspector at the office of the Ministry of Labour nearest the work place of the operation. O.Reg. 278/05, Section 11.
 - .1 The written notice required by subsection (1) shall set out:
 - .1 the name and address of the person giving the notice;
 - .2 the name and address of the owner of the place where the work will be carried out;
 - .3 the municipal address or other description of the place where the work will be carried out sufficient to permit the inspector to locate the place, including the location with respect to the nearest public highway;
 - .4 a description of the work that will be carried out;

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- .5 the starting date and expected duration of the work; and
 - .6 the name and address of the supervisor in charge of the work.
- .3 Notify the Inspector a minimum of eight hours prior to initiation of the following phases of the project:
- .1 commencement of asbestos removal;
 - .2 commencement of sealant application;
 - .3 dismantling of the enclosure; and
 - .4 removing asbestos waste from the work area.

1.12 PROTECTION, REPAIR AND REPLACEMENT OF EQUIPMENT AND MATERIALS

- .1 All equipment within and surrounding the work area shall be suitably protected by the Contractor during the work periods.
- .2 All equipment damaged by the Contractor shall be replaced by the Contractor at no additional cost to the Owner.

1.13 CONFINED SPACES

Not Applicable

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2.0 PART 2 – PRODUCTS

2.1 MATERIALS

.1 *Polyethylene:*

- .1 In 0.15 mm (6 mil) minimum thickness unless otherwise specified; in sheet size to minimize joints.

.2 *Tape:*

- .1 Reinforced duct tape suitable for sealing polyethylene under both wet conditions using amended water, and dry conditions.

.3 *Wetting Agent:*

- .1 50% polyoxethylene ester and 50% polyglycol or polyxyethylene ether, or equivalent approved product, and shall be mixed with water to a concentration to provide adequate penetration and wetting of asbestos-containing material.

.4 *Asbestos Waste Receptors:*

- .1 0.15 mm (6 mil) minimum thickness appropriately labelled, sealable polyethylene bags and 0.15 mm (6 mil) minimum thickness sealable clear polyethylene bags.

.5 *Rip-Proof Polyethylene:*

- .1 0.20 mm (8 mil) fabric made up from 0.13 mm (5 mil) weave and 2 layers 0.04 mm (1.5 mil) poly laminate, in sheet size to minimize joints.

.6 *Sealant:*

- .1 Slow-drying sealant which remains tacky on surface for a minimum of 8 hours for purpose of trapping residual airborne fibre during settling period. Product must have flame spread and smoke development ratings both less than 50. **Product shall leave a clear finish when dry. Acceptable products “Childers Chil-Lock CP-240” or equivalent.**

2.2 EQUIPMENT

- .1 All equipment brought on site must be thoroughly clean and free of all fibre, asbestos or otherwise, to the satisfaction of the Field Inspector. The Contractor will be fully responsible for the replacement of equipment rejected by the Inspector and for all costs resulting from site contamination due to dirty or faulty equipment.

.2 *Airless Sprayer:*

- .1 Spray equipment for the application of amended water and sealant such as Graco Hydrospray or equivalent:

- .1 Fine atomizing spray nozzle: Nozzle for airless sprayer capable of delivering not less than 4.5 L per minute of fine particle spray of amended water.

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- .3 *Garden Sprayer:*
- .1 Hand pump-type pressure-can garden sprayer fabricated out of either metal or plastic equipped with a wand at the end of a hose that can deliver a stream or spray of liquid under pressure. **Only to be used on small removal and repair projects with the approval of the site inspector.**
- .4 *HEPA Vacuum:*
- .1 High Efficiency Particulate Aerosol filtered vacuum equipment. Must have a filtering system capable of collecting and retaining asbestos fibres to an efficiency of 99.97% for fibres of 0.3 um or larger. HEPA filters must have been individually tested and certified by the manufacturer.
 - .2 All HEPA vacuums brought onto the job site shall be visibly clean, shall be in a good state of repair and shall be maintained in such state through completion of the project.
- .5 *Glovebag:*
- .1 Prefabricated, purposely made, 0.20 mm minimum thickness, polyvinyl chloride bag with integral 0.25 mm thick polyvinyl chloride gloves.
 - .2 Bag equipped with reversible double-pull, double-throw zipper on top to facilitate installation on pipe and progressive movement along pipe, with straps for sealing ends of bag around pipe, and with plastic flap under zipper for strength on pipe and to provide effective seal and with "ziploc" feature. Bags shall be secured using manufacturer's prescribed securing devices. Approval must be obtained from the Inspector for use of Glovebags. Bag must be acceptable to the Inspector for use.
 - .3 Bag must have valves to allow insertion of a vacuum hose and the nozzle of a water sprayer while maintaining the seal to the pipe, duct or similar structure.
- .6 *Negative Pressure Units:*
- .1 Exhaust units fitted with High Efficiency Particulate Aerosol (HEPA) filters used to effect a negative pressure differential in the work area as compared to the immediate surrounding or clean area. The filtering system must be capable of collecting and retaining asbestos fibres to an efficiency of 99.97% for fibres of 0.3 um or larger. The HEPA filters must have been individually tested and certified by the manufacturer and bear a label certifying performance. The unit is to be fitted with instrumentation to indicate pressure differential across the HEPA filter with an audible alarm to sound at a preset low differential pressure.
 - .2 Construction of HEPA filter/fan cabinet units shall be airtight and all joints shall be caulked. The gasket seal between the filter housing and the retaining frame inside the cabinet shall provide a zero-leakage seal to avoid filter bypassing.
 - .3 **Each negative pressure unit shall be integrity tested at the work site prior to commencement of asbestos removal.** The procedure must include the testing of the integrity of the entire cabinet. Written confirmation of the test results are to be provided to the Inspector. Retesting may be requested by the Inspector and

ASBESTOS ABATEMENT SPECIFICATIONS

Pauline Johnson Public School

performed by the Contractor should the unit be damaged or modified during the work.

.7 *Differential Pressure Recorder:*

.1 Instrument to monitor and record the differential pressure between the Work Area and Clean Area.

.1 sensitivity: 0.025 mm (0.001 inches) WC increments between +0.25 mm to -2.5 mm (+0.010 to -0.100 inches) WC

.2 accuracy: +/- 1 %

.3 pressure alarms: audible high and low level alarm programmable within operating range

.4 printout: minimum 24 hr period at 15 minute intervals

.8 *Ground Fault Panel:*

.1 Electrical Panel equipped with ground fault circuit breakers of sufficient capacity to power all electrical equipment and lights in work area. All breakers shall have 5 mA ground fault protection. Panel should be complete with all necessary accessories including ground fault interrupter lights, test switch to ensure unit is working, and reset switch. Ground fault receptacles on extension cords shall not be used without written authorization by the Consultant.

.2 The GFI Panel must be constructed under the direction of a licensed Electrician and inspected by a licensed Electrician on a regular basis. Evidence of such construction and inspection shall be submitted to the Consultant prior to installation of the Panel on site.

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3.0 PART 3 – EXECUTION

3.1 MAJOR ASBESTOS WORK (TYPE 3 OPERATIONS)

Not Applicable.

3.2 GLOVEBAG REMOVAL METHOD

.1 The Glovebag Removal Method may only be used with the written approval of the on-site inspector and advance notification, orally and in writing, to an inspector at the office of the Ministry of Labour nearest the work place of the operation if more than one square metre or more of insulation is to be removed.

.2 Preparation

.1 Separate the work place from the rest of the building by placing rope barriers at the boundary of the designated work area. The boundaries of the work area shall be a minimum of 3.0 m from the location of the insulation being removed. Identify the work area with clearly visible warning signs. The signs shall read in 35 mm (1 3/8") *sans serif* letters:

**“CAUTION
ASBESTOS REMOVAL WORK IN PROGRESS.
ACCESS RESTRICTED TO PERSONS WEARING
PROTECTIVE CLOTHING AND EQUIPMENT”.**

.2 Disable the mechanical ventilation system serving the work area and seal all openings or voids, including ventilation duct to and from the working area.

.3 Ensure that all sources of heat for pipe systems have been shut off.

.4 Vacuum surfaces of insulating material using a vacuum equipped with a HEPA filter. Ensure that all friable material that is lying on the surface of any article, thing or place in the work area is cleaned up and removed by damp wiping or by using a vacuum equipped with a HEPA filter.

.3 Worker Protection Procedures

.1 Each worker shall remove street clothes and put on a respirator and disposable coveralls before proceeding to the work site.

.2 Before leaving the work area, a worker shall decontaminate the protective clothing, boots, and respirator by using a HEPA vacuum or damp wiping prior to removing it.

.3 Facilities for the washing of hands and face shall be made available and shall be used by every worker before leaving the work area. The outside of the respirator shall also be cleaned at this time.

.4 Following completion of the work, HEPA vacuum or wet wipe any material from the disposable coveralls and boots, remove the used disposable coverall and dispose of as contaminated waste. Clean the outside of the respirator with soap and water, remove the respirator, remove the filters, if applicable, and wet the outside surfaces, wash and rinse the inside of the respirator.

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- .4 Asbestos Removal (Glovebag Method)
 - .1 Before performing work:
 - .1 Prepare site by placing new 0.15 mm (6 mil) polyethylene plastic drop sheets on all surfaces immediately below and within 3.0 m of the work area.
 - .2 Remove all obstructions from around pipes to allow access for repair work.
 - .3 Inspect all glovebags for defects before using. A defective bag shall not be used.
 - .4 Ensure that any knife to be used inside the glovebag has a retractable blade and that any saw used inside the glovebag is of the flexible wire type; and brush used inside a glovebag shall not have metal bristles.
 - .2 Perform removal operations using the following procedures (in accordance to the manufacturer's instructions):
 - .1 Place any tools necessary to remove insulation in bottom of the containment bag.
 - .2 Install the bag on the pipe or fitting using shoulder straps and zipper provided. **Duct tape is not to be substituted for shoulder straps.** Support bag as necessary to avoid damage to the piping system or the bag itself.
 - .3 Insert nozzle of spray pump prefilled and primed with water and surfactant mixture (amended water) into the bag through the valve provided. Place hands in gloves and relocate the tools to the tool pouch.
 - .4 Cut or remove exterior insulation jacket, where applicable, to expose asbestos pipe covering. Wet exposed pipe covering with sufficient amended water to suppress any dust. Remove insulation and arrange in bottom of bag to obtain maximum capacity for the bag. Wash down exposed portion of pipe and top section of bag ensuring that insulation in lower portion of bag as well as any exposed end of insulation is thoroughly saturated. Use one hand and a cloth or sponge to aid in washing process.
 - .5 Ensure that pipe and other surfaces are clean of visual residue, dirt or dust prior to removal of the containment bag and seal all surfaces with encapsulant. Seal exposed ends of remaining asbestos insulation with encapsulant.
 - .6 If the glovebag is ripped, cut or opened in any way, work that may disturb friable material shall cease immediately. If the rip, cut or opening is small and easy to repair then the glovebag shall be repaired immediately with tape. Work may continue once the repairs are complete. If the rip, cut or opening is not small and cannot be easily repaired, place the glovebag immediately within a suitable asbestos waste container. Any spilled material containing asbestos shall be cleaned up and removed by using a vacuum equipped with a HEPA filter.

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- .7 To remove bag after completion of stripping, wash top section and tools thoroughly. Put all tools in one hand (glove), pull hand out inverted, twist to create a separate pouch, double tape to seal ends, cut and place in the next glovebag or into a water bucket, open pouch under water and clean and then allow to dry. Tools may also be cleaned and handed out during the dismantling of the bag while taking all precautions to prevent release of asbestos.
- .8 Remove all air inside the glovebag by means of a vacuum equipped with a HEPA filter. Seal lower portion of bag and place bag into appropriate waste container.
- .9 After removal of bag, ensure pipe is clean of all residue. If necessary after removal of each section of asbestos, vacuum all surfaces of pipe, using HEPA Filtered Vacuum equipment.
- .10 Welds and folds of glovebags are to remain intact without modification to manufacturer's design.
- .11 Glovebags, disposal bags, cloth rags and any porous materials are to be handled and disposed as hazardous waste.
- .12 Frequently, and at regular intervals during the work and immediately upon completion of the work, glovebags containing asbestos-contaminated dust and waste shall be placed in a suitable waste container and shall be removed from the workplace.
- .13 Immediately after removal of asbestos, clean all surfaces and equipment within the work area using a HEPA vacuum and damp wiping.
- .14 Remove polyethylene floor covering, fold inward, and place in 6-mil polyethylene waste bags. Seal bags tightly.
- .15 Place sponges, brushes, etc., in double polyethylene bags and seal tightly.
- .16 Make arrangements for disposal of all asbestos-containing waste material.

3.3 TYPE 2 ENCLOSURE METHOD

- .1 Preparation
 - .1 Separate the work area from the rest of the building using rope barriers, signage and other appropriate means. The extent of the work area will depend on the amount of work to be done, potential for fibre release and the height of the work above floor level.
 - .2 Identify the work area with clearly visible warning signs.
 - .3 Construct a frame for the enclosure from 50 mm x 100 mm (2" x 4") studs or other suitable material (scaffolding, for example); if the potential exists for the disturbance of asbestos-containing material during the construction of the enclosure, wear a respirator and suitable protective clothing; ensure that the enclosure is of adequate size to permit the storage of equipment and waste.

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- .4 If the room where the work is to take place is small, the room itself may serve as an enclosure, provided that all openings are sealed, the mechanical ventilation system servicing the room is disabled and the ventilation ducts to and from the work area are sealed.
 - .5 Shut off the source of heat for piping systems (i.e., boiler or steam line header), where possible.
 - .6 Cover the walls, floor and ceiling of the enclosure with clear 0.15 mm polyethylene sheeting sealed with duct tape. Curtains of polyethylene sheeting must be fitted on each side of the entrance to the enclosure (curtain flaps may require weights at the bottoms to ensure proper closing).
 - .7 Disable the ventilation system servicing the enclosure; seal ventilation ducts to and from the work area.
 - .8 Shut off and lock out electrical power within the enclosure.
 - .9 When specified, establish a measurable negative pressure differential in the work area enclosure by using fan/filter units equipped with High Efficiency Particulate Air (HEPA) filters. Units are to be integrity tested on site prior to commencement of asbestos removal operations and are to be exhausted directly outdoors where practicable.
 - .10 Wear an appropriate respirator approved for use with asbestos and suitable protective equipment. Only persons wearing protective clothing and equipment shall be allowed to enter the work area. If the type of asbestos is other than chrysotile, a powered air purifying respirator shall be used.
 - .11 Do not use compressed air.
 - .12 Do not eat, drink, smoke or chew in the work area.
 - .13 Vacuum surfaces of insulated material in the work area using a HEPA vacuum.
- .2 Asbestos Removal and Cleanup
- .1 Carefully cut the outer cover of thermal insulation on the section being worked on; thoroughly wet the asbestos-containing material with amended water using a garden sprayer.
 - .2 Remove wetted asbestos material and covering jackets in small sections directly into a waste receptor (polyethylene bag). **MAINTAIN ASBESTOS IN WET CONDITION AT ALL TIMES DURING REMOVAL AND/OR HANDLING. SEAL BAGS TIGHTLY.**
 - .3 For removal gypsum board with asbestos-containing joint compounds: Spray amended water on the gypsum board material to be removed to reduce dust. Remove gypsum board and immediately place into waste receptor. Double bag when removing debris from work area.
 - .4 For floor tile removal: disconnect all floor-mounted electrical fixtures and outlets and seal with duct tape. Seal other floor penetrations as required. Spray amended water

ASBESTOS ABATEMENT SPECIFICATIONS Pauline Johnson Public School

on tiles to be removed to reduce dust. Remove tiles and immediately place into waste receptor. Double bag when removing debris from work area.

- .5 Clean surfaces exposed by asbestos removal with a brush and wet sponge. Ensure that all surfaces of piping and other equipment are clean of all residue.
- .6 Immediately after removal of asbestos, clean all surfaces and equipment within the work area, including polyethylene sheeting, using a HEPA vacuum or by damp wiping.
- .7 Seal all surfaces of pipe or other equipment, enclosure, and ends of exposed insulation with a suitable encapsulant.
- .8 After satisfactory completion of cleaning and before leaving the work area, decontaminate protective clothing (including boots) and equipment, etc., using a HEPA vacuum or by damp wiping.
- .9 Dismantle the enclosure and wet and dispose of all polyethylene sheeting, brushes and sponges as asbestos waste.
- .10 Dispose of protective clothing as asbestos waste.
- .11 Wash hands and face at the completion of the work (before leaving the work area); damp wipe the respirator and store in a proper place.
- .12 Make arrangements for disposal of all asbestos-containing waste material.

3.4 TYPE 1 OPERATION

Not Applicable.

3.5 WASTE DISPOSAL

- .1 Asbestos-containing wastes shall be disposed of in accordance with procedures established by the Ontario Ministry of the Environment *Regulation 347 (as amended) under the Environmental Protection Act* and the Government of Canada *Transportation of Dangerous Goods Regulations*.
- .2 Both sides of every vehicle used for the transportation of asbestos and every waste container must display in large easily legible letters that contrast in colour with the background the word "CAUTION" in letters not less than 10 cm in height and the words:

CONTAINS ASBESTOS FIBRES
Avoid Creating Dust and Spillage
Asbestos May Be Harmful to Your Health
Wear Approved Protective Equipment

- .3 Both sides of every waste container must display in large easily legible letters the words '**ASBESTOS, WHITE, PRODUCT IDENTIFICATION NUMBER 2590**' or '**ASBESTOS, BLUE, PRODUCT IDENTIFICATION NUMBER 2212**' in accordance with the type of asbestos being transported.
- .4 Every vehicle used for the transportation of asbestos waste shall display a Class 9 placard on the front, back and two sides of the vehicle.

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- .5 The waste must be transported in a fully-enclosed truck, or alternatively, in a waste disposal skip. The driver must be familiar with cleanup and handling procedures and be trained to deal with spills or container breakage.
- .6 The truck must be equipped with a shovel and broom, wetting agent, protective clothing, respiratory protective equipment, polyethylene bags of at least 0.15 mm (6 mil) thickness, and bag closures and duct tape.
- .7 All waste must be transported with a **Bill of Lading** directly from the work area to the waste disposal site. The Bill of Lading is to indicate the source and type of asbestos, the Carrier, the amount, the destination (disposal site) and date all in accordance to applicable regulations. A copy of the Bill of Lading and disposal site receipt is to be provided to the Inspector.

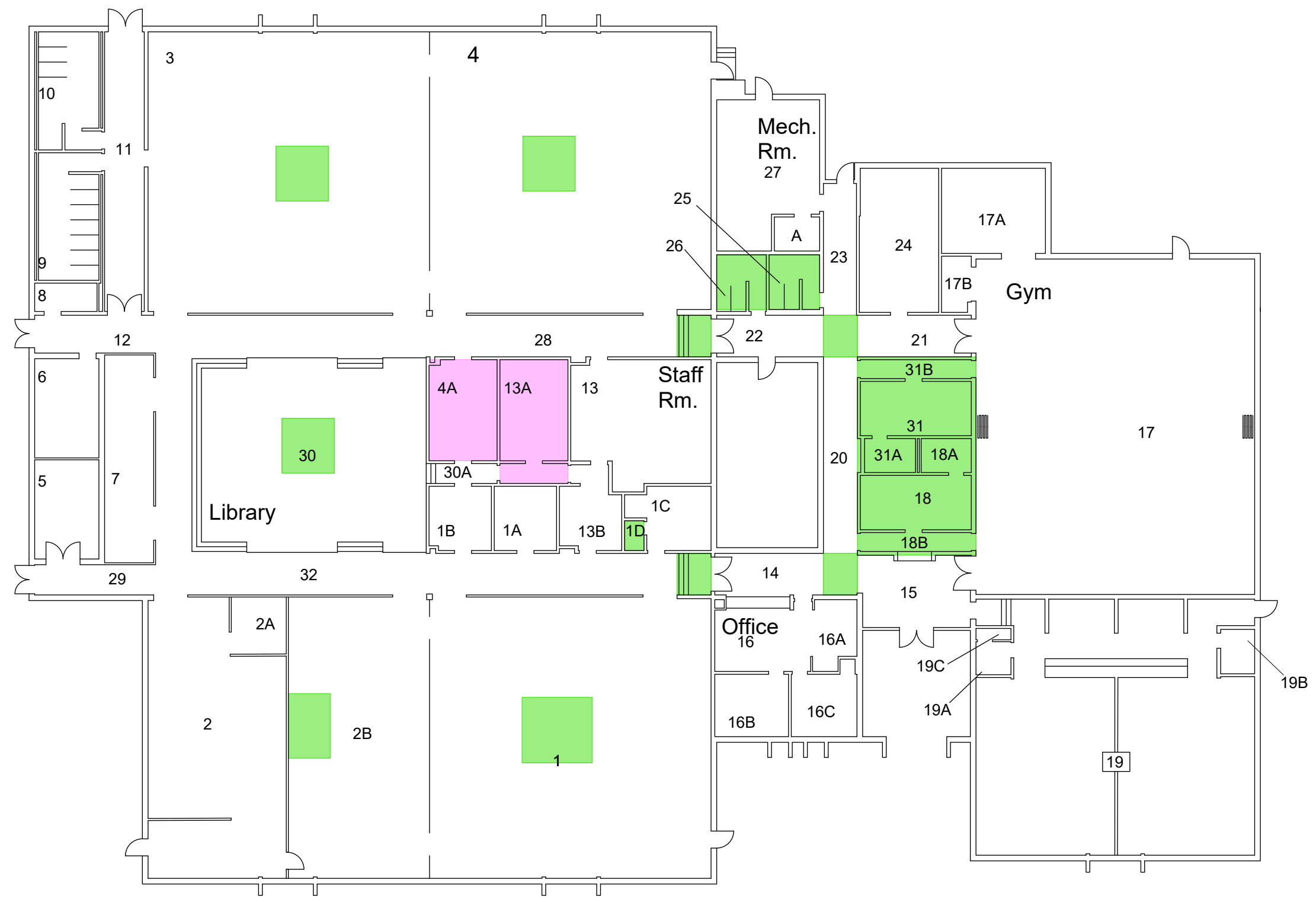
3.6 AIR MONITORING

- .1 Air tests will be taken at the discretion of the Asbestos Consultant using the Phase Contrast Microscopy (PCM) method from the time asbestos-containing materials may be disturbed until the final visual inspection of the work area(s). PCM will be used for final clearance air monitoring analysis.
 - .1 *Outside Asbestos Removal Work Areas:*
 - .1 The maximum allowable fibre concentration outside the Work Areas during asbestos removal or cleanup shall be 0.05 f/cc. Should readings exceed this value, the work shall stop at the discretion of the inspector and proceed only after the cause of the high fibre counts has been remedied.
 - .2 All costs associated with the cleaning, monitoring, and disruption caused by excessive fibre levels outside the Work Area and related to the work, are to be borne by the Asbestos Contractor including but not limited to:
 - .1 thorough cleaning with wet wiping and HEPA vacuuming by the Asbestos Contractor to the extent and satisfaction of the Inspector,
 - .2 all activities deemed necessary by the Inspector including area isolation, personnel relocation, additional visual inspections and air monitoring to confirm that the area has been adequately cleaned,
 - .3 disruption of plant production, office routine, and delays.
 - .2 *Final Clearance Test:*

Not Applicable.

END OF SECTION

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 XREFS: IMAGES: PROJECTNAME: ---



LEGEND:

- 1 FUNCTIONAL SPACE
- WORK AREA 1
- WORK AREA 2

NOTES:

REVISIONS:

No.	Date:	By:	Revisions

REFERENCE:

- 1.



HALTON DISTRICT SCHOOL BOARD
ASBESTOS ABATEMENT SPECIFICATIONS

LOCATIONS OF WORK AREAS

PAULINE JOHNSON PUBLIC SCHOOL
 4350 LONGMOOR DRIVE, BURLINGTON,
 ONTARIO

FIRST FLOOR PLAN

Drawn By: M.S	Approved By: J.D	Project No: 30089648
Date: JULY 2021	Scale: N.T.S	Drawing No: 30089648-1

HALTON DISTRICT SCHOOL BOARD

PRE-RENOVATION DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS SURVEY

PAULINE JOHNSON PUBLIC SCHOOL

4350 LONGMOOR DRIVE, BURLINGTON, ONTARIO

July 12, 2021

30089648



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PRE-RENOVATION DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS SURVEY

PAULINE JOHNSON PUBLIC SCHOOL
4350 Longmoor Drive, Burlington,
Ontario

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Our Ref.:
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Date:
July 12, 2021

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1 INTRODUCTION

Arcadis Canada Inc. (Arcadis) was retained by the Halton District School Board to conduct a pre-renovation designated substances and hazardous materials survey in designated study areas of Pauline Johnson Public School located at 4350 Longmoor Drive in Burlington, Ontario.

The information in this report is to be provided to all bidders on a project in accordance with the requirements of the *Occupational Health and Safety Act*.

The building is a single storey masonry structure originally constructed in 1967 with an addition to the west constructed in 1986.

It is our understanding that renovations are planned in designated areas of the building. The designated study areas were limited to areas affected by the proposed renovation project and are based on information provided by the HDSB. The survey included primarily inspecting materials in the designated study areas that are anticipated to be affected by the renovation project.

The designated study areas and eras of construction are shown on the floor plans provided in Appendix A.

The survey was undertaken to report on the presence or suspected presence of readily observable designated substances and hazardous materials.

1.1 Scope of Work

The scope of work for our investigation included:

- review of existing information;
- investigation of readily-accessible areas in the designated study areas for the presence of designated substances and hazardous materials used in building construction materials;
- obtaining representative bulk samples of materials suspected of containing asbestos and paint chip samples for lead analyses;
- laboratory analyses of bulk samples for asbestos content;
- laboratory analyses of paint chip samples for lead content; and
- preparation of a report outlining the findings of the investigation.

Mr. Dwayne Kellyman of Arcadis visited the site on June 17, 2021, to conduct the designated substances and hazardous materials survey at Pauline Johnson Public School.

2 REGULATORY DISCUSSION AND METHODOLOGY

Ontario Occupational Health and Safety Act (OHSA)

The Ontario *Occupational Health and Safety Act* (OHSA) sets out, in very general terms, the duties of employers and others to protect workers from health and safety hazards on the job. These duties include, but are not limited to:

- taking all reasonable precautions to protect the health and safety of workers [clause 25(2)(h)];
- ensuring that equipment, materials and protective equipment are maintained in good condition [clause 25(1)(b)];
- providing information, instruction and supervision to protect worker health and safety [clause 25(2)(a)]; and
- acquainting a worker or a person in authority over a worker with any hazard in the work and in the handling, storage, use, disposal and transport of any article, device, equipment or a biological, chemical or physical agent [clause 25(2)(d)].

In addition, Section 30 of the OHSA deals with the presence of designated substances on construction projects. Compliance with the OHSA and its regulations requires action to be taken where there is a designated substance hazard on a construction project.

Section 30 of the OHSA requires the owner of a project to determine if designated substances are present on a project and, if so, to inform all potential contractors as part of the bidding process. Contractors who receive this information are to pass it onto other contractors and subcontractors who are bidding for work on the project.

Regulation for Construction Projects, O.Reg. 213/91

The *Regulation for Construction Projects*, O.Reg. 213/91, applies to all construction projects. The following sections of the regulation would apply to situations where there is the potential for workers to be exposed to designated substances:

- | | | |
|------------|-----|---|
| Section 14 | (5) | A competent person shall perform tests and observations necessary for the detection of hazardous conditions on a project. |
| Section 21 | (1) | A worker shall wear such protective clothing and use such personal protective equipment or devices as are necessary to protect the worker against the hazards to which the worker may be exposed. |
| | (2) | A worker's employer shall require the worker to comply with subsection (1). |

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- (3) A worker required to wear personal protective clothing or use personal protective equipment or devices shall be adequately instructed and trained in the care and use of the clothing, equipment or device before wearing or using it.
- Section 30 Workers who handle or use substances likely to endanger their health shall be provided with washing facilities with clean water, soap and individual towels.
- Section 46 (1) A project shall be adequately ventilated by natural or mechanical means,
- (a) if a worker may be injured by inhaling a noxious...dust or fume;
- (2) If it is not practicable to provide natural or mechanical ventilation in the circumstances described in clause (1)(a), respiratory protective equipment suitable for the hazard shall be provided and be used by the workers.
- Section 59 If the dissemination of dust is a hazard to a worker, the dust shall be adequately controlled or each worker who may be exposed to the hazard shall be provided with adequate personal protective equipment.

Regulation for Designated Substances (O.Reg. 490/09)

The *Designated Substance Regulation* (O.Reg. 490/09) specifies occupational exposure limits (OELs) for designated substances and requires an assessment and a control program to ensure compliance with these OELs.

Although, O.Reg. 490/09 and the OELs do not apply to an employer on a construction project, or to their workers at the project, employers still have a responsibility to protect the health of their workers and to comply with the OHSA and other applicable regulations. Section 25(2)(h) of the OHSA requires that employers take "every precaution reasonable in the circumstances for the protection of a worker".

Other regulatory requirements (and guidelines) which apply to control of exposure to designated substances and hazardous materials are referenced in the sections below.

2.1 Asbestos

Asbestos has been widely used in buildings, both in friable applications (materials which can be crumbled, pulverized or powdered by hand pressure, when dry) such as pipe and tank insulation, sprayed-on fireproofing and acoustic texture material and in non-friable manufactured products such as floor tile, gaskets, cement board and so on. The use of asbestos in friable applications was curtailed around the mid-1970s and, as such, most buildings constructed prior to about 1975 contain some form of friable construction material with an asbestos content. The use of asbestos in certain non-friable materials continued beyond the mid-1970s.

Control of exposure to asbestos is governed in Ontario by Regulation 278/05 – *Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations*. Disposal of asbestos waste

PRE-RENOVATION DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS SURVEY
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(friable and non-friable materials) is governed by Ontario Regulation 278/05 and by Ontario Regulation 347, *Waste Management – General*. O.Reg. 278/05 classifies asbestos work operations into three types (Type 1, 2 and 3), as shown in Table C-1 in Appendix C, and specifies procedures to be followed in conducting asbestos abatement work.

2.2 Lead

Lead is a heavy metal that can be found in construction materials such as paints, coatings, mortar, concrete, pipes, solder, packings, sheet metal, caulking, glazed ceramic products and cable splices. Lead has been used historically in exterior and interior paints.

The *Surface Coating Materials Regulations* (SOR/2016-193) made pursuant to the Canada Consumer Product Safety Act states that a surface coating material must not contain more than 90 mg/kg total lead. Health Canada defines a lead-containing surface coating as a paint or similar material that dries to a solid film that contains over 90 mg/kg dry weight of lead.

Information from the United States Occupational Health and Safety Administration (OSHA) suggests that the improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the permissible exposure limit. Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children⁽¹⁾.

The *National Plumbing Code* allowed lead as an acceptable material for pipes until 1975 and in solder until 1986.

The Ministry of Labour *Guideline, Lead on Construction Projects*, dated April 2011, provides guidance in the measures and procedures that should be followed when handling lead containing materials during construction projects. In the guideline, lead-containing construction operations are classified into three groups - Type 1 (low risk), Type 2 (medium risk) and Type 3 (high risk) based on presumed airborne concentrations of lead, as shown in Appendix C, Table C-2. Any operation that may expose a worker to lead that is not a Type 1, Type 2, or Type 3b operation, is classified as a Type 3a operation.

2.3 Mercury

Mercury has been used in electrical equipment such as alkaline batteries, fluorescent light bulbs (lamps), high intensity discharge (HID) lights (mercury vapour, high pressure sodium and metal halide), “silent switches” and in instruments such as thermometers, manometers and barometers, pressure gauges, float and level switches and flow meters. Mercury-containing lamps, the bulk of which are 1.22 m (four foot) fluorescent lamps contain between 7 and 40 mg of mercury each. Mercury compounds have also been

⁽¹⁾ *Lead-Containing Paints and Coatings: Preventing Exposure in the Construction Industry*. WorkSafe BC, 2011.

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used historically as additives in latex paint to protect the paint from mildew and bacteria during production and storage.

The intentional addition of mercury to Canadian-produced consumer paints for interior use was prohibited in 1991. Mercury may have remained in paints after 1991, however, as a result of impurities in the paint ingredients or cross-contamination due to other manufacturing processes. The *Surface Coating Materials Regulations* made under the *Hazardous Products Act* set a maximum total mercury concentration of 10 mg/kg (0.001 percent) for surface coating materials (including paint). This criterion level applies to the sale and importation of new surface coating materials.

Mercury-containing thermostats and silent light switches are mercury tilt switches which are small tubes with electrical contacts at one end of the tube. A mercury tilt switch is usually present when no switch is visible. Mercury switches often have the word "TOP" stamped on the upper end of the switch, which is visible after removing the cover plate. If mercury switches are to be removed, the entire switch should be removed and placed into a suitable container for storage and disposal.

Waste light tubes generated during renovations or building demolition and waste mercury from equipment must either be recycled or disposed of in accordance with the requirements of Ont. Reg. 347 - *Waste Management, General*.

Waste mercury in amounts less than 5 kg (per month) are exempt from the generator registration requirements prescribed by O.Reg. 347 – *Waste Management – General*. Waste mercury from mercury switches or gauges should, however, be properly collected and shipped to a recycling facility or disposed of as a hazardous waste. Removal of mercury-containing equipment (e.g., switches, gauges, controls, etc.) should be carried out in a manner which prevents spillage and exposure to workers.

2.4 Silica

Silica exists in several forms of which crystalline silica is of most concern with respect to potential worker exposures. Quartz is the most abundant type of crystalline silica. Some commonly used construction materials containing silica include brick, refractory brick, concrete, concrete block, cement, mortar, rock and stone, sand, fill dirt, topsoil and asphalt containing rock or stone.

The Ministry of Labour *Guideline, Silica on Construction Projects*, dated April 2011, provides guidance in controlling exposure to silica dust during construction activities. In the guideline, silica-containing construction operations are classified into three groups - Type 1 (low risk), Type 2 (medium risk) and Type 3 (high risk) based on presumed airborne concentrations of respirable crystalline silica in the form of cristobalite, tridymite, quartz and tripoli as shown in Appendix C, Table C-3.

2.5 Vinyl Chloride

Vinyl chloride vapours may be released from polyvinyl chloride (PVC) products in the event of heating or as a result of decomposition during fire. PVC is used in numerous materials that may be found in building

construction, including, for example, piping, conduits, siding, window and door frames, plastics, garden hoses, flooring and wire and cable protection.

2.6 Acrylonitrile

Acrylonitrile is used to produce nitrile-butadiene rubber, acrylonitrile-butadiene-styrene (ABS) polymers and styrene-acrylonitrile (SAN) polymers. Products made with ABS resins which may be found in buildings include telephones, bottles, packaging, refrigerator door liners, plastic pipe, building panels and shower stalls. Acrylonitrile can be released into the air by combustion of products containing ABS.

2.7 Other Designated Substances

Isocyanates are a class of chemicals used in the manufacture of certain types of plastics, foams, coatings and other products. Isocyanate-based building construction materials may include rigid foam products such as foam-core panels and spray-on insulation and paints, coatings, sealants and adhesives. Isocyanates may be inhaled if they are present in the air in the form of a vapour, a mist or a dust.

Benzene is a clear, highly flammable liquid used mainly in the manufacture of other chemicals. The commercial use of benzene as a solvent has practically been eliminated, however it continues to be used as a solvent and reactant in laboratories.

Arsenic is a heavy metal used historically in pesticides and herbicides. The primary use in building construction materials was its use in the wood preservative chromated copper arsenate (CCA). CCA was used to pressure treat lumber since the 1940's. Pressure-treated wood containing CCA is no longer being produced for use in most residential settings.

Ethylene oxide is a colourless gas at room temperature. It has been used primarily for the manufacture of other chemicals, as a fumigant and fungicide and for sterilization of hospital equipment.

Coke oven emissions are airborne contaminants emitted from coke ovens and are not a potential hazard associated with building construction materials.

2.8 Polychlorinated Biphenyls (PCBs)

The management of equipment classified as waste and containing Polychlorinated Biphenyls (PCBs) at concentrations of 50 parts per million (mg/kg) or greater is regulated by Ontario Regulation 362, *Waste Management – PCBs*. Under this regulation, PCB waste is defined as any waste material containing PCBs in concentrations of 50 mg/kg or greater. Any equipment containing PCBs at or greater than this level, such as transformers, switchgear, light ballasts and capacitors, which is removed from service due to age, failure or as a result of decommissioning, is considered to constitute a PCB waste. Although current federal legislation (effective 1 July 1980) has prohibited the manufacture and sale of new equipment containing PCBs since that time, continued operation of equipment supplied prior to this date and containing PCBs is still permitted. Handling, storage and disposition of such equipment is, however, tightly regulated and must

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be managed in accordance with provincial and federal government requirements as soon as it is taken out of service or becomes unserviceable.

In most institutional, commercial facilities and in smaller industrial facilities, the primary source of equipment potentially containing PCBs is fluorescent and H.I.D. light ballasts. Small transformers may also be present. In larger industrial facilities, larger transformers and switch gear containing, or potentially containing, PCBs may also be present.

PCBs were also commonly added to industrial paints from the 1940s to the late 1970s. PCBs were added directly to the paint mixture to act as a fungicide, to increase durability and flexibility, to improve resistance to fires and to increase moisture resistance. The use of PCBs in new products was banned in Canada in the 1970s. PCB amended paints were used in speciality industrial/institutional applications prior to the 1970s including government buildings and equipment such as industrial plants, radar sites, ships as well as non-government rail cars, ships, grain bins, automobiles and appliances.

Removal of in-service equipment containing PCBs, such as fluorescent light ballasts, capacitors and transformers, is subject to the requirements of the federal *PCB Regulations* (discussed below).

The *PCB Regulations*, which came into force on 5 September 2008, were made under the *Canadian Environmental Protection Act, 1999* (CEPA 1999) with the objective of addressing the risks posed by the use, storage and release to the environment of PCBs, and to accelerate their destruction. The *PCB Regulations* set different end-of-use deadlines for equipment containing PCBs at various concentration levels.

The Regulations Amending the PCB Regulations and Repealing the Federal Mobile PCB Treatment and Destruction Regulations were published on 23 April 2014, in the *Canada Gazette, Part II*, and came into force on 1 January 2015. The most notable part of the amendments is the addition of an end-of-use deadline date of 31 December 2025 for specific electrical equipment located at electrical generation, transmission and distribution facilities.

When the PCB materials are classified as waste, jurisdiction falls under the Ontario Ministry of the Environment and Climate Change (MOECC) and O.Reg. 362. All remedial and PCB management work must be carried out under the terms of a Director's Instruction issued by an MOECC District Office (for quantities of PCB fluid greater than 50 litres). The PCB waste stream, regardless of quantity, must be registered with the MOECC, in accordance with O.Reg. 347, *General - Waste Management*. O.Reg. 362 applies to any equipment containing greater than 1 kg of PCBs.

2.9 Ozone-Depleting Substances (ODS) and Other Halocarbons

Ontario Regulation 463/10 – *Ozone Depleting Substances and Other Halocarbons*, applies to the use, handling and disposal of Class 1 ozone-depleting substances, including various chlorofluorocarbons (CFCs), halons and other halocarbons, Class 2 ozone-depleting substances, including various hydrochlorofluorocarbons (HCFCs) and halocarbons, and other halocarbons, including fluorocarbons (FCs) and hydrofluorocarbons (CFCs). The most significant requirements for handling of ozone-depleting substances (ODS) and other Halocarbons, which include, for example, refrigerants used in refrigeration equipment and chillers, include the following:

- certification is required for all persons testing, repairing, filling or emptying equipment containing ODS and other halocarbons;
- the discharge of a Class 1 ODS or anything that contains a Class 1 ODS to the natural environment or within a building is prohibited;
- the making, use of, selling of or transferring of a Class 1 ODS is restricted to certain conditions;
- the discharge of a solvent or sterilant that contains a Class 2 ODS is prohibited;
- the making, use of, selling of or transferring of a solvent or sterilant that contains a Class 2 ODS is restricted to certain conditions;
- fire extinguishing equipment that contains a halon may be discharged to fight fires, except fires for firefighting training purposes;
- portable fire extinguishing equipment that contains a halon may be used or stored if the extinguisher was sold for use for the first time before 1 January 1996;
- records of the servicing and repair of equipment containing ODS and other halocarbons must be prepared and maintained by the owner of the equipment; and
- equipment no longer containing ODS and other halocarbons must be posted with a notice completed by a certified person.

Ontario Regulation 347, *General – Waste Management*, has also been amended to provide for more strict control of CFCs. The requirements under the amended regulation apply primarily to the keeping of records for the receipt or recycling of CFC waste.

2.10 Mould

Moulds are forms of fungi that are found everywhere both indoors and outdoors all year round. Outdoors, moulds live in the soil, on plants and on dead and decaying matter. More than 1000 different kinds of indoor

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moulds have been found in buildings. Moulds spread and reproduce by making spores, which are all small and light-weight, able to travel through air, capable of resisting dry, adverse environmental conditions, and hence capable of surviving a long time. Moulds need moisture and nutrients to grow and their growth is stimulated by warm, damp and humid conditions.

Control of exposure to mould is required under Section 25(2)(h) of the Ontario *Occupational Health and Safety Act*, which states that employers shall take every precaution reasonable in the circumstances for the protection of workers. Recommended work practices are outlined in the following documents:

- *Mould Guidelines for the Canadian Construction Industry*. Standard Construction Document CCA 82 2004. Canadian Construction Association.
- *Mould Abatement Guidelines*. Environmental Abatement Council of Ontario. Edition 3. 2015.

3 RESULTS AND DISCUSSION

3.1 Asbestos

Arcadis reviewed a report entitled *Survey of Asbestos-Containing Materials, Pauline Johnson Public School, 4350 Longmoor Drive, Burlington, Ontario* dated March 8, 2021. Information and/or bulk sample analysis results obtained from this report was utilized by Arcadis during the course of our investigation and in the preparation of this report.

During the course of our site investigation, representative bulk samples of material were collected by Arcadis staff. The samples were forwarded to EMSL Canada Inc. (EMSL) for asbestos analyses. Results of bulk sample analysis for asbestos content are provided in Table 3.1. Table 3.1 also include sample results that are outside of the designated study areas. This information is provided for references purposes only. Laboratory reports are provided in Appendix B. Locations of accessible asbestos-containing materials are outlined on the floor plan provided in Appendix A.

Table 3.1. Summary of Results of Analyses of Bulk Samples for Asbestos Content

Pauline Johnson Public School – June 17, 2021

Sample No.	Sample Location	Sample description	Asbestos Content
1A	Room 5	Interior concrete block mortar (era 1986)	< 0.25% chrysotile ⁽¹⁾
1B	Room 6	Interior concrete block mortar (era 1986)	< 0.25% chrysotile ⁽¹⁾
1C	Room 6	Interior concrete block mortar (era 1986)	< 0.25% chrysotile ⁽¹⁾
2A	Room 5	Concrete block-filler paint (era 1986)	None detected
2B	Room 6	Concrete block-filler paint (era 1986)	None detected
2C	Room 6	Concrete block-filler paint (era 1986)	None detected
3A	Room 4A	Black mastic under 9" vinyl floor tile	5% chrysotile
1A	9	Paint on block wall	None detected ⁽²⁾
1B	3	Paint on block wall	None detected ⁽²⁾
1C	27	Paint on block wall	None detected ⁽²⁾
2A	27	Mortar on block wall	< 0.25% chrysotile ^(1,2)
2B	32	Mortar on block wall	< 0.25% chrysotile ^(1,2)
2C	28	Mortar on block wall	< 0.25% chrysotile ^(1,2)
3A	2	Vermiculite insulation in block wall	None detected (TEM) ⁽²⁾
4A	2	Grout in ceramic tiles	None detected ⁽²⁾
4B	2B	Grout in ceramic tiles	None detected ⁽²⁾
4C	2B	Grout in ceramic tiles	None detected ⁽²⁾
5A	2	Mortar in ceramic tiles	None detected ⁽²⁾
5B	2B	Mortar in ceramic tiles	None detected ⁽²⁾
5C	2B	Mortar in ceramic tiles	None detected ⁽²⁾
6A	1	12"x12" vinyl floor tile, grey with black and white fleck	None detected (TEM) ⁽²⁾

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Sample No.	Sample Location	Sample description	Asbestos Content
6B	3	12"x12" vinyl floor tile, grey with black and white fleck	None detected ⁽²⁾
6C	4	12"x12" vinyl floor tile, grey with black and white fleck	None detected ⁽²⁾
7A	1	Mastic below 12"x12" vinyl floor tile, grey with black and white fleck	None detected ⁽²⁾
7B	3	Mastic below 12"x12" vinyl floor tile, grey with black and white fleck	None detected ⁽²⁾
7C	4	Mastic below 12"x12" vinyl floor tile, grey with black and white fleck	None detected ⁽²⁾
8A	1	Grey interior window caulking between block wall and window frame	None detected ⁽²⁾
8B	2	Grey interior window caulking between block wall and window frame	None detected ⁽²⁾
8C	3	Grey interior window caulking between block wall and window frame	None detected ⁽²⁾
9A	1	White interior window caulking	None detected ⁽²⁾
9B	3	White interior window caulking	None detected ⁽²⁾
9C	4	White interior window caulking	None detected ⁽²⁾
1A	Ext. wall	Parging on concrete wall	None detected ⁽²⁾
1B	Ext. wall	Parging on concrete wall	None detected ⁽²⁾
1C	Ext. wall	Parging on concrete wall	None detected ⁽²⁾
2A	Ext. wall	Control joint caulking	None detected ⁽²⁾
2B	Ext. wall	Control joint caulking	None detected ⁽²⁾
2C	Ext. wall	Control joint caulking	None detected ⁽²⁾
3A	Corridor 11	Exterior door caulking - Brown	None detected ⁽²⁾
3B	Corridor 11	Exterior door caulking - Brown	None detected ⁽²⁾
3C	Corridor 12	Exterior door caulking - Brown	None detected ⁽²⁾
4A	Ext. wall Room 17	Metal panel control joint caulking – Dark brown	None detected ⁽²⁾
4B	Ext. wall Room 17	Metal panel control joint caulking – Dark brown	None detected ⁽²⁾
4C	Ext. wall Room 3/4	Metal panel control joint caulking – Dark brown	None detected ⁽²⁾
5A	Room 4	Exterior door caulking – Light grey/white	None detected ⁽²⁾
5B	Room 27	Exterior door caulking – Light grey/white	None detected ⁽²⁾
5C	Room 2	Exterior door caulking – Light grey/white	None detected ⁽²⁾
6A	Room 17	Exterior door caulking – Hard grey/white	None detected ⁽²⁾
6A	Room 23	Exterior door caulking – Hard grey/white	None detected ⁽²⁾
6C	Room 1	Exterior door caulking – Hard grey/white	None detected ⁽²⁾
1-A	Room: 1	Mastic – yellow in colour under carpet	None detected (PLM) ⁽²⁾ None detected (TEM) ⁽²⁾

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Sample No.	Sample Location	Sample description	Asbestos Content
1-B	Room: 2	Mastic – yellow in colour under carpet	None detected ⁽²⁾
1-C	Room: 19	Mastic – yellow in colour under carpet	None detected ⁽²⁾
2-A	Room: 1	Mastic – black in colour under 12" x 12" vinyl floor tile	None detected (PLM) ⁽²⁾ None detected (TEM) ⁽²⁾
2-B	Room: 2	Mastic – black in colour under 12" x 12" vinyl floor tile	None detected ⁽²⁾
2-C	Room: 2	Mastic – black in colour under 12" x 12" vinyl floor tile	None detected ⁽²⁾
3-A	Room: 1	12" x 12" vinyl floor tile – white in colour with black streaks	1.1% chrysotile ^(2,3)
4-A	Room: 1	Mastic – light beige in colour from baseboard	None detected (PLM) ⁽²⁾ None detected (TEM) ⁽²⁾
4-B	Room: 2	Mastic – light beige in colour from baseboard	None detected ⁽²⁾
4-C	Room: 19	Mastic – light beige in colour from baseboard	None detected ⁽²⁾
5-A	Room: 1	Vinyl baseboard – black in colour	None detected (PLM) ⁽²⁾ None detected (TEM) ⁽²⁾
5-B	Room: 2	Vinyl baseboard – black in colour	None detected ⁽²⁾
5-C	Room: 19	Vinyl baseboard – black in colour	None detected ⁽²⁾
6-A	Room: 29	Mastic – black in colour under 12" x 12" vinyl floor tile	None detected (PLM) ⁽²⁾ None detected (TEM) ⁽²⁾
6-B	Room: 29	Mastic – black in colour under 12" x 12" vinyl floor tile	None detected ⁽²⁾
6-C	Room: 29	Mastic – black in colour under 12" x 12" vinyl floor tile	None detected ⁽²⁾
7-A	Room: 29	12" x 12" vinyl floor tile – brown in colour with white streak	None detected (PLM) ⁽²⁾ None detected (TEM) ⁽²⁾
7-B	Room: 29	12" x 12" vinyl floor tile – brown in colour with white streak	None detected ⁽²⁾
7-C	Room: 29	12" x 12" vinyl floor tile – brown in colour with white streak	None detected ⁽²⁾
8-A	Room: 19	Mastic – black in colour under 12" x 12" vinyl floor tile	1.9% chrysotile ⁽²⁾
9-A	Room: 19	12" x 12" vinyl floor tile – light green with light and dark fleck	None detected (PLM) ⁽²⁾ None detected (TEM) ⁽²⁾
9-B	Room: 19A	12" x 12" vinyl floor tile – light green with light and dark fleck	None detected ⁽²⁾
9-C	Room: 19B	12" x 12" vinyl floor tile – light green with light and dark fleck	None detected ⁽²⁾
10-A	Room: 16	12" x 12" vinyl floor tile – beige in colour with light and dark fleck	None detected (PLM) ⁽²⁾ None detected (TEM) ⁽²⁾
10-B	Room: 16A	12" x 12" vinyl floor tile – beige in colour with light and dark fleck	None detected ⁽²⁾
10-C	Room: 16C	12" x 12" vinyl floor tile – beige in colour with light and dark fleck	None detected ⁽²⁾

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Sample No.	Sample Location	Sample description	Asbestos Content
11-A	Room: 13	9" x 9" vinyl floor tile – brown/white/grey in colour with streaks	None detected (PLM) ⁽²⁾ 0.97% chrysotile (TEM)⁽²⁾
12-A	Room: 8	12" x 12" vinyl floor tile – cream in colour with light and dark fleck	None detected (PLM) ⁽²⁾ None detected (TEM) ⁽²⁾
12-B	Room: 8	12" x 12" vinyl floor tile – cream in colour with light and dark fleck	None detected ⁽²⁾
12-C	Room: 8	12" x 12" vinyl floor tile – cream in colour with light and dark fleck	None detected ⁽²⁾
13-A	Room: 18	12" x 12" vinyl floor tile – beige in colour with brown streaks	None detected (PLM) ⁽²⁾ None detected (TEM) ⁽²⁾
13-B	Room: 18	12" x 12" vinyl floor tile – beige in colour with brown streaks	None detected ⁽²⁾
13-C	Room: 18	12" x 12" vinyl floor tile – beige in colour with brown streaks	None detected ⁽²⁾
14-A	Room: 18A	12" x 12" vinyl floor tile – grey in colour with light and dark fleck	None detected (PLM) ⁽²⁾ None detected (TEM) ⁽²⁾
14-B	Room: 18A	12" x 12" vinyl floor tile – grey in colour with light and dark fleck	None detected ⁽²⁾
14-C	Room: 18A	12" x 12" vinyl floor tile – grey in colour with light and dark fleck	None detected ⁽²⁾
15-A	Room: 17	12" x 12" vinyl floor tile – light beige in colour with spaced tan fleck	None detected (PLM) ⁽²⁾ None detected (TEM) ⁽²⁾
15-B	Room: 17	12" x 12" vinyl floor tile – light beige in colour with spaced tan fleck	None detected ⁽²⁾
15-C	Room: 17	12" x 12" vinyl floor tile – light beige in colour with spaced tan fleck	None detected ⁽²⁾
16-A	Room: 25	12" x 12" vinyl floor tile – white in colour with spaced black fleck	None detected (PLM) ⁽²⁾ None detected (TEM) ⁽²⁾
16-B	Room: 25	12" x 12" vinyl floor tile – white in colour with spaced black fleck	None detected ⁽²⁾
16-C	Room: 26	12" x 12" vinyl floor tile – white in colour with spaced black fleck	None detected ⁽²⁾
17-A	Room: 1	Caulking – grey in colour from interior window frame and wall	None detected (PLM) ⁽²⁾ None detected (TEM) ⁽²⁾
17-B	Room: 2	Caulking – grey in colour from interior window frame and wall	None detected ⁽²⁾
17-C	Exterior: 1	Caulking – grey in colour from exterior window frame and wall	None detected ⁽²⁾
18-A	Room: 1	Caulking – white in colour from wall and wood bulkhead joint	None detected (PLM) ⁽²⁾ None detected (TEM) ⁽²⁾
18-B	Room: 1	Caulking – white in colour from wall and wood bulkhead joint	None detected ⁽²⁾
18-C	Room: 2	Caulking – white in colour from wall and wood bulkhead joint	None detected ⁽²⁾
19-A	Room: 2	Caulking – brown in colour from interior door frame	1.5% chrysotile⁽²⁾

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Sample No.	Sample Location	Sample description	Asbestos Content
20-A	Room: 14	Caulking – grey in colour new look from interior window frame	None detected (PLM) ⁽²⁾ None detected (TEM) ⁽²⁾
20-B	Room: 14	Caulking – grey in colour new look from interior window frame	None detected ⁽²⁾
20-C	Room: 14	Caulking – grey in colour new look from exterior window frame	None detected ⁽²⁾
21-A	Room: 15	Caulking – white in colour from interior door frame	< 0.25% chrysotile (PLM) ^(1,2) 1.3% chrysotile (TEM) ⁽²⁾
22-A	Room: 19	Caulking – yellow in colour from wall and wood bulkhead joint	2.2% chrysotile ⁽²⁾
23-A	Exterior: 19	Caulking – grey in colour brittle from exterior door frame	1.3% chrysotile ⁽²⁾
24-A	Room: 29	Caulking- white in colour from interior door frame	None detected (PLM) ⁽²⁾ None detected (TEM) ⁽²⁾
24-B	Room: 29	Caulking- white in colour from interior door frame	None detected ⁽²⁾
24-C	Room: 29	Caulking- white in colour from interior door frame	None detected ⁽²⁾
25-A	Room: 1	Fire proofing – white in colour from gypsum board above ceiling tiles	None detected ⁽²⁾
25-B	Room: 2	Fire proofing – white in colour from gypsum board above ceiling tiles	None detected ⁽²⁾
25-C	Room: 2	Fire proofing – white in colour from gypsum board above ceiling tiles	None detected ⁽²⁾
26-A	Room: 6	Cement board – grey in colour from work bench	11.7% chrysotile ⁽²⁾
27	Room: 32	Pipe fitting insulation – grey in colour	60% chrysotile ⁽²⁾
28-A	Room: 1	Vermiculite – brown in colour from concrete block wall	None detected ⁽²⁾
28-B	Room: 1	Vermiculite – brown in colour from concrete block wall	None detected ⁽²⁾
28-C	Room: 2	Vermiculite – brown in colour from concrete block wall	None detected ⁽²⁾
29-A	Room: 32	Drywall joint compound from column enclosure	None detected ⁽²⁾
29-B	Room: 32	Drywall joint compound from column enclosure	1.6% chrysotile ⁽²⁾
30-A	Room: 1	Mortar – from interior concrete block mortar	None detected (PLM) ⁽²⁾ None detected (TEM) ⁽²⁾
30-B	Room: 2	Mortar – from interior concrete block mortar	<0.25% chrysotile ^(1,2)
30-C	Room: 19	Mortar – from interior concrete block mortar	<0.25% chrysotile ^(1,2)
31-A	Exterior: 1	Mortar – from exterior brick mortar	<0.25% chrysotile (PLM) ^(1,2) <0.40% chrysotile (TEM) ^(1,2)
31-B	Exterior: 2	Mortar – from exterior brick mortar	<0.25% chrysotile ^(1,2)
31-C	Exterior: 19	Mortar – from exterior brick mortar	<0.25% chrysotile ^(1,2)
32-A	Room: 1	Textured paint – from interior concrete block wall	None detected ⁽²⁾
32-B	Room: 2	Textured paint – from interior concrete block wall	None detected ⁽²⁾
32-C	Room: 19	Textured paint – from interior concrete block wall	None detected ⁽²⁾

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Sample No.	Sample Location	Sample description	Asbestos Content
33-A	Room: 14	Textured paint – from drywall ceiling	None detected ⁽²⁾
33-B	Room: 14	Textured paint – from drywall ceiling	None detected ⁽²⁾
33-C	Room: 14	Textured paint – from drywall ceiling	None detected ⁽²⁾
34-A	Room: 1	2' x 4' ceiling tile – chicken feet fissure with pinholes	None detected ⁽²⁾
34-B	Room: 2	2' x 4' ceiling tile – chicken feet fissure with pinholes	None detected ⁽²⁾
34-C	Room: 2	2' x 4' ceiling tile – chicken feet fissure with pinholes	None detected ⁽²⁾
35-A	Room: 1	12" x 12" ceiling tile – directional fissures with pinholes	None detected ⁽²⁾
35-B	Room: 2	12" x 12" ceiling tile – directional fissures with pinholes	None detected ⁽²⁾
35-C	Room: 2	12" x 12" ceiling tile – directional fissures with pinholes	None detected ⁽²⁾
36-A	Room: 1	Ceiling mastic pucks – brown in colour under 12" x 12" ceiling tile	None detected (PLM) ⁽²⁾ None detected (TEM) ⁽²⁾
36-B	Room: 2	Ceiling mastic pucks – brown in colour under 12" x 12" ceiling tile	None detected ⁽²⁾
36-C	Room: 2	Ceiling mastic pucks – brown in colour under 12" x 12" ceiling tile	None detected ⁽²⁾
37-A	Room: 1	2'x4' ceiling tile – fissures on 2' with pinholes	None detected ⁽²⁾
37-B	Room: 2	2'x4' ceiling tile – fissures on 2' with pinholes	None detected ⁽²⁾
37-C	Room: 2	2'x4' ceiling tile – fissures on 2' with pinholes	None detected ⁽²⁾
38-A	Room: 1	12" x 12" ceiling tile – long directional fissure with pinholes	None detected ⁽²⁾
38-B	Room: 2	12" x 12" ceiling tile – long directional fissure with pinholes	None detected ⁽²⁾
38-C	Room: 2	12" x 12" ceiling tile – long directional fissure with pinholes	None detected ⁽²⁾
39-A	Room: 32	2' x 4' ceiling tile – fissure on 4' with pinholes	None detected ⁽²⁾
39-B	Room: 14	2' x 4' ceiling tile – fissure on 4' with pinholes	None detected ⁽²⁾
39-C	Room: 19	2' x 4' ceiling tile – fissure on 4' with pinholes	None detected ⁽²⁾
40-A	Room: 32	2' x 4' ceiling tile – random fissures with pinholes	None detected ⁽²⁾
40-B	Room: 14	2' x 4' ceiling tile – random fissures with pinholes	None detected ⁽²⁾
40-C	Room: 19	2' x 4' ceiling tile – random fissures with pinholes	None detected ⁽²⁾

NOTES:

- (1) "Asbestos-containing material" is defined as material that contains 0.5% or more asbestos by dry weight.
- (2) Sample results derived from a report prepared by Arcadis for the Halton District School Board entitled *Survey of Asbestos-Containing Materials, Pauline Johnson Public School, 4350 Longmoor Drive, Burlington, Ontario* dated March 8, 2021.
- (3) Material collected in the area have since been removed and are provided here for references purposes only.

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Bulk samples were analyzed by Polarized Light Microscopy (PLM) analysis, except where "TEM" is noted, in which case Transmission Electron Microscopy analysis was also performed.

< = less than.

Chrysotile = Chrysotile asbestos.

Determination of the locations of asbestos-containing material was made based on the review of existing information, results of bulk sample analysis, visual observations and physical characteristics of the applications as well as our knowledge of the uses of asbestos in building materials.

Based on visual observations and results of laboratory analyses of samples collected by Arcadis Canada Inc., the following asbestos-containing materials were found to be present in the designated study areas:

- thermal insulation applied to pipe fittings above ceiling in Rooms 1C, 13, 13B, 14, 16, 16B, 20, 22, 23, 24, 28 and 32;
- joint compound on drywall applications above windows and column enclosures in Rooms 1, 2, 2B, 3, 4, 16, 19, 28 and 32;
- joint compound on drywall walls in Rooms 13, 13A, 13B,
- joint compound on drywall encasing HVAC units in Rooms 1, 2, 2B, 3, 4 and 30
- joint compound on drywall ceiling in Rooms 1D, 14, 16A, 18, 18A, 18B, 20, 21, 25, 26, 30A, 31, 31A and 31B;
- 9" x 9" vinyl floor tiles and associated mastics in Rooms 1A, 1B, 4A, 13, 13A and 18B;
- Cement board work bench in Room 6;
- Caulking located between wooden bulkheads and walls in Rooms 1, 2 and 2B; and
- Caulking on select door frames in Rooms 14, 15 and 32.

Asbestos-containing thermal insulation applied to pipe fittings is a white-coloured cementitious material.

Glass fibre insulation is readily visually distinguishable (typically yellow in colour) from asbestos-containing insulation materials and was, therefore, not tested for asbestos content.

Vinyl floor tiles, floor tile mastics, caulking and cement board are non-friable materials. The removal, alteration and/or disturbance of these non-friable asbestos-containing materials can be performed as a Type 1 operation as specified in O. Reg. 278/05 if the material is wetted and the work is done only using non-powered, hand-held tools (see Table C-1 in Appendix C). If the removal, alteration and/or disturbance work is done using power tools that are attached to dust-collecting devices equipped with HEPA filters, then the work is classified as Type 2. If the power tools do not have HEPA filtered dust collecting devices, then the work is Type 3.

The removal, alteration and/or disturbance of less than one square metre of drywall in which asbestos-containing joint filling compounds have been used is classified as a Type 1 operation. The removal,

PRE-RENOVATION DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS SURVEY
PAULINE JOHNSON PUBLIC SCHOOL

alteration and/or disturbance of one square metre or more of drywall with asbestos-containing joint compounds is a Type 2 operation.

Thermal insulation is a friable material. The removal, alteration and/or disturbance of less than 1 m² of friable asbestos-containing materials is classified as a Type 2 enclosure operation as specified in O.Reg. 278/05. The removal, alteration and/or disturbance of more than 1 m² of friable asbestos-containing materials is classified as a Type 3 operation.

Asbestos may also be present in materials which were not sampled during the course of the asbestos survey carried out by Arcadis, including, but not limited to, areas outside the designated study areas, roofing materials, fire doors, gaskets in piping, internal components of boilers, components of electrical equipment (e.g. electric wiring insulation, non-metallic sheathed cable, electrical panel partitions, arc chutes, high-grade electrical paper, etc.), cement, asphaltic pavement, etc., and/or in locations that are presently inaccessible (e.g., in pipe chases, behind walls, above suspended gypsum board or plaster ceilings, and below carpets). Confirmatory testing of any such materials could be undertaken as the need arises (i.e., at the time of renovations, modifications or demolition) or the materials can be assumed to contain asbestos based on findings in adjacent areas.

If any materials which may contain asbestos and which were not tested during the course of the designated substances and hazardous materials survey are discovered during any construction activities, the work shall not proceed until such time as the required notifications have been made and an appropriate course of action is determined.

3.2 Lead

During the course of our site investigation, bulk samples of the predominant paints observed in the study areas were collected by Arcadis staff. The samples were forwarded to Bureau Veritas Laboratories for lead analyses. Results of bulk sample analysis for lead content are provided in Table 3.2. The laboratory report is provided in Appendix B.

Table 3.2. Summary of Results of Analyses of Bulk Samples for Lead Content

Pauline Johnson Public School – June 17, 2021

Sample No.	Sample Location	Sample Description	Lead Content
P-1	Room 20	Beige paint on concrete block	1,200 mg/kg
P-2	Room 3	Beige paint on drywall	580 mg/kg

NOTE:

< = less than.

mg/Kg = milligrams lead per kilogram paint.

1 mg/Kg - 1 part per million (ppm).

PRE-RENOVATION DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS SURVEY PAULINE JOHNSON PUBLIC SCHOOL

Lead was detected at levels above the criteria of 90 mg/kg (Surface Coating Materials Regulations criterion value) in the samples of beige paint observed in the study areas.

Lead may also be present in lead pipe, mortar, glazing on ceramic tiles, in the solder on the seals of bell joints of any cast iron drainpipe and in the solder on the sweated-on joints between copper pipe and fittings.

The Ministry of Labour *Guideline – Lead on Construction Projects*, dated April 2011, provides guidance in the measures and procedures that should be followed when handling lead containing materials during construction projects. In the guideline, lead-containing construction operations are classified into three groups - Type 1 (low risk), Type 2 (medium risk) and Type 3 (high risk) based on presumed airborne concentrations of lead, as shown in Appendix C, Table C-2. Any operation that may expose a worker to lead that is not a Type 1, Type 2, or Type 3b operation, is classified as a Type 3a operation.

In addition, the *EACO Lead Abatement Guidelines, 2014 — Edition 1*, Environmental Abatement Council of Ontario, also provides guidance and recommended work practices.

3.3 Mercury

During the course of our site investigation, fluorescent lights were identified in the designated study areas. Mercury should be assumed to be present as a gas in all fluorescent light tubes and in all paint applications, albeit at low levels. The fluorescent light tubes should be recycled for mercury, if the lights are removed.

Proper procedures for removing and handling mercury-containing fluorescent light tubes typically involve:

- ensuring that electrical power to light fixtures has been disconnected and locked out;
- taking all necessary precautions to ensure that fluorescent lamp tubes are removed in a manner that prevents breakage; and
- transporting fluorescent lamp tubes to a licensed processing location for separation and recovery of mercury.

The measures and procedures outlined in the MOL *Guideline, Lead on Construction Projects* for control of potential exposure to lead in paint during construction activities will also serve to control potential exposure to any mercury in paint.

3.4 Silica

Materials observed in the designated study areas which should be considered to contain silica included gypsum board, drywall joint compound, concrete, mortar, concrete block, cement board and vinyl floor tiles.

Silica can also be assumed to be present in any gravel ballast on roofs and will also be found in asphalt roofing materials if rock or stone are present in the asphalt.

The Ministry of Labour *Guideline, Silica on Construction Projects*, April 2011, provides guidance in controlling exposure to silica dust during construction activities. In the guideline, silica-containing construction operations are classified into three groups - Type 1 (low risk), Type 2 (medium risk) and Type 3 (high risk) based on presumed airborne concentrations of silica, as shown in Appendix C, Table C-3.

Additional precautionary measures should also be implemented for certain types of materials (e.g., plaster and texture coat materials, including non-asbestos applications, concrete block, etc.). For minor disturbances such as drilling, a HEPA-filtered attachment should be used. For removal of more than a minor amount of material, enclosures should be constructed for dust control and separation of the work area from adjacent areas.

3.5 Vinyl Chloride

As mentioned in Section 2.5 above, vinyl chloride would only be a potential exposure concern in the event of combustion of PVC products.

3.6 Acrylonitrile

As mentioned in Section 2.6 above, acrylonitrile would only be a potential exposure concern in the event of combustion of ABS products.

3.7 Other Designated Substances

No other designated substances (benzene, isocyanates, arsenic, ethylene oxide and coke oven emissions) were observed to be present in the designated study areas, and none would be expected to be encountered in any building materials in a form that would represent an exposure concern. Arsenic may be present at low levels in paint applications. The measures and procedures outlined in the MOL *Guideline, Lead on Construction Projects* for control of potential exposure to lead in paint during construction activities will also serve to control potential exposure to any arsenic (or mercury) in paint.

3.8 Polychlorinated Biphenyls (PCBs)

Fluorescent lights were observed in the designated study areas during the course of our site investigations. Light ballasts, such as those associated with the type of fluorescent lights (T8s) observed in the designated study areas, are usually an electronic-type which do not contain PCBs, however, this would be confirmed by an electrician at the time of dismantling of the lights.

3.9 Ozone-Depleting Substances (ODS) and Other Halocarbons

Equipment potentially containing ozone-depleting substances was not observed during the course of the site investigation.

3.10 Mould

Readily evident mould was not observed during the course of the site investigation. The inspection of mould was limited to visual observations of readily-accessible surfaces and did not include intrusive inspections of wall cavities. During renovations or interior demolition work, any mould-impacted materials uncovered/discovered should be remediated following the measures and procedures outlined in the *Canadian Construction Association Standard Construction Document CCA-82 2004 - Mould Guidelines for the Canadian Construction Industry*.

4 USE AND LIMITATIONS OF THIS PRE-RENOVATION DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS SURVEY REPORT

This report, prepared for the Halton District School Board, does not provide certification or warranty, expressed or implied, that the investigation conducted by Arcadis Canada Inc. identified all designated substances (as defined in the Ontario *Occupational Health and Safety Act*) in the designated study areas at the subject facility. The work undertaken by Arcadis Canada Inc. was directed to provide information on the presence of designated substances in building construction materials based on review of existing information, visual investigation of readily accessible areas in the designated study areas of the building and on the results of laboratory analysis of a limited number of bulk samples of material for asbestos content and laboratory analysis of a limited number of paint samples for lead content. The survey did not include for identification of asbestos in process materials, equipment (including electrical equipment and wiring), furniture (e.g., chairs, table tops, etc.), nor material outside of the building (e.g., asphaltic pavement).

The material in this report reflects Arcadis Canada Inc.'s best judgment in light of the information available at the time of the investigation, which was performed on June 17, 2021.

This report is not intended to be used as a scope of work or technical specification for remediation of designated substances or hazardous materials.

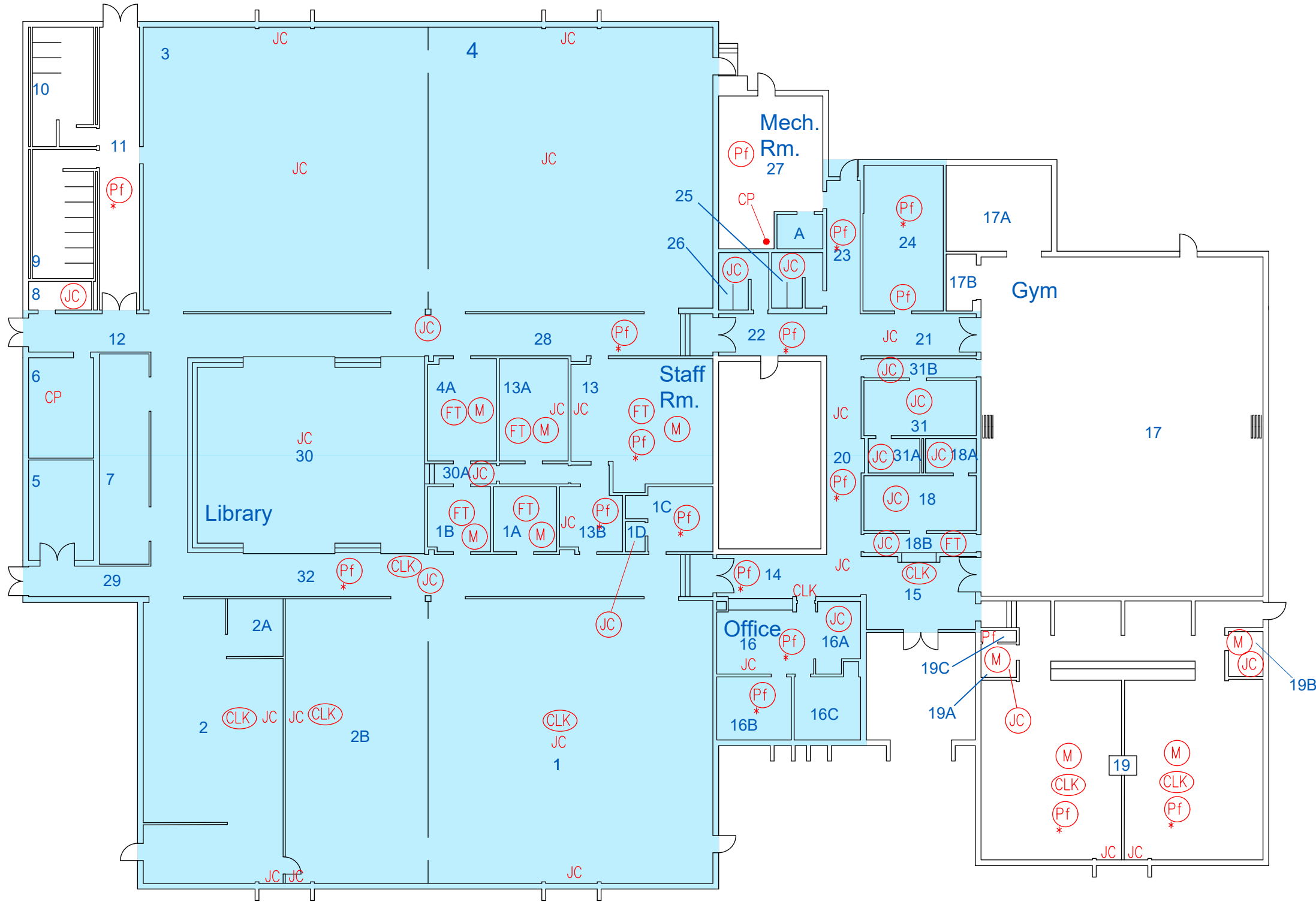
This report was prepared by Arcadis Canada Inc. for the Halton District School Board. Any use which any other party makes of the report, or reliance on, or decisions to be based on it, is the responsibility of such parties.

APPENDIX A

Floor Plans



Jun 25, 2021 - 2:43pm - USER ma0285
 C:\Users\ma0285\OneDrive\Documents\Halton District School Board\Project Files\Pauline Johnson PS\2021\30089648\01-DWG\30089648 Pauline Johnson PS Pre Renovation.dwg



LEGEND:

- 1 FUNCTIONAL SPACE
- THROUGHOUT FUNCTIONAL SPACE
- * ABOVE CEILING ASSEMBLY
- Pf ASBESTOS ON PIPE FITTINGS (FRIABLE)
- JC ASBESTOS DRYWALL JOINT COMPOUND (NON-FRIABLE)
- FT ASBESTOS FLOOR TILE (NON-FRIABLE)
- CLK ASBESTOS CAULKING (NON-FRIABLE)
- M ASBESTOS FLOOR TILE MASTIC (NON-FRIABLE)
- CP ASBESTOS CEMENT PRODUCT (NON-FRIABLE)
- STUDY AREA

NOTES:

1. INTERIORS OF ALL FIRE DOORS ARE ASSUMED TO CONTAIN ASBESTOS.

REVISIONS:

No.	Date:	By:	Revisions

REFERENCE:

- 1.



HALTON DISTRICT SCHOOL BOARD
**PRE-RENOVATION DESIGNATED
 SUBSTANCE AND HAZARDOUS MATERIAL
 SURVEY**

LOCATIONS OF ASBESTOS-CONTAINING
 MATERIALS AND STUDY AREAS

 PAULINE JOHNSON PUBLIC SCHOOL
 4350 LONGMOOR DRIVE, BURLINGTON, ON

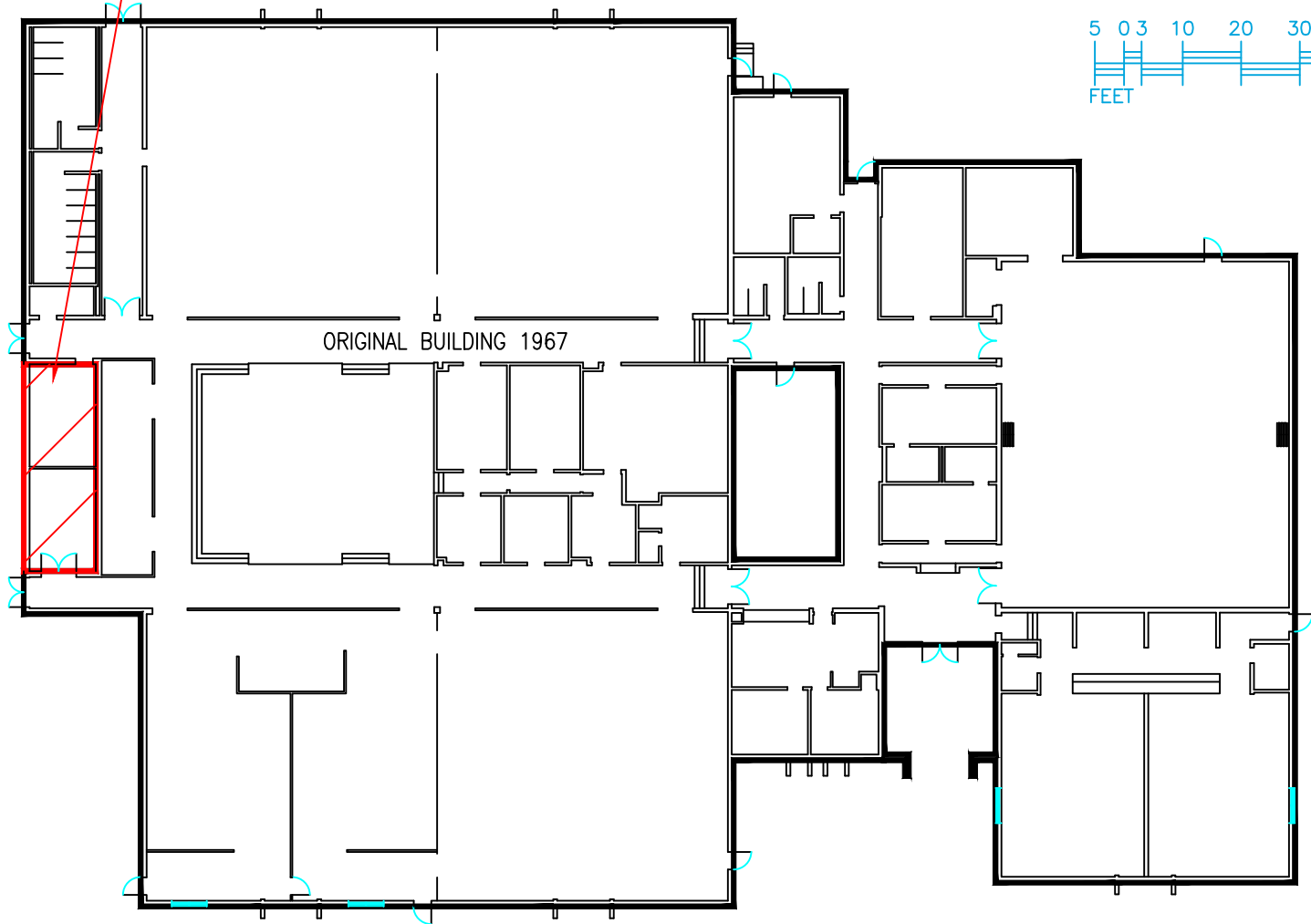
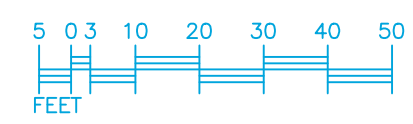
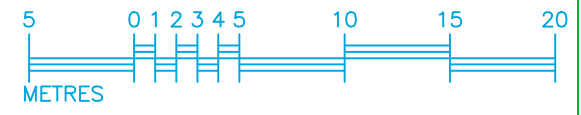
FIRST FLOOR

Drawn By: M.S	Approved By: D.K.	Project No: 30089648
Date: JUNE 2021	Scale: N.T.S	Drawing No: 30089648-1

FIRST ADDITION 1986

ORIGINAL BUILDING 1967

Scale





Pauline Johnson Public School

4885 LINDSEY DRIVE
BURLINGTON, ONTARIO

DATE	11 NOVEMBER 2014
ISSUED FOR	3 MAY 2011
OWNER	JK-S
SCALE	1"=30'-0"
DESIGN	RDZ
DATE	24 OCT 2011
YEAR BUILT	1974
AREA IN FL.	28919 (2801m ²)
NO. FLOOR	PAPERS

FIRST FLOOR PLAN	
AREA	
B	2

APPENDIX B

Laboratory Reports





EMSL Canada Inc.

2756 Slough Street Mississauga, ON L4T 1G3
 Phone/Fax: (289) 997-4602 / (289) 997-4607
<http://www.EMSL.com> / torontolab@emsl.com

EMSL Canada Order 552109823
 Customer ID: 55DCSL97
 Customer PO: 30089648
 Project ID:

Attn: Dwayne Kellyman
 ARCADIS Canada Inc.
 121 Granton Drive
 Unit 12
 Richmond Hill, ON L4B 3N4
Proj: 30089648 / Pauline Johnson PS

Phone: (905) 882-5984
Fax: (905) 882-8962
Collected:
Received: 6/18/2021
Analyzed: 6/21/2021

Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

Client Sample ID: 1A **Lab Sample ID:** 552109823-0001

Sample Description: interior concrete block mortar (era 1986) Room 5

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/21/2021	Gray	3.0%	97.0%	<1% Chrysotile	
400 PLM Pt Ct	6/21/2021	Gray	0.0%	100.0%	<0.25% Chrysotile	

Client Sample ID: 1B **Lab Sample ID:** 552109823-0002

Sample Description: interior concrete block mortar (era 1986) Room 6

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/21/2021	Gray	3.0%	97.0%	<1% Chrysotile	
400 PLM Pt Ct	6/21/2021	Gray	0.0%	100.0%	<0.25% Chrysotile	

Client Sample ID: 1C **Lab Sample ID:** 552109823-0003

Sample Description: interior concrete block mortar (era 1986) Room 5

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/21/2021	Gray	0.0%	100.0%	<1% Chrysotile	
400 PLM Pt Ct	6/21/2021	Gray	0.00%	99.75%	0.25% Chrysotile	

Client Sample ID: 2A **Lab Sample ID:** 552109823-0004

Sample Description: Concrete block-filler paint (era 1986) Room 5

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/21/2021	Gray/White/Red	3.0%	97.0%	None Detected	

Client Sample ID: 2B **Lab Sample ID:** 552109823-0005

Sample Description: Concrete block-filler paint (era 1986) Room 6

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/21/2021	Gray/White/Red	3.0%	97.0%	None Detected	

Client Sample ID: 2C **Lab Sample ID:** 552109823-0006

Sample Description: Concrete block-filler paint (era 1986) Room 6

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/21/2021	Gray/White/Red	0.0%	100.0%	None Detected	



EMSL Canada Inc.

2756 Slough Street Mississauga, ON L4T 1G3
Phone/Fax: (289) 997-4602 / (289) 997-4607
<http://www.EMSL.com> / torontolab@emsl.com

EMSL Canada Order 552109823
Customer ID: 55DCSL97
Customer PO: 30089648
Project ID:

Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

Client Sample ID: 3A

Lab Sample ID: 552109823-0007

Sample Description: 9" vinyl floor tile mastic Room 4A

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/21/2021	Black	0.0%	95.0%	5% Chrysotile	

Client Sample ID: 3B

Lab Sample ID: 552109823-0008

Sample Description: 9" vinyl floor tile mastic Room 13

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/21/2021				Positive Stop (Not Analyzed)	

Client Sample ID: 3C

Lab Sample ID: 552109823-0009

Sample Description: 9" vinyl floor tile mastic Room 13A

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	6/21/2021				Positive Stop (Not Analyzed)	

Analyst(s):

Delaney Breen	PLM (5) 400 PLM Pt Ct (2)
Tiffany Pilon	PLM (2) 400 PLM Pt Ct (1)

Reviewed and approved by:

Matthew Davis or other approved signatory
or Other Approved Signatory

None Detected = <0.1%. EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. Estimation of uncertainty available upon request. This report is a summary of multiple methods of analysis, fully compliant reports are available upon request. A combination of PLM and TEM analysis may be necessary to ensure consistently reliable detection of asbestos. This report must not be used to claim product endorsement by NVLAP of any agency or the U.S. Government.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Initial report from: 06/21/2021 10:05:47



Your Project #: 30089648
 Site Location: PAULINE JOHNSON P.S
 Your C.O.C. #: 165894

Attention: Dwayne Kellyman

ARCADIS Canada Inc
 121 Granton Dr
 Unit 12
 Richmond Hill, ON
 CANADA L4B 3N4

Report Date: 2021/06/22
 Report #: R6687693
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1G8353
Received: 2021/06/18, 13:39

Sample Matrix: Paint
 # Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Metals in Paint	2	2021/06/21	2021/06/22	CAM SOP-00408	EPA 6010D m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA. Where applicable, the analytical testing herein was performed in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. All methodologies comply with this document and are validated for use in the laboratory. The methods and techniques employed in this analysis conform to the performance criteria (detection limits, accuracy and precision) as outlined in the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Bureau Veritas is accredited by SCC (Lab ID 97) for all specific parameters as required by Ontario Regulation 153/04.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.



Your Project #: 30089648
Site Location: PAULINE JOHNSON P.S
Your C.O.C. #: 165894

Attention: Dwayne Kellyman

ARCADIS Canada Inc
121 Granton Dr
Unit 12
Richmond Hill, ON
CANADA L4B 3N4

Report Date: 2021/06/22
Report #: R6687693
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1G8353
Received: 2021/06/18, 13:39

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Marijane Cruz, Senior Project Manager
Email: Marijane.Cruz@bureauveritas.com
Phone# (905)817-5756

=====

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



BUREAU
VERITAS

BV Labs Job #: C1G8353
Report Date: 2021/06/22

ARCADIS Canada Inc
Client Project #: 30089648
Site Location: PAULINE JOHNSON P.S
Sampler Initials: DK

ELEMENTS BY ATOMIC SPECTROSCOPY (PAINT)

BV Labs ID		PWJ378		PWJ379		
Sampling Date		2021/06/17 13:00		2021/06/17 13:00		
COC Number		165894		165894		
	UNITS	P-1 BEIGE PAINT ON CONCRETE BLOCK RM 20	RDL	P-2 BEIGE PAINT ON DRYWALL RM 3	RDL	QC Batch
Metals						
Lead (Pb)	mg/kg	1200	10	580	1.3	7419523
RDL = Reportable Detection Limit						
QC Batch = Quality Control Batch						



BUREAU
VERITAS

BV Labs Job #: C1G8353
Report Date: 2021/06/22

ARCADIS Canada Inc
Client Project #: 30089648
Site Location: PAULINE JOHNSON P.S
Sampler Initials: DK

TEST SUMMARY

BV Labs ID: PWJ378
Sample ID: P-1 BEIGE PAINT ON CONCRETE BLOCK RM 20
Matrix: Paint

Collected: 2021/06/17
Shipped:
Received: 2021/06/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals in Paint	ICP	7419523	2021/06/21	2021/06/22	Medhat Nasr

BV Labs ID: PWJ379
Sample ID: P-2 BEIGE PAINT ON DRYWALL RM 3
Matrix: Paint

Collected: 2021/06/17
Shipped:
Received: 2021/06/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Metals in Paint	ICP	7419523	2021/06/21	2021/06/22	Medhat Nasr



BUREAU
VERITAS

BV Labs Job #: C1G8353

Report Date: 2021/06/22

ARCADIS Canada Inc

Client Project #: 30089648

Site Location: PAULINE JOHNSON P.S

Sampler Initials: DK

GENERAL COMMENTS

Sample PWJ378 [P-1 BEIGE PAINT ON CONCRETE BLOCK RM 20] : Metals Analysis: Due to the sample matrix, sample required dilution. Detection limit was adjusted accordingly.

Sample PWJ379 [P-2 BEIGE PAINT ON DRYWALL RM 3] : Metals: Due to limited amount of sample available for analysis, a smaller than usual portion of the sample was used. Detection limits were adjusted accordingly.

Results relate only to the items tested.



BUREAU
VERITAS

BV Labs Job #: C1G8353
Report Date: 2021/06/22

QUALITY ASSURANCE REPORT

ARCADIS Canada Inc
Client Project #: 30089648
Site Location: PAULINE JOHNSON P.S
Sampler Initials: DK

QC Batch	Parameter	Date	Matrix Spike		Method Blank		QC Standard	
			% Recovery	QC Limits	Value	UNITS	% Recovery	QC Limits
7419523	Lead (Pb)	2021/06/22	NC	75 - 125	<1.0	mg/kg	106	75 - 125

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)



BUREAU
VERITAS

BV Labs Job #: C1G8353

Report Date: 2021/06/22

ARCADIS Canada Inc

Client Project #: 30089648

Site Location: PAULINE JOHNSON P.S

Sampler Initials: DK

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

A handwritten signature in black ink, appearing to read 'Anastassia Hamanov', written over a horizontal line.

Anastassia Hamanov, Scientific Specialist

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.



RUSH!

6740 Campbell Road, Mississauga, Ontario L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/6

CHAIN OF CUSTODY RECORD 165894 Page ____ of ____

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)		Turnaround Time (TAT) Required	
Company Name: <u>Arcadis Canada Inc.</u>		Company Name:		Quotation #:		<input type="checkbox"/> Regular TAT (5-7 days) Most analyses	
Contact Name: <u>Dwayne Kellyman</u>		Contact Name:		P.O. #/ AFEN:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS	
Address: <u>21 Branton Drive</u>		Address:		Project #: <u>30089648</u>		Rush TAT (Surcharges will be applied)	
Suite # <u>12</u>		Address:		Site Location: <u>Pauline Johnson P.S</u>		<input type="checkbox"/> 1 Day <input checked="" type="checkbox"/> 2 Days <input type="checkbox"/> 3-4 Days	
Phone: _____ Fax: _____		Phone: _____ Fax: _____		Site #:		Date Required:	
Email: <u>dwayne.kellyman@arcadis.com</u>		Email: _____		Site Location Province:		Rush Confirmation #:	
MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS LABORATORIES' DRINKING WATER CHAIN OF CUSTODY							
Regulation 153		Other Regulations		Analysis Requested		LABORATORY USE ONLY	
<input type="checkbox"/> Table 1 <input type="checkbox"/> Res/Park <input type="checkbox"/> Med/ Fine <input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input type="checkbox"/> Coarse <input type="checkbox"/> Table 3 <input type="checkbox"/> Agr/ Other <input type="checkbox"/> Table _____ FOR RSC (PLEASE CIRCLE) Y / N		<input type="checkbox"/> CCME <input type="checkbox"/> Sanitary Sewer Bylaw <input type="checkbox"/> MISA <input type="checkbox"/> Storm Sewer Bylaw <input type="checkbox"/> PWQG Region _____ <input type="checkbox"/> Other (Specify) _____ <input type="checkbox"/> REG 558 (MIN. 3 DAY TAT REQUIRED) <input type="checkbox"/> REG 406 Table _____		# OF CONTAINERS SUBMITTED REG FILTERED (CIRCLE) Metals / Pb / Cr / V BTEX / PHC F1 PHC F2 - F4 VOCs REG 153 METALS & INORGANICS REG 153 ICPMS METALS REG 153 METALS (Pb, Cr, Ni, ICPMS Metals, HWS - B) LEAD HOLD: DO NOT ANALYZE		CUSTODY SEAL Y / N Present Intact COOLING MEDIA PRESENT: Y <input checked="" type="checkbox"/> N COMMENTS	
Include Criteria on Certificate of Analysis: Y / N							
SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS							
SAMPLE IDENTIFICATION		DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	REG FILTERED (CIRCLE) Metals / Pb / Cr / V	REG 153 METALS & INORGANICS
1	<u>P1 beige paint on concrete km 20</u>			<u>Paint</u>			
2	<u>P2 Beige paint on driveway km 3</u>			<u>Paint</u>			
3							
4							
5							
6							
7							
8							
9							
10							
RELINQUISHED BY: (Signature/Print)		DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	BV JOB #
<u>Dwayne Kellyman</u>		<u>2021/06/18</u>	<u>1:35 pm</u>	<u>[Signature]</u>	<u>2021/06/18</u>	<u>1:35</u>	

18-Jun-21 13:39
Marijane Cruz
C1G8353
URE ENV-1170

Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Bureau Veritas Laboratories' standard Terms and Conditions. Signing of this Chain of Custody document is acknowledgment and acceptance of our terms available at <http://www.bvlabs.com/terms-and-conditions>
COC-1004 (06/19) White: BV Labs - Yellow: Client

APPENDIX C

Summary of Asbestos, Lead and Silica Work Classifications



TABLE C-1
SUMMARY OF CLASSIFICATION OF
TYPE 1, 2 AND 3 OPERATIONS
(Ont. Reg. 278/05)

TYPE 1 OPERATIONS

- removing less than 7.5 m² asbestos-containing ceiling tiles;
- removing non-friable asbestos-containing material other than ceiling tiles, if the material is removed without being broken, cut, drilled, abraded, ground, sanded or vibrated;
- breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable asbestos-containing material if the material is wetted and the work is done only using non-powered, hand-held tools; and
- removing less than 1 m² of drywall in which asbestos-containing joint compounds have been used.

TYPE 2 OPERATIONS

- removing all or part of a false ceiling to obtain access to a work area, if asbestos-containing material is likely to be lying on the surface of the false ceiling;
- removal of one square metre or less of friable asbestos-containing material;
- enclosing friable asbestos-containing material;
- applying tape or a sealant or other covering to asbestos-containing pipe or boiler insulation;
- removing 7.5 m² or more asbestos-containing ceiling tiles (if removed without being broken, cut, drilled, abraded, ground, sanded or vibrated);
- breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable asbestos-containing material if the material is not wetted and the work is done only using non-powered, hand-held tools;
- removal of one square metre or more of drywall in which asbestos-containing joint compounds have been used;
- breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable asbestos-containing material if the work is done using power tools that are attached to dust-collecting devices equipped with HEPA filters;
- cleaning or removing filters used in air-handling equipment in a building that has asbestos-containing sprayed fireproofing.

TABLE C-1 (Continued)
SUMMARY OF CLASSIFICATION OF
TYPE 1, 2 AND 3 OPERATIONS
(Ont. Reg. 278/05)

TYPE 3 OPERATIONS

- removal of more than one square metre of friable asbestos-containing material;
- spray application of a sealant to friable asbestos-containing material;
- cleaning or removing air-handling equipment, including rigid ducting but not including filters, in a building that has sprayed asbestos-containing fireproofing;
- repairing or demolishing a kiln, metallurgical furnace or similar structure that is made in part of asbestos-containing refractory materials;
- breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable asbestos-containing materials, if the work is done using power tools that are not attached to dust-collecting devices equipped with HEPA filters.

TABLE C-2
SUMMARY OF CLASSIFICATION OF
LEAD-CONTAINING CONSTRUCTION TASKS
MOL GUIDELINE – LEAD ON CONSTRUCTION PROJECTS, APRIL 2011

Type 1 Operations	Type 2 Operations		Type 3 Operations	
	Type 2a	Type 2b	Type 3a	Type 3b
<0.05 mg/m ³	>0.05 to 0.50 mg/m ³	>0.50 to 1.25 mg/m ³	>1.25 to 2.50 mg/m ³	>2.50 mg/m ³

Note: The classification of Type 1, 2 and 3 operations is based on presumed airborne concentrations of lead, as shown above.

TYPE 1 OPERATIONS

- application of lead-containing coatings with a brush or roller;
- removal of lead-containing coatings with a chemical gel or paste and fibrous laminated cloth wrap;
- removal of lead-containing coatings or materials using a power tool that has an effective dust collection system equipped with a HEPA filter;
- installation or removal of lead-containing sheet metal;
- installation or removal of lead-containing packing, babbitt or similar material;
- removal of lead-containing coatings or materials using non-powered hand tools, other than manual scraping or sanding;
- soldering.

TYPE 2 OPERATIONS

Type 2a Operations

- welding or high temperature cutting of lead-containing coatings or materials outdoors. This operation is considered a Type 2a operation only if it is short-term, not repeated, and if the material has been stripped prior to welding or high temperature cutting. Otherwise it will be considered a Type 3a operation;
- removal of lead-containing coatings or materials by scraping or sanding using non-powered hand tools;
- manual demolition of lead-painted plaster walls or building components by striking a wall with a sledgehammer or similar tool.

Type 2b Operations

- spray application of lead-containing coatings.

TABLE C-2 (Continued)
SUMMARY OF CLASSIFICATION OF
LEAD-CONTAINING CONSTRUCTION TASKS
MOL GUIDELINE – LEAD ON CONSTRUCTION PROJECTS, APRIL 2011

TYPE 3 OPERATIONS

Type 3a Operations

- welding or high temperature cutting of lead-containing coatings or materials indoors or in a confined space;
- burning of a surface containing lead;
- dry removal of lead-containing mortar using an electric or pneumatic cutting device;
- removal of lead-containing coatings or materials using power tools without an effective dust collection system equipped with a HEPA filter;
- removal or repair of a ventilation system used for controlling lead exposure;
- demolition or cleanup of a facility where lead-containing products were manufactured;
- an operation that may expose a worker to lead dust, fume or mist that is not a Type 1, Type 2, or Type 3b operation

Type 3b Operations

- abrasive blasting of lead-containing coatings or materials;
- removal of lead-containing dust using an air mist extraction system.

TABLE C-3
SUMMARY OF CLASSIFICATION OF SILICA-CONTAINING CONSTRUCTION TASKS
MOL GUIDELINE, SILICA ON CONSTRUCTION PROJECTS, APRIL 2011

	Type 1 Operations	Type 2 Operations	Type 3 Operations
Cristobalite and Tridymite	>0.05 to 0.50 mg/m ³	>0.50 to 2.50 mg/m ³	>2.5 mg/m ³
Quartz and Tripoli	>0.10 to 1.0 mg/m ³	>1.0 to 5.0 mg/m ³	>5.0 mg/m ³

Note: The classification of silica-containing construction tasks is based on presumed concentrations of respirable crystalline silica, as shown above.

TYPE 1 OPERATIONS

- The drilling of holes in concrete or rock that is not part of a tunnelling operation or road construction.
- Milling of asphalt from concrete highway pavement.
- Charging mixers and hoppers with silica sand (sand consisting of at least 95 per cent silica) or silica flour (finely ground sand consisting of at least 95 per cent silica).
- Any other operation at a project that requires the handling of silica-containing material in a way that may result in a worker being exposed to airborne silica.
- Entry into a dry mortar removal or abrasive blasting area while airborne dust is visible for less than 15 minutes for inspection and/or sampling.
- Working within 25 metres of an area where compressed air is being used to remove silica-containing dust outdoors.

TYPE 2 OPERATIONS

- Removal of silica containing refractory materials with a jackhammer.
- The drilling of holes in concrete or rock that is part of a tunnelling or road construction.
- The use of a power tool to cut, grind, or polish concrete, masonry, terrazzo or refractory materials.
- The use of a power tool to remove silica containing materials.
- Tunnelling (operation of the tunnel boring machine, tunnel drilling, tunnel mesh installation).
- Tuckpoint and surface grinding.
- Dry mortar removal with an electric or pneumatic cutting device.
- Dry method dust cleanup from abrasive blasting operations.
- The use of compressed air outdoors for removing silica dust.
- Entry into area where abrasive blasting is being carried out for more than 15 minutes.

TABLE C-3 (Continued)
SUMMARY OF CLASSIFICATION OF SILICA-CONTAINING CONSTRUCTION TASKS
MOL GUIDELINE, SILICA ON CONSTRUCTION PROJECTS, APRIL 2011

TYPE 3 OPERATIONS

- Abrasive blasting with an abrasive that contains ≥ 1 per cent silica.
- Abrasive blasting of a material that contains ≥ 1 per cent silica.

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